Considerations for Minimizing the Potential of Lagoon Liner Seepage

Consideration should be given to providing an additional measure of safety from lagoon seepage when any of the potential impact categories listed in Table 3 may be affected.

Should any of the potential impact categories listed in Table 3 be affected, consideration should be given to the following:

- A clay liner designed in accordance with Section 506.205 of the Rules and Regulations for the LMF Act and procedures of AWMFH, Appendix 10D with a thickness and coefficient of permeability so that hydraulic conductivity is less than 1×10^{-7} cm/sec.
- A flexible membrane liner
- A geosynthetic clay liner (GCL) flexible membrane liner
- A concrete liner designed in accordance with slabs on grade criteria, Waste Storage Facility (313), for fabricated structures requiring water tightness.

Table 3 - Potential Impact Categories for Liner Seepage

• Any underlying aquifer is at a shallow depth and not confined
• The vadose zone is rock
• The aquifer is a domestic water supply or ecologically vital water supply
• The site is located in an area of carbonate rock (limestone or dolomite)

Considerations for Improving Air Quality

To reduce emissions of greenhouse gases, ammonia, volatile organic compounds, and odor:

- Reduce the recommended loading rate for anaerobic lagoons to one-half the values given in AWMFH Figure 10-22.
- Use additional practices such as Anaerobic Digester – Ambient Temperature (365), Anaerobic Digester – Controlled Temperature (366), Waste Facility Cover (367) and Composting Facilities (code 317) in the waste management system.
- Liquid/solid separation prior to discharge to lagoon will reduce volatile solids (VS) loading resulting in reduced gaseous emissions and odors. Composting of solids will further reduce emissions.
- Design lagoons to be naturally aerobic or to allow mechanical aeration.

Adjusting pH below 7 may reduce ammonia emissions from the lagoon but may increase odor when waste is surface applied (See Waste Utilization, code 633).

PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared in accordance with the criteria of this standard and shall describe the requirements for applying the practice to achieve its intended use.

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) plan shall be prepared for and reviewed with the landowner or operator. The plan shall specify that the treated areas and associated practices are inspected annually and after significant storm events to identify repair and maintenance needs.

The plan shall contain the operational requirements for drawdown and the role of permanent markers. This shall include the requirement that waste be removed from the lagoon and utilized at locations, times, rates, and volume in accordance with the overall waste management system plan. In addition, the plan shall include a strategy for removal and disposition of waste with least environmental damage during the normal treatment period to the extent necessary to insure the lagoon's safe operation. This strategy shall also include the removal of unusual storm events.

Development of an emergency action plan should be considered for lagoons where there is a potential for significant impact from breach or accidental release. The plan shall include site-specific provisions for emergency actions that will minimize these impacts.

REFERENCES

Illinois Department of Agricuture, Livestock Management Facilities Act [510 ILCS 77/1 et seq.]

NRCS National Engineering Handbook, Part 651, Agricultural Waste Management Field Handbook, Chapter 10.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

PRESCRIBED GRAZING (Acre)

(528A)

DEFINITION

The controlled harvest of vegetation with grazing or browsing animals, managed with the intent to achieve a specified objective.

PURPOSES

This practice is applied as part of a conservation management system to accomplish one or more of the following purposes:

1. Improve or maintain the health and vigor of key species and to maintain a stable and desired plant community.
2. Provide or maintain food, cover and shelter for animals of concern.
3. Improve or maintain animal health and productivity.
4. Maintain or improve water quality and quantity .
5. Reduce accelerated soil erosion and maintain or improve soil condition for sustainability of the resource.

CONDITIONS WHERE PRACTICE APPLIES

This practice may be applied on all lands where grazing and/or browsing animals are managed.

CRITERIA

General criteria applicable for all the purposes stated above.

Removal of herbage will be in accordance with production limitations, plant sensitivities, and management goals using Sections I and II of the Illinois Field Office Technical Guide and other references as guidance.

Frequency of defoliations and season of grazing will be based on the rate and physiological conditions of plant growth.

Duration, time (season), and intensity of grazing will be based on desired plant community goals, expected productivity of key species, and management unit objectives.

