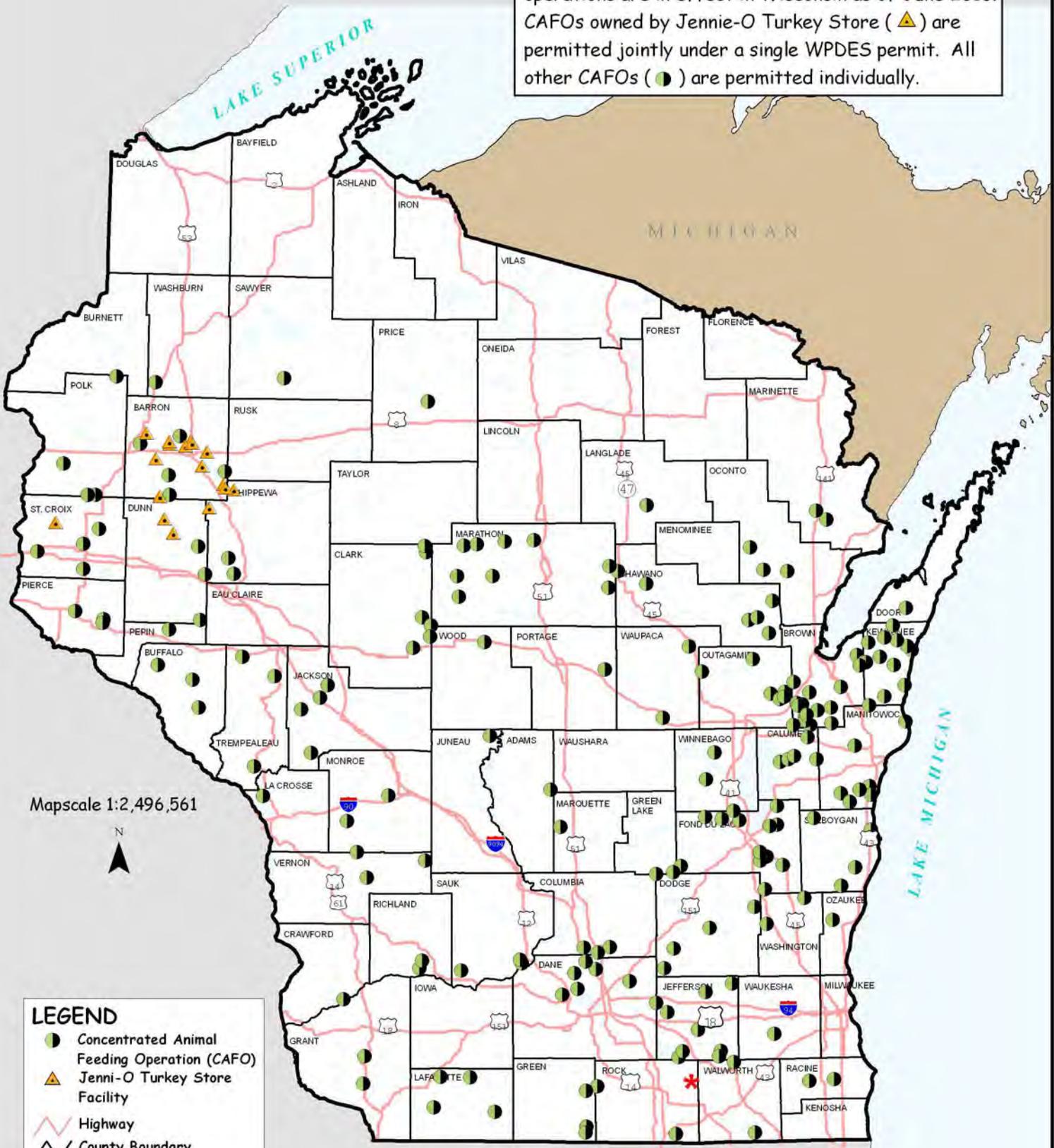


Wisconsin's WPDES Permitted Concentrated Animal Feeding Operations

A total of 194 WPDES permits for animal feeding operations are in effect in Wisconsin as of June 2010. CAFOs owned by Jennie-O Turkey Store (▲) are permitted jointly under a single WPDES permit. All other CAFOs (●) are permitted individually.



Mapscale 1:2,496,561



LEGEND

- Concentrated Animal Feeding Operation (CAFO)
- ▲ Jenni-O Turkey Store Facility
- Highway
- County Boundary
- Stream
- Open Water
- * RPD (approx. location)

Wisconsin Department of Natural Resources
 Water Division
 Bureau of Watershed Management
 June 2010



Memo

To: Ken Johnson, Regional Water Leader, WDNR SCR
From: Robert Thiboldeaux, PhD, Toxicologist, Wisconsin Division of Public Health
CC: Lloyd Eagan, Director, WDNR SCR
Mark Cain, Wastewater Engineer WDNR SCR
Andrew Craig, WDNR Bureau of Watershed Management
Date: February 17, 2011
Re: Public Health setbacks for manure spray irrigation

As part of the Environmental Assessment and permit review for the proposed Rock Prairie Dairy, you have asked the Bureau of Environmental and Occupational Health whether the proposed setbacks for the manure spray irrigation system are sufficient from a public health perspective. Wisconsin code allows for a 500 foot setback to inhabited dwellings unless aesthetic and public health impacts demand otherwise.¹ As the practical experience among state regulatory agencies with manure spray irrigation is limited, we have reviewed current literature and consulted with experts in other states.

The Rock Prairie Dairy proposes land application of liquid manure using center pivot sprinkler technology on quarter section areas. The sprinkler application areas are circular; injection has been proposed for the squared corners of each quarter section. The relevant public health question hinges on determining whether populations will be directly exposed to manure spray irrigation drift, and the risk corresponding to that exposure. Risk is dependent upon:

- The presence of harmful organisms in applied material, *i.e.* bacterial, viral, and parasitic fecal pathogens in untreated liquid manure.
- The presence and emission, to air, of Hazardous Air Pollutants from spray-applied material. Hydrogen sulfide and ammonia are the most commonly identified CAFO-related HAPs.
- Concentration of the applied material, *i.e.* dilution and fecal pathogen load.
- Exposure: drift radius, distance to source, and frequency of exposure.