The intensity, frequency, duration, and season of grazing will be manipulated to promote ecological sound and economical stable plant communities which will sustain the resources of the ecosystem and meet the landowner's objectives.

Grazing use on native warm season grasses and grass like species will not remove more than 50 percent, by weight, of the current year's growth of the identified key grazing species when grazed during the growing season, and not more than 60 percent when grazed during the dormant season. Table 1 can be utilized as a tool to help determine the percent of weight removed of common grasses by estimating the percent of the plant height removed.

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Grazing use, for sustainable management purposes, on browse (woody) species will not remove more than 65 percent of the current years' growth of the designated key browse species. Degree of use on browse species is based on the amount of current years' growth removed.

Grazing use on pasturelands; the designated key species will not be grazed closer than the minimum leaf lengths shown in Table 1. Also, grazing use should not be initiated on pastureland until the designated key species has reached the minimum height shown in Table 1. To maintain the health and vigor of the designated key species, these species should have attained a minimum leaf length as shown in Table 1 before the first killing frost.

Final grazing use determinations will generally be made at, or near, the end of the grazing period.

Degraded or continually grazed grasslands can benefit from one to two years of deferment during the growing season. Deferment will be for a minimum of three consecutive months during the growing season. Deferment for cool season plant communities should at a minimum be from April 1 to June 30 and for warm season plant communities from June 1 to August 31.

All domestic grazing animals must be removed from the grassland unit being deferred.

Additional criteria for the development of rotational type grazing programs

Grazing and rest periods should be scheduled to meet the desired objectives for the plant communities and the associated resources in each pasture including the grazing animals.

Livestock movements shall be based on plant growth and utilization and not calendar dates.

The planned grazing sequence shall in most all cases provide periods of rest at least every other year during the primary growing season of the key plant species (see Table 3).

In some cases the planned grazing sequence may be changed for short periods to take advantage of seasonal forages such as annual bromes, Kentucky bluegrass, crop aftermath, etc.

Where needed, grazing prescriptions will be adjusted to maintain or improve riparian and associated upland vegetation to meet planning goals and objectives.

Where available, crop aftermath should be included in the grazing system to allow for forage growth before a frost or as a forage supply to extend the grazing period.

Grazing sequences will need to be changed or adjusted when significant changes in plant vigor or composition, animal kinds and classes, and management objectives occur.

When two or more pastures are planned to be grazed only one time during the growing season, do not graze the same pasture year after year during the same period of the growing season. On rangelands or native pastures, provide a minimum of 45 consecutive days of rest during the growing season of the key species. On pasturelands, provide a minimum of 30 consecutive days of rest during the growing season .

Where two or more pastures are planned to be grazed and rested two or more times during a growing season, do not graze the same pasture year after year during the same period of the growing season. Plan the rest periods so each pasture will receive a minimum of 20 consecutive days of rest each period and a minimum of 75 total days of rest during a growing season .

The grazing manager will need to initiate a monitoring program to document actual grazing dates, livestock performance, climatic conditions, vegetation utilization, and changes

in plant communities over time. This is needed to analyze results and to develop the following years grazing schedule.

Additional criteria for improved animal health and productivity.

Movement of animals will be scheduled to improve and/or maintain animal health and performance and to reduce or prevent the spread of disease, parasites, and contact with harmful insects and toxic plants.

Grazing should be scheduled in accordance with forage quality and quantity criteria that best meets the production requirements for the kind and/or class of animal.

Additional criteria for water quality and quantity.

Duration, intensity, frequency, and season of grazing near surface waters will be prescribed in such a manner that the impacts to vegetation, ground cover, and resulting water quality will be positive.

Duration, intensity, frequency, and season grazing will be prescribed to enhance nutrient cycling by better manure distribution and increased rate of decomposition.

Additional criteria to reduce soil erosion and condition.

Maintain the amount of vegetative cover needed to prevent accelerated soil erosion due to wind and water as prescribed by the appropriate wind and water erosion equations.

Duration, intensity, frequency, and season of grazing shall be managed to minimize soil compaction, sustain high levels of vegetative cover, and reduce detrimental effects on soil condition.

Use a harrow or other equipment as needed to break up concentrated areas of dung to maintain a high level of nutrient cycling.

Additional criteria for providing food, cover, and shelter for animals of concern, i.e., wildlife species.

When needed, the prescribed grazing prescription will be designed to result in the plant community meeting the needs of the animals of concern as to cover, shelter, food, nesting cover, water, etc.. The habitat management guides in the FOTG should be used to provide assistance in writing the prescription.

CONSIDERATIONS

Supplemental feed may be necessary to meet the desired nutritional levels for animals of concern. The proper placement of supplemental feeds can be used as a method to distribute livestock throughout a pasture. Improper placement can have negative impacts on the soil, water, air, plant, and animal resources.

Use of natural or artificial shelter can be included as part of this practice when conditions demand.

Livestock water quantity and quality must be adequate to meet the demands of the livestock over the specified grazing period in each pasture.

Every grazing program must be tailored to the cooperator's goals and resources. Such things as animal husbandry requirements (breeding programs, etc.) may affect the design of the grazing prescription and needs to be considered.

Prescribed Grazing should consider the needs of other enterprises utilizing the same land such as wildlife and recreational uses.

PLANS AND SPECIFICATIONS

A Prescribed Grazing Prescription will be prepared for the operating unit or portion of an operating unit being addressed. The prescription will be recorded in a manner that is readily understood and usable by the decision maker. The manner of documentation will depend upon the size and

complexity of the operating unit and the details required for a grazing prescription.

A prescribed grazing prescription will include the following information:

1. Documentation of the expected forage quantity and quality for each management unit, and availability. Also, document any special problems inventoried such as location of toxic plants, etc..

2. For each kind and class of domestic livestock and grazing/browsing wildlife species of concern, document the animal numbers and forage demands by month, nutritional surpluses, and deficiencies from the forage resources and supplemental feed requirements needed to meet the desired nutritional level. Also, document any special needs of animals such as nesting cover, etc..

3. Development of a planned grazing schedule for livestock which identifies periods of grazing, resting, and other treatment activities, or needs, for each management unit. The grazing schedule is to be used as a guide and can not take the place of daily observations, the result of changing climatic conditions, and changes in supply and demand.

4. A contingency plan that details potential problems (i.e., drought) and guidelines for adjusting the prescribed grazing prescription to insure resource goals are achieved in an economically feasible manner without resource degradation.

Stocking Rates

Appropriate stocking rates will be calculated and used as a guide to optimize utilization of the forage resource.

Adjust livestock numbers and/or grazing time to match forage demand to forage yield.

Use the following formulas to estimate animal numbers or grazing days:

$A.N. = \frac{T.F.P./Ac. \times Ac. \times \% H.E.}{A.W. \times I.R. \times Days}$	$Days = \frac{T.F.P./Ac. \times Ac. \times \% H.E.}{A.W. \times I.R. \times A.N.}$

A.N. = Animal Number
T.F.P. = Total Forage Production (Total above ground biomass in lbs./acre dry weight)
Ac. = Acres
% H.E. = % Harvest Efficiency (same as % degree utilization or % grazing efficiency)
Guide: continuous grazing = 25% -30%
3 - 7 days grazing (8 - 12 pastures) = 40 - 60%
0.5 - 3 days grazing (24+ pastures) = 60 - 75%
A.W. = Animal weight (pounds)
I.R. = Intake Rate in % body weight
Guide: 2.0 % for maintenance
2.6 % annual average production
4.0 % high production
Days = Days of grazing planned

Harvest Efficiency

Harvest efficiency should not exceed those values listed above at any time during the growing season.

Interpolate harvest efficiency for management levels not shown.

Grazing and Rest Period

The length of the grazing period is determined by the length of the rest period needed for recovery of the forage resource and to reduce second bite opportunity.

During rapid growth, short (Minimum) rest periods are necessary; as growth slows, rest periods need to be lengthened to (Maximum) dormancy. (See TABLE 3)

$$GP = \frac{\text{Rest Period needed in days}}{\text{No. of pastures - No. of herds}}$$

(GP = Grazing Period)

Remove all livestock from a resting pasture.