¹ Wisc. Admin. Code ch NR 214. LAND TREATMENT OF INDUSTRIAL LIQUID WASTES, BY-PRODUCT SOLIDS AND SLUDGES. <http://legis.wisconsin.gov/rsb/code/nr/nr214.pdf>

If center pivot irrigation is approved for the Rock Prairie Dairy, then engineering detail and best management practices should be followed to minimize risk to the public. Robert Dungan with the USDA has provided a detailed review of the fate and transport of manure bioaerosols, including those associated with manure spray irrigation.² Dungan, in his 2010 review, notes that while land application of untreated liquid manures increase the chances of aerosolizing microorganisms, few papers outside of municipal wastewater research have addressed the risk to humans associated with land application of fecal wastes. Mechanical similarities of manure spray irrigation to other types of waster land application are used in this assessment, and could be used to inform CAFO policy and permitting decisions.

The Idaho Department of Environmental Quality has published a *Microbial Risk Assessment and Fate and Transport Modeling of Aerosolized Microorganisms at Wastewater Land Application*.³ The Idaho DEQ risk assessment makes the following conclusions:

- Fine droplets may contribute to microbial risk under high wind conditions.
- Droplets larger than 200 micrometers do not transport significantly beyond the application area and may be neglected when analyzing risk at typical buffer zone distances.
- Deposition of droplets and aerosol containing microbial pathogens on surfaces such as produce may be a significant pathway for exposure under windy conditions. Thus, if wastewater loadings are elevated, high-wind cut-off restrictions should be considered.
- Worst-case conditions that lead to the greatest exposure and risk of infection are nighttime low-wind stable conditions, which maximize the inhalation pathway, and high-wind conditions, which maximize the deposition and produce ingestion pathway.

Exposure to airborne or deposited pathogens. With regard to deposition of aerosols, the infective dosages of common fecal pathogens are normally thought of in terms of ingestion rather than inhalation. This makes accurate risk assessment via inhalation difficult even when the airborne concentration is known. Infective inhaled exposure, depending on the organism, could be directly to the lungs, or could be to the gut where inhaled pathogens are secondarily swallowed. Given adult inhalation rates of 25,000 L air/d,⁴ the presence of bioaerosols implies a risk of significant inhalation exposure. Similarly, where airborne pathogens are deposited on ready-to-eat crops or on surfaces handled by adults or young children, accumulation could occur throughout the irrigation period, and risk of infection would be dependent upon the

² Dungan R. S. 2010. BOARD-INVITED REVIEW: Fate and transport of bioaerosols associated with livestock operations and manures. *J. Anim Sci.* 88:3693-3706.

³ Hardy R, Schilling K, Fromm J, Dai X, Cook M. 2006. Technical Background Document: Microbial Risk Assessment and Fate and Transport Modeling of Aerosolized Microorganisms at Wastewater Land Application Facilities in Idaho. Idaho Department of Environmental Quality.

⁴ Derelanko MJ, Hollinger MA (eds.). 2002. *Handbook of Toxicology*, 2nd ed. CRC Press.

concentration of viable pathogen on the food or handled surface. In the case of *E. coli* O157:H7, the infectious dose has been estimated to range from 1 to 100 colony-forming units.⁵ For *Salmonella spp.*, an infective dose may be as low as 15-20 cells.⁶

The U.S. Centers for Disease Control has developed worker safety guidelines applicable to the range of land-applied municipal, industrial, and agricultural wastes.⁷ In addition to waste worker hygiene practices, training, and equipment that minimize occupational safety risks, the CDC guidance recommends several *Environmental Practices to Prevent and Minimize Occupational Exposures*. These recommendations would apply equally to avoiding exposure to the public adjacent to a manure spray irrigation site:

- Where feasible, substitute Class A biosolids for Class B biosolids.⁸
- Monitor the source material to assure Class A or Class B standards prior to land application operations.
- Monitor stored biosolids prior to application to assure that the biosolids are properly stabilized and that unacceptable regrowth or cross-contamination from substandard material has not occurred.
- Where local conditions permit, inject or incorporate biosolids below the soil.
- On windy days, avoid spreading or disturbing dry biosolids that would create dust.
- On windy days, avoid spreading biosolids by high-pressure spray.
- Avoid unnecessary mechanical disturbance and contact with land-applied Class B biosolids during the period when public access is restricted.
- Equip heavy equipment used at storage and application facilities with sealed, positive-pressure, air-conditioned cabs that contain filtered air-recirculation units.
- Monitor worker exposures when adjusting precautions to address site-specific issues.

Division of Public Health conclusions and recommendations. Interrupting human exposure to feces, with its attendant risk of infection by bacterial, viral, and parasitic pathogens, is at the foundation of public health practice.

- Based on available literature, it appears that a 500 foot setback from irrigation nozzles to receptors for the land application of liquid manure will be adequate to avoid infection *if* the system is designed to (1) substantially

⁵ Paton, J.C. and Paton, A.W. 1998. Pathogenesis and diagnosis of shiga toxin-producing *Escherichia coli* infections. Clin. Microbiol. Reviews. 11(3):450-479.

⁶ FDA. 2009. Foodborne Pathogenic Microorganisms and Natural Toxins Handbook. U.S. Food and Drug Administration. <http://www.fda.gov/Food/FoodSafety/default.htm>

⁷ DEPARTMENT OF HEALTH AND HUMAN SERVICES. 2002. Guidance for Controlling Potential Risks to Workers Exposed to Class B Biosolids Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. Publication 2002.149

⁸ See Wisc. Admin. Code ch NR 204.07. DOMESTIC SEWAGE SLUDGE MANAGEMENT <http://legis.wisconsin.gov/rsb/code/nr/nr204.pdf>

reduce the microbial load of the applied material,⁹ using some form of treatment such as aerobic or anaerobic digestion, lime treatment, or composting; (2) deliver spray droplets greater than 200 µm mean diameter to minimize aerosolization and drift, and (3) that the irrigation schedule be optimally managed with regard to weather conditions and time of day. DHS recognizes that manure treatment may be outside of the scope of the current Rock Prairie Dairy proposal.