Begin grazing sequence each year in a different pasture.

Livestock Stress

Systems shall be developed that subjects animals to a minimum amount of handling stress.

Livestock water shall be provided that is adequate in quantity and quality.

OPERATION AND MAINTENANCE

Operation: The manager will apply Prescribed Grazing on a continuing basis making adjustments as needed to insure that the concept and objectives of its application are met.

Maintenance: An evaluations of the current prescribed grazing prescription should be made periodically to monitor the results of the prescription on all of the resources and the planned goals and objectives. If the planned goals or objectives are not being met or there is degradation of any of the resources including animal performance, the prescription needs to be adjusted accordingly.

REFERENCES

USDA - NRCS (SCS) Forage Production and Management Reference Manual.

NRCS - National Range and Pasture Handbook (Draft - January 1997)

TABLE 1: Minimum Heights of Pasture Species for Initiating and Terminating Grazing

SPECIES AND MIXTURES	Minimum/ Optimum Height of Vegetative Growth 1/	Minimum Grazing Height 2/	Minimum Regrowth Before Killing Frost	Approximate Date to Begin Rest for Winter protection by Plant Suitability Zones 3/		
COOL SEASON (C3s)	INCHES Begin Grazing	INCHES End Grazing	INCHES	I	II	III
Alfalfa/Timothy/Orchardgrass	6 - 8	3	8	9/1-10/1	9/15-10/15	9/20-10/20
Alfalfa/Orchardgrass	6 - 8	3	8	9/1-10/1	9/15-10/15	9/20-10/20
Alfalfa/Timothy/Bromegrass	6 - 8	3	8	9/1-10/1	9/15-10/15	9/20-10/20
Ladino Clover/Orchardgrass	8	3	8	9/1-10/1	9/15-10/15	9/20-10/20
Red Clover/Ladino Clover/Orchardgrass	8	3	8	9/1-10/1	9/15-10/15	9/20-10/20
Red Clover/Ladino Clover/Tall Fescue	8	3	5		9/15-10/15	9/20-10/20
Birdsfoot Trefoil/Timothy	5	3	6	9/1-10/1	9/15-10/15	
Ladino Clover/Bromegrass	5	3	6	9/1-10/1	9/15-10/15	
Orchardgrass	6 - 8	3	8	4/	4/	4/
Tall Fescue	6 - 8	3	8	4/	4/	4/
Alfalfa/Tall Fescue	6 - 8	3	8		9/15-10/15	9/20-10/20
Ladino Clover/Tall Fescue	5	3	8		9/15-10/15	9/20-10/20
Alsike Clover/Ladino Clover/Timothy	5	2	5	9/1-10/1	9/15-10/15	
Ladino Clover/Alsike Clover/Reed Canarygrass	6	4	6	9/1-10/1	9/15-10/15	9/20-10/20
Ladino Clover/Alsike Clover/Tall Fescue	5	3	8		9/15-10/15	9/20-10/20
Alfalfa/Bromegrass	6 - 8	4	6	9/1-10/1	9/15-10/15	9/20-10/20
Sericea Lespedeza/Tall Fescue	10	4	8			9/20-10/20
Korean Lespedeza/Tall Fescue	6	4	8			9/20-10/20
Bluegrass 5/	4	2	4	N/A	N/A	N/A
WARM SEASON (C4s)						
Switchgrass	18	8 6/	10	9/10-10/10	9/15-10/15	9/20-10/20
Indiangrass	18	8 6/	10	9/10-10/10	9/15-10/15	9/20-10/20
Big Bluestem	18	8 6/	10	9/10-10/10	9/15-10/15	9/20-10/20
Eastern Gamagrass	20	10	15	9/10-10/10	9/15-10/15	9/20-10/20

1/ Minimum plant heights are to be reached before grazing is permitted in the spring or following a rest period resulting from rotational grazing. Management Intensive Grazing (MIG) systems (8 or more pastures) can reduce the height by 50%.
2/ Minimum plant heights below which grazing is not permitted.
3/ Protection from fall grazing is required for one month before a killing frost. Remove livestock on or before the dates shown and do not permit grazing before a killing frost occurs.
4/ No restrictions.
5/ May include other species such as redtop, timothy, quackgrass, or white clover.
6/ Leave a 10" stubble at end of grazing season until after first killing frost.

TABLE 2. Estimated Percentage of Annual Growth, Hay Equivalent, and Hay yields per acre for the Growing Season of Selected Pasture Crops under Continuous Grazing Management in Southern Illinois - Plant Suitability Zone I. (Data converted from U of I, College of Ag., Agronomy Facts, F-54 March, 1991, by C. J. (Jim) Kaiser).

Pasture Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tons of H. E.	Tons of Hay
Alfalfa	0	0	3	9	18	18	15	15	12	9	3	0	2.04	3.04
Tall Fescue	0	0	6	15	18	18	7	4	7	13	9	3	2.02	3
Orchardgrass	0	0	3	16	19	16	10	6	10	13	6	0	1.86	2.77
Smooth Bromegrass	0	0	3	16	19	19	10	4	8	13	6	0	1.85	2.75
Reed Canarygrass	0	0	7	18	22	22	18	5	7	1	0	0	1.67	2.49
Red Clover	0	0	4	11	18	19	18	11	7	7	4	0	1.62	2.41
Eastern Gamagrass	0	0	0	0	10	23	25	17	17	8	0	0	1.44	2.15
Bermudagrass	0	0	0	0	7	20	25	25	17	5	0	0	1.42	2.11
Switchgrass	0	0	0	0	19	27	27	14	9	4	0	0	1.32	1.97
Big Bluestem	0	0	0	0	14	28	28	24	5	0	0	0	1.26	1.88
Indiangrass	0	0	0	0	10	15	25	30	15	5	0	0	1.2	1.79
Sorghum-sudangrass	0	0	0	0	0	8	31	31	25	5	0	0	1.18	1.75
Pearl Millet	0	0	0	0	0	5	31	31	26	5	0	0	1.16	1.73
Sericea lespedeza	0	0	0	3	10	20	21	19	16	10	0	0	1.15	1.72
Sweet clover	0	0	3	16	21	21	11	5	5	16	2	0	1.14	1.7
Birdsfoot trefoil	0	0	2	10	22	22	16	10	13	5	0	0	1.13	1.68
Bluegrass	0	0	2	17	28	11	5	3	7	17	8	0	1.06	1.57
Timothy	0	0	3	18	24	24	6	5	7	10	3	0	0.98	1.47
Winter rye	0	0	19	25	0	0	0	0	0	19	25	12	0.96	1.43
White clover	0	0	8	20	20	19	6	3	6	13	5	0	0.92	1.38
Redtop	0	0	0	18	27	27	8	3	8	9	0	0	0.8	1.2
Lespedeza	0	0	0	0	0	11	23	23	23	20	0	0	0.78	1.16
Perennial ryegrass	0	0	0	0	25	33	18	8	8	8	0	0	0.72	1.07
Spring oat	0	0	0	10	45	45	0	0	0	0	0	0	0.66	0.98
Spring rape	0	0	0	0	0	10	30	30	20	10	0	0	0.6	0.89
Fall rape	12	0	0	0	0	0	0	0	0	13	38	37	0.48	0.72

Adjust annual production, by months, by approximately 15 and 20 days for Plant Suitability Zones II and III, respectively.

Tons of H. E. = Tons of Hay Equivalent

TABLE 3: Grazing Management Guidelines.

Pasture Kind	Min-Max Grazing Periods (days) 1/	Min-Max Rest Periods (days) 2/	Minimum Pastures Needed (number) 3/
Single Species - 1 specie planting (essentially a monoculture)			
Introduced:			
cool season	10 - 22	20 - 45	3
warm-season	10 - 22	20 - 45	3
legume	6 - 9	25 - 35	5
Native:			
warm-season	1 - 17	20 - 50	4
Simple Mixtures - 2 - 4 similar species and/or legumes			
Introduced:			
cool-season	8 - 15	25 - 45	4
warm-season	8 - 15	25 - 45	4
Native:			
warm-season	8 - 12	30 - 50	5
Complex Mixtures - 5 or more dissimilar species			
Introduced:			
cool-season	5 - 9	25 - 45	6
warm-season	5 - 9	25 - 45	6
Native			
warm-season	4 - 7	30 - 50	8

1/ "Min-Max Grazing Periods" are determined by the Min-Max Rest Period necessary for adequate recovery of the pasture following grazing, and also limits second bite opportunity. However, second bites occur if livestock are left in a pasture longer than 5 days.