- In addition to steps to avoid infectious exposure to off-site receptors, land application of manure liquid must be managed to avoid unacceptable off-site levels of hazardous air pollutants, particularly hydrogen sulfide and ammonia. Since manure injection techniques are currently proposed for part of the project, it is noteworthy that injection techniques are among the most effective for the control of both odor and HAP emissions.¹⁰
- NR 214 allows for the regulation of land-applied wastes with regard to aesthetic impacts. If manure spray irrigation is permitted as part of the Rock Prairie Dairy project, DHS recommends that the land application of manure liquids be managed to minimize impacts, particularly nuisance odor, that might inhibit the full use and enjoyment of neighboring private residences. Nuisances, though qualitative, are important to those perceiving the nuisance, and raise the potential for land-use conflicts. Attention to both technical detail (treatment and storage of manure; application techniques)¹¹ and landowner relationships in avoiding nuisance conflicts will benefit the Rock Prairie Dairy project.
- If the center pivot sprinkler technology is approved for the Rock Prairie Dairy project, DHS recommends that the permit include regulatory means, such as the monitoring of both applied liquid manure and deposition in downwind areas, to *assure* that any permit conditions to avoid aerosolization, drift, and odor control are met.

⁹ Hardy *et al.* (referenced above) conclude that *E. coli* loadings less than 1000 to 10,000 colony-forming units/L in land-applied wastewater represent minimal risk beyond a typical 300 foot buffer zone.

¹⁰ Burton, CH. 1997. Manure management - treatment strategies for sustainable agriculture. Silsoe Research Institute, Silsoe, Bedford, UK. *In* Casey KD, Bicudo JR, Schmidt DR, Singh A, Gay SW, Gates RS, Jacobson LD, Hoff SJ. 2006. Air quality and emissions from livestock and poultry production/waste management systems. Pp. 1-40. In J. M. Rice, D. F. Caldwell, and F. J. Humenik (eds). Animal Agriculture and the Environment. National Center for Manure and Animal Waste Management White Papers. ASABE, St. Joseph, Michigan.

¹¹ Kranz WL, Koelsch RK, Shapiro CA. 2007. Application of Liquid Animal Manures Using Center Pivot Irrigation Systems. Univ. Nebraska Extension. Publication EC778.

Title of Original Environmental Assessment: Rock Prairie Dairy, LLC
Region or Bureau: South Central Region
Type List Designation: Type II

Contact Person: Mark Cain
Title: Animal Waste Engineer
Address: 3911 Fish Hatchery Road Fitchburg, WI 53711
Phone: 608-275-3252
E-mail Address: mark.cain@wisconsin.gov

Date: January 14, 2011

Applicant: Rock Prairie Dairy, LLC

Address: NE Corner of S. Scharine Rd and STH 14, Avalon, Wisconsin

Title of Proposed Amendment: Rock Prairie Dairy, LLC WPDES Permit

Location: County: Rock City/Town/Village: Bradford

Township Range Section(s): SE ¼ of T2N R14E Section 02

PROJECT SUMMARY

1. General Description

This environmental analysis is prepared in connection with the Department of Natural Resources' (the Department) proposed issuance of a Wisconsin Pollutant Discharge Elimination System (WPDES) permit and review and approval actions of designed structures for Rock Prairie Dairy, a large Concentrated Animal Feeding Operation (CAFO) proposed to be constructed in Rock County. This operation has not held a WPDES permit in the past. Permits are normally issued for up to five years. The Department anticipates issuance of a WPDES permit in May 1, 2011 with an expiration date in April 2016.

The applicant is the same ownership group that currently owns and operates two other permitted CAFOs in Nebraska – Double Dutch Dairy, LLC with 4,600 dairy cows (6,440 animal units), and Butler County Dairy, LLC with 6,000 dairy cows (8,400 animal units). Double Dutch has been operating since April 2000 and Butler County has been operating since March 2008. The ownership group's project lead is Mr. Todd Tuls.

Rock Prairie Dairy facility is proposed to occupy and be constructed upon approximately 124 acres of a 160 acre agricultural site currently used for row crop production. This new dairy and livestock facility would provide for housing, feeding, and milking of 5,200 milking and dry cows, which is the equivalent of 7,280 animal units.

The Farm plans to construct six sand bedded freestall barns, two milking parlors and holding areas, three high-density polyethylene (HDPE) lined and covered manure storage ponds, one concrete-lined and covered waste storage pond, concrete sand settling lanes, a sand storage area, a manure solids separation building, and a feed storage complex which includes a concrete feed pad, four hay sheds, a commodity shed, and two sweet corn silage bunkers. The site will also include two stormwater detention ponds and a series of swales and culverts to handle stormwater flow on the site.

The total project cost for this construction is estimated at \$35,000,000. This estimate includes \$7,000,000 for cattle, \$15,000,000 for buildings, \$4,000,000 for the manure system, \$1,000,000 for land procurement, \$2,200,000 for feed storage, \$1,500,000 for machinery, and \$4,300,000 for chattel (personal movable property).

Construction is proposed to begin in the spring 2011 and is expected to be complete by fall 2011. Animal unit goals are planned to be reached within weeks of the completion of construction. Additional background information about the proposed project can be found in the Rock Prairie Dairy WPDES permit application and EA Questionnaire.

2. The Department of Natural Resources has the following authorities regarding the Rock Prairie Dairy, LLC dairy operation:

- Wisconsin Pollutant Discharge Elimination System (WPDES) Permits for Concentrated Animal Feeding Operations (CAFO), those operations with 1,000 animal units or more.
- NR 243, Wis. Admin. Code.
- NR 150, Wis. Admin. Code.
- Objectionable odor determinations pursuant to s. NR 429.03 Wis Adm. Code, covering fugitive dust sources.
- Air emission limitations from s. NR 415.04, Wis. Adm. Code, covering fugitive dust sources.
- Air emission limitations from ch. NR 445, Wis. Adm. Code, regarding control of hazardous pollutants.
- Potentially applicable permitting thresholds contained in s. NR 406.04(2)(c), Wis. Adm. Code (construction permits); s. NR 407.02(4), Wis. Adm. Code (operation permits), and s. NR 405.02(22)(a)2, Wis. Adm. Code (prevention of significant deterioration).
- Chs. NR 406, 407, and 445, Wis. Adm. Code, contain provisions that allow a source to exclude emissions of hazardous air contaminants (ammonia and hydrogen sulfide) associated with agricultural waste in determining the need for an air permit until July 31, 2011. These provisions apply to hazardous air contaminants only and do not apply for criteria pollutants such as PM or VOCs or to PSD major source permitting thresholds contained in Ch. NR 405, Wis. Adm. Code.
- Emissions reporting requirements contained in Ch. NR 438, Wis. Adm. Code.
- High capacity well approval for operations with the capacity to use 70 gallons/minute or more from operator-owned wells, or temporary dewatering approval for operations pumping 70 gallons/minute during construction only.
- If construction activities disturb one or more acres, the operation must obtain a storm water construction permit (WI-0067831-1) per NR 216, Wis. Admin. Code.
- NR 108, Wis. Admin. Code, review and approval authority of manure storage facilities and runoff control systems.
- Nutrient Management Plan review and approval.
- Annual Spreading Report review and approval.

3. Documents, plans, studies or memos developed or referenced to support this proposal include:

- Rock Prairie Dairy Nutrient Management Plan prepared by Brian Mooney, DeLong Company, Inc.
- WPDES Permit Application.
- Environmental Analysis Questionnaire for Livestock Operations completed by Conestoga-Rovers & Associates.
- Plans and specifications for all proposed reviewable facilities, completed by Conestoga-Rovers & Associates June, 2010.
- Plans and specifications for all proposed center pivot irrigation systems and irrigation pipeline, completed by Conestoga-Rovers & Associates June, 2010.
- WPDES Stormwater Erosion Control Construction Application (FIN #43806).
- Soil survey maps, topographic maps, wetland maps and aerial photographs – various years.
- Natural Heritage Inventory database. Endangered Resources Log # 10-353.
- Archaeological and Historical site maps.
- Wisconsin Agricultural Statistics Service website (http://www.nass.usda.gov/Statistics_by_State/Wisconsin/index.asp).
- Bedrock Stratigraphic Units in Wisconsin. Wisconsin Geological and Natural History Survey, Open-File Report 2006-06.
- Delineation of Zones of Contribution for Municipal Wells in Rock County, Wisconsin: Final report. Wisconsin Geological and Natural History Survey, Open-File Report 2002-02.
- Ground-Water Quality of Rock County, Wisconsin, Wisconsin Geological and Natural History Survey, Information Circular Number 41, March 1982.
- Oregon Technical Support Document (Table 6) to the Oregon Dairy Air Quality Task Force, July 1, 2008.
- San Joaquin Valley Air Pollution Control District, Determination of VOC Emission Factors, Aug, 1 2005.
- Final Report VFAs, Amine, Phenol, and Alcohol Emissions from Dairy Cows and Fresh Waste, Frank Mitloehner, et al UC Davis (2006).
- Nutrient Application Guidelines for Field, Vegetable, and Fruit Crops in Wisconsin. University of Wisconsin Extension Publication A2809.

- Manure Characteristics. Midwest Plan Service Center publication MWPS-18, 2000.
- Wisconsin and the Agricultural Economy Study, UW Department of Applied Agriculture and Economics.
- 2009 Annual Report. Rock County Health Department.
- Risk Assessment Evaluation for Concentrated Animal Feeding Operations. EPA Document EPA/600/R-04/042. May 2004.

4. Attachments:

- Plat Map
- Existing Conditions Map of the Site by Conestoga-Rovers & Associates.
- Proposed Layout Map of the Site by Conestoga-Rovers & Associates
- Soils Map of the site
- Topographical Map of the site
- Wetlands Map of the site
- Center pivot location map
- Land Spreading map
- Groundwater recharge map

DNR EVALUATION

1. Environmental Effects and Their Significance

Physical Impacts

Facility Site

The Rock Prairie Dairy site has most recently been used for agriculture production cropland. The fields were planted in corn and soybeans. This project will result in the conversion of the land from one type of agricultural use to another. Short-term physical impacts will result primarily from construction activities at the site. Storm water runoff from the site during the construction phase could result in environmental impacts such as silt and sediment being transported to area wetlands and surface waters. Because the project will result in the disturbance of one or more acres, the operation has applied for a Construction Site Erosion Control general permit (WI-S067831-3) from the Department (FIN #43806). Construction activities conducted in accordance with that WPDES general permit are considered in compliance with water quality standards. The construction phase erosion and stormwater control plans and specifications required review and permit issuance by the Department. The facility is also required to obtain a Stormwater Permit and permits to construct the manure storage facilities from Rock County.

During construction and as part of the building process, topsoil and subsoil will be moved around on the site for the clearing and grubbing. Disturbance of former cropland or agricultural related lands, noise and dust from machinery and traffic from construction equipment are the expected short-term environmental impacts. Water will be used to reduce the amount of airborne dust during construction.

The Department's Construction Site Erosion Control permit will require the operation to implement Best Management Practices (BMP's) to address impacts from stormwater runoff. Stormwater runoff controls must be in place to control runoff from rainfall and snowmelt events. The BMPs are implemented to minimize siltation and sediment delivery from the construction site and prevent silt and sediment from reaching wetlands and surface waters.

The Department requires a post-construction stormwater management plan that addresses potential pollution caused by storm water discharges from the construction site after construction is completed. Rock Prairie Dairy's stormwater management plan must identify controls that will be implemented to minimize such sources of pollution, including runoff from rooftops and impervious areas, as well as the maintenance of vegetated areas. Department stormwater regulations are not intended to address water quantity (flooding) issues that may result from new development. Water quantity concerns are typically dealt with at the local (county) level.

Turtle Creek, Spring Brook and Blackhawk Creek are the nearest named waterways to the proposed Rock Prairie Dairy. Turtle Creek is located approximately 2 miles southeast of the facility, Spring Brook is located approximately 6,000 feet south of the facility, and Blackhawk Creek is located approximately 1.75 miles northwest of the facility. There are no mapped wetlands within the immediate vicinity of the proposed facility.