2/ "Min-Max Rest Periods" provide time for pastures to recover from grazing. The pasture's potential growth rate and current growing conditions regulate the length of the rest period. (rapid growth, rapid rotation - slow growth, slow rotation.

3/ "Minimum Pastures Needed" is a relationship between necessary rest period and appropriate grazing period. Increasing pasture numbers, reduces length of grazing period, increases pasture rest, improves harvest efficiency, and provides higher forage quality.

Waste System Analysis

Current – The waste system utilized by Westridge Dairy on their dairy operation is a scrape and haul, to the field, waste management system. Waste is stored in manure bedding packs, within the various facilities that straw bedding is needed, until such time that land applications are permissible. The dairy cows are housed in freestall buildings that have scrape alleys behind them that are scraped twice a day, to insure sanitary of the cows. That manure that is produced in the freestall barns is stored in outside manure settling basins, located adjacent to each individual building. The manure that is pushed into the basins is stored there until land application is permissible. When field application is not permissible it is transferred to the waste holding pond. Once the manure is in the waste holding pond it is either applied to crop acres or it is transferred to the storage lagoon. The manure from the holding pen by the milking parlor is scraped twice a day into basin 102 or 103. There are nine individual buildings located on the main farm of the operation. Barns 1, 2, 3, 4, 5, & 6 houses mature lactating dairy cows. Barn 7 is a calving and treatment barn. Barn 8 houses dry cows that are soon to freshen. Barn 9 is a dry cow barn that allows the cows to have access to pasture that is available. All inventories are in loose housing and on concrete feedlots. The East facility of this operation has 4 buildings that it includes. Barns 10 & 11 house baby calves until they are weaned. Barn 12 houses dry cows that have access to pasture. Barn 13 houses weaned calves until they are 12 -14 weeks of age. The manure in these Barns 10, 11, & 13 is stored in manure bedding packs until land application can occur. Barn 12 is scraped daily and the manure is stored in the adjacent manure bunker 107 until land application can occur. Land application of manure is conducted via a dry box spreader with a subsequent tillage pass for incorporation of the dry material that is stored in the manure basins and the dry stacking areas. The manure that is stored in the waste holding pond and the lagoon is land applied via a drag line system that directly injects the manure into the soil. The current system has both adequacies and inadequacies.

First for the parts of the operation that are **adequate**.

1. Lots are paved for the capture of manure. Lots are scraped twice a day to eliminate any potential for manure to enter the water stream.
2. Clean roof water is being diverted away from all animal areas to prevent it from entering the waste stream. This reduces the amount of waste water that needs to be handled.
3. All areas are elevated adequately to avoid any outside surface water from entering the waste stream.
4. Soil test demonstrate the operation understands the nutrient value of the manure and has distributed it fairly evenly over the years that this operation has existed.
5. The operation has adequate storage available to maintain the 180 days of waste storage capacity.
6. Silage bunkers are on a concrete lot and the silage leachate is controlled at the site that it is stored.

Now for the parts of the operation that are **inadequate**.

1. The operation has shown that it has and does apply manure to crop acres in an environmentally fashion. Calculations have shown that the operation is of need to obtain more acres for application of the manure that is produced from that operation.
2. The operation uses composting as a means to accommodate the death loss of the smaller animals of the farm that occur. It is recommended that the operation add a more modern facility to conduct the composting in.
3. Since waste is stored in earthen basins within the operation the producer need to maintain the vegetation around and near the embankments of those basins. Reseeding and mowing those in a more timely fashion is recommended.
4. There areas of the pasture acres showing signs of over grazing. It is recommended that the producer reseed the pasture to enhance the vigor and health of the forages uses and to rotational graze parts of the pasture.
5. To eliminate the potential for waste water to exit, Manure bunker 106 needs to have some form of permanent wall installed to control the waste water at that site.
6. Areas of the Cow lot have the potential for waste water to exit and clean water to enter the waste stream. To prevent this curbing needs to be added to those areas to eliminate those risks.
7. There is an area were straw pack is stored outside the building until land application occurs, there need to be a more permanent storage added in that location to prevent clean water contamination.
8. Clean water flows up to the cow alleys, to prevent any water from entering the waste stream. Clean water drains and tiles need to be added.