Based on well construction reports, wells in the area draw from both sand and gravel and limestone aquifers. The depth to water on the facility property varies from 6.6 to 22 feet below ground surface (bgs). A review of well construction records for the area indicates that the depth to bedrock varies greatly. The depth to limestone bedrock varied from 6 to 25 feet bgs to the southwest of the

proposed facility and 68 to 121 feet bgs to the northeast of the proposed facility. Within a half mile of the proposed facility, the depth to limestone bedrock varies from 58 to 110 feet bgs in wells. Some of the area surrounding the proposed dairy has been identified by the Wisconsin Geological and Natural History Survey as a major bedrock aquifer recharge area. (Ground-Water Quality of Rock County, Wisconsin by Alexander Zaporozec, Information Circular #41, March 1982). There are historic groundwater contamination concerns prevalent throughout Rock County. These concerns are in no way limited to the area immediately surrounding the Rock Prairie Dairy facility site, and originate from a number of sources, including agricultural fertilizer applications, legume cropping systems and on-site wastewater systems (septic systems). According to the 2009 Rock County Health Department Annual Report, 32% of private wells tested for nitrates in 2009 exceeded the ten (10) parts per million enforcement standard. The percentage of private wells testing unsafe for bacteria decreased in 2009, which has been the trend over the past five years. Rock County has a Groundwater Protection Plan, which includes sampling private and public supply wells for nitrates and other contaminants.

A private sewerage system is proposed at the facility for collection of all human waste pursuant to the Rock County Private Onsite Wastewater Treatment System Ordinance (POWTS). There are restroom facilities planned at Rock Prairie Dairy in the milking parlor and office. Prior to installation, the Farm will obtain the necessary permits from the Rock County Planning and Zoning Department.

There are a number of physical impacts at the site that do not fall under the regulatory authority of the Department's WPDES permit and plan review authority. One long-term physical effect may be visual impacts. The physical changes at the site due to converting agricultural fields to animal housing, manure and process wastewater storage, and feed storage represent a change from the current landscape. There also may be additional noise and dust associated with the transportation of livestock, milk, feed, and manure.

Extensive field work has been completed to evaluate the physical attributes of the site. A total of 199 boreholes were drilled within the footprint of the proposed dairy facility components. The geotechnical investigation work was completed based on the requirements of each design component. Preliminary drilling work for the facility components was conducted by Terra Trace Environmental Services of Lake Bluff, Illinois on January 27 – 28, 2010. Additional drilling work was conducted by Geis Soil and Samples, Ltd. of Merrill, Wisconsin on April 27 – 30, 2010. Additional drilling was completed in the fall after the corn crop was harvested; that included twelve soil borings that either deepened or advanced in the area of the reviewable facilities to ensure compliance with NRCS and WDNR technical standards. During the geotechnical investigations, groundwater at the site was encountered at 17 ft below ground surface and no bedrock was encountered in any of the soil borings. The Geotechnical Report, including soil boring logs, was submitted to the Department in October 2010. Additional soils information was submitted on November 30, 2010.

A separate soils investigation is being conducted as part of the center pivot irrigation and pipeline plans and specifications. This information will be used to evaluate the area for; suitability to install pipelines, groundwater monitoring well construction and placement, and land application of manure and process wastewater.

Following the completion of construction, the dairy estimates that approximately 9,500 truckloads of feed, manure, supplies, etc. will enter and exit the dairy each year. The number of truckloads will vary based on the season of the year. The facility will exit to Scharine Road, to the north of STH 14. Trucks will enter and exit the dairy transporting milk to market and delivering feed and supplies year round. Higher traffic levels will occur when feed is harvested and when manure is applied to crop fields. Most truck traffic will occur during daylight hours. However, during crop harvesting, traffic will occur whenever necessary to bring in the crop. Vendors will be instructed to follow standards related to truck routes and engine braking. "Courtesy to neighbors" signs will be installed at property exits to remind drivers. Driveways will be maintained to keep dust to a minimum and maintain visibility of traffic turning onto the highway.

Air Quality:

Animal agricultural operations generate odors and air pollutants. When localized and insignificant, these odors and air pollutants pose few problems. If enough animals are concentrated together in a small area, air emissions may cause human health and environmental concerns.

Airborne contaminant emissions from concentrated animal feeding operations (CAFO), or other types of animal agricultural operations, include gases and particles. Air quality concerns have focused primarily on ammonia (NH₃), hydrogen sulfide (H₂S), two toxic air pollutants, as well as odors, particulate matter (PM), volatile organic compounds (VOC), and greenhouse gases (GHG). Diesel exhaust particulate matter emissions from semi-trucks, manure spreading, and other miscellaneous farm operations could also be associated with animal agricultural operations.

Emergency generators, other stationary diesel or biogas engines and other combustion sources, such as dryers, will emit pollutants, too. Criteria pollutants (oxides of nitrogen (NO_x); carbon monoxide (CO); and sulfur dioxide (SO₂)) and incomplete products of combustion are also emitted and formed from the combustion of diesel, biogas or other fuels.

In addition to primary emissions, certain air pollutants are formed through chemical processes in the atmosphere known as secondary formation processes. The secondary pollutants have significant effects. Ammonia reacts with sulfur dioxide and nitrogen oxides

(NO_x) to form PM_{2.5}. VOC and NO_x react to form ozone. Nitrogen containing compounds such as ammonia and NO_x result in increased nutrient loading and acidification of soils and waters.

Both quantity and the types of air contaminant emissions from animal agricultural operations are challenging to estimate, making off-site air quality impacts difficult to predict. This is due to diurnal and seasonal temperature variation, varying number and type of animal species present (which may change over time), type of housing and manure handling system, feed type, and chosen management practices.

Large amounts of nitrogen are excreted in the production of all animal species, including dairy, and most excess nitrogen is in a form that is easily transformed into ammonia. Most ammonia is produced when the urea contained in urine comes in contact with the urease enzyme contained in feces (also on barn floors and in soil). Much smaller amounts of ammonia are produced during the decomposition of feces. Nitrogen occurs as both unabsorbed nutrients in animal feces and as either urea (mammals) or uric acid (poultry) in urine.

After contaminants are generated, they can be emitted through animal housing ventilation systems (if used) or emitted from any number of sources including animal housing and production areas, feed preparation and storage, manure management/storage facilities, mortality composting, land application sites and dispersed by atmospheric processes. Air contaminant travel distance varies due to size of particles, weather conditions and surrounding topography and vegetation. These variations make it challenging to form a clear picture of the expected emissions and emission-related effects from animal agricultural operations.

Regulatory dispersion modeling is predicated on the steady-state nature of the release. Gaussian plume models have been developed to replicate monitored concentrations attributed to industrial or commercial operations, for example a large industrial boiler for generating steam and/or electricity. The release of farm emissions comes from locations (i.e. barns, lagoons) that are unlike a smoke stack. These “fugitive” emissions are able to be modeled, but there is more uncertainty associated with establishing release parameters. The time-varying nature of farm emissions is even more difficult to model. Regulatory models generally assume steady-state emission generation. This implies that over the course of one hour, the emission rate will not significantly change, and that any changes from hour-to-hour are under the control of the operator. Farm emissions vary between hours, within a given hour, and more importantly this variation is chaotic and unpredictable.

Despite the variability of emissions from animal agricultural operations, the nitrogen balance (and ammonia as a part of the balance) has been studied extensively in dairy operations which have integrated cropping systems. Nitrogen excretion from animals varies based on nitrogen feed rates, the nutritional needs of the dry or lactating cows, and how much nitrogen ends up in milk. In Wisconsin and elsewhere, research points to an average annualized total nitrogen loss of 15 percent from freestall housing and losses of incoming nitrogen into uncovered manure storage from 10 to 30 percent loss of nitrogen as ammonia. Estimates based on farm component ammonia losses are presented in the table below.

Wisconsin DNR in coordination with an advisory group which included animal agriculture producers, academia, NRCS and DATCP, published a report in December 2010 which included a list of beneficial management practices (BMPs) that reduce ammonia and hydrogen sulfide air emissions. Many BMPs identified in the report, which either prevent or mitigate air emissions, often make common sense. For example, mixed operations (such as the Rock Prairie Dairy) that integrated cropping systems with animal production typically retain nitrogen for crops (minimizing ammonia losses), resulting in decreased need for fertilizer nitrogen.

The facility is proposing a geomembrane cover on manure storage facilities which is expected to greatly mitigate air emissions from manure storage. The geomembrane waste facility storage cover system will be combined with a biofilter treating exhaust air from under the cover. Covering the waste facility storage with a properly designed geomembrane cover may reduce air emissions and odors by 90% from the waste storage facility. The least amount of emissions would be created with a system that includes both a cover over the lagoon and direct injection techniques. Some of the areas will receive this BMP. However, the proposed center pivot irrigation system does not allow for direct injection of nutrients. It is unclear how much ammonia (and other air pollutants) will be volatilized with the center pivot irrigation system proposed, but it is expected that significantly larger ammonia losses may be associated with this practice when compared to direct injection techniques.

Air Quality Regulations Overview

Rock Prairie Dairy, as with any source of air pollution, is required to evaluate existing information, determine its air emissions, and comply with any air regulatory requirements that apply.

Federal air permit requirements are incorporated into state air permit rules in chs. NR 405, 406, and 407. In addition, chs. NR 406 and 407 also include air permit requirements for minor sources. Emissions associated with animal feeding operations are not, categorically, exempt from these requirements. However, the revisions to chs. NR 406 and 407 published in July 2004, established an exemption period ending in July 2007 for sources of hazardous air contaminant emissions from agricultural waste. The exemption

period was extended, again, in February 2008 for chs. NR 406 and 407 and how they relate to NR 445. The NR 445 compliance extension expires on July 31, 2011.

Chapter NR 445 establishes ambient air concentrations for ammonia and hydrogen sulfide, two pollutants associated with agricultural waste from animal feeding operations. These concentrations are 418 and 335 micrograms per cubic meter, respectively, on a 24-hour average basis.

Similar to federal reporting requirements, state reporting requirements include the air reporting requirements in ch. NR 445 and the annual air emission reporting requirements of ch. NR 438. Air emissions from animal feeding operations are not categorically exempt from these reporting requirements.

Odors are addressed in ch. NR 429 (Malodorous Emissions). Odor control practices contained in ch. ATCP 51 (Livestock Facility Siting), included frequent cleaning of animal housing, diet manipulation, and the impermeable cover have been included with the proposed project.

Rock Prairie Farm Specific Impacts

Using a variety of emission estimates (see footnotes), the total annual estimated emissions from Rock Prairie Dairy are listed below. Note that direct human health impacts cannot be inferred from these estimates.

	Dairy Operations Liquid manure systems (5200 Dairy Cows)
PM ₁₀	11 tons/year ¹
VOC (volatile organic compounds) ²	Less than 49 tons/year ³
NH ₃ (ammonia)	150 tons/year freestall + covered manure storage ⁴ 360 tons/year freestall + top-loaded manure storage 350 tons/year freestall + covered manure storage + land application 509 tons/year freestall + top-loaded manure storage + land application
H ₂ S (hydrogen sulfide) ⁵	Less than 25 tons/year ⁶
CH ₄ (methane) ⁷	Less than 1,400 tons/year (including enteric) ⁸
N ₂ O (nitrous oxide) ⁹	Less than 8 tons/year ¹⁰
MeOH (methanol) ¹¹	Less than 28 tons/year ¹²

Groundwater

Soils in this area of Rock County are generally deep and moderately to well drained over stratified sand and gravel or glacial till.

Based on well construction reports, wells in the area draw from both sand and gravel and limestone aquifers. The depth to water on the facility property varies from 6.6 to 22 feet below ground surface (bgs). A review of well construction records for the area indicates that the depth to bedrock varies greatly. The depth to limestone bedrock varied from 6 to 25 feet bgs to the southwest of the proposed facility, 58 to 110 feet bgs in wells within a half mile of the proposed facility, and 68 to 121 feet bgs to the northeast of the proposed facility.

¹ Oregon Technical Support Document (Table 6) to the Oregon Dairy Air Quality Task Force, July 1, 2008

² Does not consider the effect of waste facility storage cover

³ San Joaquin Valley Air Pollution Control District, Determination of VOC Emission Factors, Aug. 1, 2005

⁴ Based on ASAE excretion standard of 0.83 lbs N for a 1,400-lb cow producing 70 lb milk; Rotz 2004; Wisconsin – based research on nitrogen losses from freestall housing; Rotz 2004 for manure storage (covered, top and bottom loaded basins) and land application. It is unclear how much ammonia will be volatilized with center pivot irrigation with nozzles located 36 inches above ground surface, but it is expected that these losses will be much greater than injection or rapid incorporation and may even exceed nitrogen loss of 25% (Jokela, 2000; Koelsch 1995).