Proposed – Discussions regarding the solutions for the inadequacies bring to the forefront the desires for Westridge Dairy to be environmentally friendly and good stewards of the land. The current operators have the desire to continue their operation along as they are physically able. As this operation has grown in the past the producers have implemented the changes in their operation to be friendly to the environment. The main inadequacies that this operation faces in the future will be the availability of the operation to obtain the additional acres that is needed to evenly apply all the manure that it produces. Currently that operation has the acreage to apply the manure it produces for one year, but as carry over credits continue to build in subsequent years the operation has to be able to obtain more acres in future years. Calculations demonstrate that the operation will need to obtain an additional 270 acres of land to apply manure on. Also the operation utilizes a mortality station for all the death loss that occurs to the smaller animals of the operation. It is recommended that the operation add a more modern type of mortality station. The new facility would be located to the east of Barn #9. It will consist of 3 primary bins and 3 secondary bins. It will be 23' x 60' this building would be of size to handle all the death loss that occurs on the operation. There are areas of the lot that are of risk for allowing waste water to exit and clean water to enter. To prevent this possibility curbing needs to be added to those areas, 150' of rounded curbing and 40' of square curbing. To contain and collect the waste water runoff of Bunker 106 there needs to be more permanent walls added to eliminate that potential. A total of 70' of 3' walls needs to be added. There is a staging area for straw bedding pack that is between Barns 3 & 8. To prevent any potential of clean water contamination a permanent storage structure will need to be added to

contain the straw pack until land application can occur. The structure will need to be 35' x 55' x 3'. Clean water drains from the buildings toward the cow alley ways. To prevent the potential for clean water from entering the waste stream there need to be clean water sumps and drain tile added. The need to be a total of 3 sumps and approximately 350' of drain tile added to achieve this. The operation need to maintain and manage the pasture areas of the option differently to ensure the proper vegetation cover and growth of the pasture acres. The pastures need to be reseeded and grazed periodically to maintain them better. The operation, with having earthen basins for storage of manure, needs to manage the embankments to ensure the proper vegetation to control soil erosion. To maintain this, the producers need to mow and reseed those embankments according to NRCS guidelines, when necessary. With the labor force that the operation has they can frequently scrape and flush the lots when necessary. The current operators have the desire to address the situation; however how the containment will best benefit their current operation needs to be analyzed further.

Air Quality Considerations – The operation currently uses waste storage systems that store waste in a fashion to minimize the odors released into the environment. Additional air quality practices implemented are frequent scraping of the concrete lots to eliminate dust being carried off site. Finally the operation follows the practice of manure incorporation for waste being applied to the crop land.

Pathogen Considerations – The operation uses large amounts of bedding material due to utilizing the pen pack as part of their waste storage. By providing a dry environment the number of pathogens the inventory is exposed to is minimized. By utilizing mechanical incorporation of manure during land application of waste, any potential contamination or release of pathogens to the environment is minimized.

Mortality Management – the operation currently utilizes the services of a rendering company for the timely disposal of any death loss of the mature cows. When death loss occurs the dead animal is removed from the operation and placed on the gravel driveway between Barn #5 and the shop. This location is away from potable water supplies and surface water. The rendering company has historically picked up the dead animal between 24 and 48 hours after they have been notified. They currently have a compost pile in operation for the small animals of the operation, but it needs to be updated to meet the recommendations stated in the LMFA. A new compost system is recommended to be built east of the dry cow barn #8. See Proposed facility portion of the CNMP. The system would be able to accommodate all the death loss that occurs on the facility.