⁵ Does not consider the effect of waste facility storage cover

⁶ University of Wisconsin Extension average (Erb/Holmes et al, 2009)

⁷ Does not consider the effect of waste facility storage cover

⁸ Calculated using Tier 2 IPCC calculator with VS = 11.55 lb/hd-day, Bo=0.24, weighted MCF of 0.37 and IPCC Tier 1 enteric estimates (128 kg CH₄/hd-yr)

⁹ Does not consider the effect of waste facility storage cover

¹⁰ Oregon Technical Support Document (Table 6) to the Oregon Dairy Air Quality Task Force, July 1, 2008

¹¹ Does not consider the effect of waste facility storage cover

¹² Final Report VFAs, Amine, Phenol, and Alcohol Emissions from Dairy Cows and Fresh Waste, Frank Mitloehner, et al UC Davis (2006)

There are an estimated 70 private wells within ½ mile of the proposed facility and the 16 proposed pivot irrigation points that will be used to land apply liquid manure from the facility. Most of the proposed pivot irrigation points are located in an area identified by the Wisconsin Geological and Natural History survey as a major bedrock aquifer recharge area (Ground-Water Quality of Rock County, Wisconsin by Alexander Zaporozec, Information Circular #41, March 1982). There is a significant probability that any nitrogen that does not get taken up by crops will reach surface water and groundwater.

There are historic groundwater contamination concerns prevalent throughout Rock County. These concerns are in no way limited to the area immediately surrounding the Rock Prairie Dairy facility site, and originate from a number of sources, including agricultural fertilizer applications, legume cropping systems and on-site wastewater systems (septic systems). According to the 2009 Rock County Health Department Annual Report, 32% of private wells tested for nitrates in 2009 exceeded the ten (10) parts per million enforcement standard. The percentage of private wells testing unsafe for bacteria decreased in 2009, which has been the trend over the past five years. Rock County has a Groundwater Protection Plan, which includes sampling private and public supply wells for nitrates and other contaminants.

No specific information has been provided on the existing concentrations of Nitrate in groundwater in the area of the proposed facility. However, nitrate levels in one transient-non-community water system well (IZ090) that is located one mile east of the proposed facility, and immediately adjacent to a proposed pivot irrigation point, has already shown an increase in Nitrate concentrations during the last 36 years, which indicates that nitrogen from existing fertilizer applications is reaching groundwater. The most recent nitrate concentration in well IZ090 was 12.9 mg/l in April 2010.

Additional information on the concentration of nitrogen in the liquid manure and the anticipated uptake potential of the crops would be needed to fully evaluate the potential for the continued increase in nitrate concentrations in drinking water in the area. The spray irrigation concept is to apply the proper nutrients to growing crops that will use all the provided nutrients. The facility is planning on installing monitoring wells near the center pivot irrigation systems to evaluate this management practice and to ensure that groundwater standards are not exceeded. This is important because there is a significant probability that any nitrogen that does not get taken up by crops will reach surface water and ground water. A further description of the Nutrient Management Plan and center pivot spray irrigation system is provided in the Manure Management section.

The Rock Prairie Dairy is proposing to build four lagoons with a total volume of 80 million gallons. This will be one of the largest manure storage systems in Wisconsin. Three of the waste storage facilities will be lined with HDPE liners and one will be lined with 5-inch thick water tight concrete. Beneath both the HDPE and the concrete liners will be a layer of compacted soils that will act as a secondary liner. HDPE liner failures, when they occur, are typically the result of poor system management rather than materials. The Rock Prairie Dairy has been designed to minimize the risks associated with HDPE failures, for example, the lagoons will be covered and little to no equipment will be used in the lagoons. Due to the complex geology of the area, the selected liner type, and the extremely large size of the lagoon system, the Department concurs with the decision to install a monitoring well system for the manure storage units and through its plan and specification review will ensure that the monitoring system will provide the necessary data and comply with the appropriate administrative codes. This includes NR 140, Wis. Adm. Code, Groundwater Quality.

Groundwater Use

Rock Prairie Dairy plans to install two high capacity wells for the dairy facility. After the dairy facility reaches full capacity the dairy will use 64 million gallons of water per year which equates to 175,000 gallons of water per day or 128 gallons/minute. The dairy will use a combination of potable and non-potable water in the facility. Potable water is used in the plate cooler for cooling milk and then is recycled for other uses on the farm including: animal drinking water, cow cooling, footbaths, and employee boot washes. The dairy will employ high efficiency water heaters, toilets, and washer/dryer units.

Because the operation's water usage from wells at this site will be 70 gallons per minute or greater, Rock Prairie Dairy is required to obtain high capacity well approval for both of the proposed wells. Applications for new high capacity wells are reviewed for impacts to municipal wells, trout streams, and water bodies designated as Exceptional Resource Water (ERW) or Outstanding Resource Water (ORW), and certain springs. Conditions to minimize impacts to the groundwater levels and these water resources are addressed through the High Capacity Well permit process. Water quantity impacts to individual private wells do not fall within the Department's review authority under the high capacity well permit process and are addressed as a civil matter, not through Department enforcement action.

Private wells near the RPD Site are drilled to depths of less than 200 feet and are screened within the Pleistocene glacial deposits, Platteville/Galena Limestone Group, or upper portions of the St. Peter Sandstone aquifer. The St. Peter Sandstone aquifer extends from approximately 180 to 350 ft below ground surface (bgs). The St Peter Sandstone aquifer is regionally extensive and is continuously being recharged. Municipal wells, such as those in Janesville are primarily drilled into Mt. Simon Sandstone at depths of greater than 1000 ft. The two high capacity wells planned for RPD will be drilled to a depth of approximately 500 feet with 250 ft of well casing. The RPD wells will draw water from the Trempealeau Formation and the Franconia Sandstone aquifers which are

located between the St Peter Sandstone and Mt Simon Sandstone. The Trempealeau and Franconia aquifers are also regionally extensive and are continuously being recharged.

Because RPD will draw water from the extensive resources of the Trempealeau Formation and Franconia Sandstone aquifers, RPD's high capacity wells are not expected to impact private wells near the RPD Site.

Biological Impacts

Endangered Resources

The Bureau of Endangered Resources conducted an Endangered Resources review (ERR Log # 10-353) of the proposed project site. The endangered species review was conducted on the 124 acres of the proposed Rock Prairie Dairy and for the application of manure on the 5340.8 total acres in Rock County. The ER review may contain Natural Heritage Inventory data which are considered sensitive and are not subject to Wisconsin's Open Records Law. Specific locations of endangered resources should not be released or reproduced in any publicly disseminated documents.

There is no record of endangered species near the construction site for the proposed Rock Prairie Dairy facility. Several rare plants, animals and natural communities have been observed near some agricultural fields where application of manure is proposed. The results of the review are organized into sites composed of a grouping of fields associated with this project. The results of the review are listed for each site as is the recommended action, but the location of the sites is confidential.

Site A: Several rare plant species, including purple milkweed (*Asclepias purpurascens*), kitten tails (*Besseyia bullii*), Flodman thistle (*Cirsium flodmanii*), marbleseed (*Onosmodium molle*), and small white lady's slipper (*Cypripedium candidum*). One special concern bird species, black crowned night heron (*Nycticorax nycticorax*). All of the records listed are historic (non-recent) and it is not believed that there is currently suitable habitat for these species on or near the sites in question. Recommendations are general erosion control and runoff minimization measures for these sites to protect nearby water bodies and ecologically sensitive areas.

Site B: Several of the historic records listed in Site A. Recent results for the high-quality natural community types: moist cliff, southern dry-mesic forest and floodplain forest. A recent record exists for a threatened plant, forked aster (*Aster furcatus*). This rare plant and the high-quality natural communities were recorded in a protected area near these spreading sites. It is believed that manure spreading will not directly impact this area, but stringent erosion and runoff control measures are recommended to minimize the likelihood of direct impacts.

Site C: Several of the historic records listed in Site A. In addition, Blanding's turtle (*Emydoidea blandingii*), a state Threatened species, queensnake (*Regina septemvittata*), a state Endangered species, and a record for a herp hibernaculum. After an analysis of the available NRCS soil data for the spreading sites, it is not believed that there is suitable nesting or overwintering habitat for Blanding's turtles on the sites due to a lack of sandy soils. The queensnake is an aquatic-associated species and is very sensitive to fluctuations in water quality.

Site D: Queensnake and herp hibernaculum. A record for the state Endangered species and Federal Candidate species Eastern massasauga rattlesnake (*Sistrurus catenatus*). Records for several rare fish species: the Endangered gravel chub (*Erimystax hybopsis x punctata*), the Threatened Ozark minnow (*Notropis nubilus*), and the Special Concern least darter (*Etheostoma microperca*). Records for two Special Concern invertebrate species: the elktoe mussel (*Alasmidonta marginata*) and the Mulberry wing butterfly (*Poanes massasiot*). Several additional rare plant species: must-root (*Adoxa moschatellina*), swamp agrimony (*Agrimonia parviflora*), lesser fringed gentian (*Gentianopsis procera*), and yellow evening primrose (*Calylophis serrulatus*). Several high quality natural communities are present, including calcareous fens, emergent marsh, shrub-carr, southern sedge meadow, and springs and spring runs, hard.

Follow up actions that need to be taken to comply with state and/or federal endangered species laws: Because of the large number of rare species in the area of the proposed spreading sites and their vulnerability to increased runoff and sedimentation, an erosion control plan needs to be developed and submitted for the following sites to ensure that, at minimum, existing water quality levels are maintained. This plan needs to be submitted and approved by the Bureau of Endangered Resources prior to any spreading taking place on these sites: Site C and Site D. Actions recommended to help conserve Wisconsin's rare species and high-quality natural communities: For the sites not specifically listed above, we recommend strict erosion control and runoff minimization to protect nearby water bodies and ecologically sensitive areas. The facility has submitted a Nutrient Management Plan (NMP) for all manure applications which the facility will be required to follow after it is approved by the Department. Part of the Nutrient Management Plan which was developed in accordance with NRCS 590 and NR 243 Wis Adm Code is a requirement that they meet the tolerable soil loss standard for all fields where they spread manure. Although the tolerable soil loss standard is an agricultural standard, not a water quality standard, the proposed WPDES permit will regulate the application rates, applied acreage, spreading techniques and other specifications through the phosphorus-based Nutrient Management Plan.

Surface Water

Turtle Creek and Blackhawk Creek are located approximately 2 miles southeast and 1.75 miles northwest of the proposed facility, respectively. Neither of those waterways is 303(d) listed as impaired for phosphorus or sediment. However, at the Department's request, Rock Prairie Dairy evaluated present and future soil loss and P-index on all fields currently in the Nutrient Management Plan to determine whether Rock Prairie Dairy's field management will increase or decrease soil loss and phosphorus contributions to nearby watersheds. This evaluation considered current and future tillage practices, nutrient use (chemical fertilizer v. manure) and crop rotations. Under Rock Prairie Dairy management, soil loss will be reduced by 20%. This reduction is due to crop residue and cover crop strategies that are not currently in place, but will be employed by Rock Prairie Dairy. Because the fields in the Nutrient Management Plan are currently only receiving chemical nitrogen fertilizer, the P-index is 5 – 10% lower than it will be with Rock Prairie Dairy manure applications. However, on fields that currently have high P-index due to soil loss, P-index on these fields will be reduced by 20% or more due to Rock Prairie Dairy management. Even with no current phosphorus applications, the soils in this geographic area do contain phosphorus. As currently written, the Rock Prairie Dairy Nutrient Management Plan is designed to stabilize and/or reduce the phosphorus levels in the soils – planned manure applications will not build soil phosphorous levels. Despite the minimal rise in P-index, all fields in the Rock Prairie Dairy Nutrient Management Plan will comply with NR 243 and have a P-index of 6 or lower throughout the crop rotation. Replacing chemical fertilizer with organic fertilizer has many other benefits, including reducing the carbon footprint of the farm and the surrounding fields by not requiring nutrients to be imported from other states and countries and providing a local, organic alternative to petroleum-based commercial fertilizers.

Waters classified as Exceptional and Outstanding Resource Waters include surface waters which provide valuable fisheries, hydrologically or geologically unique features, outstanding recreational opportunities, unique environmental settings, and which are not significantly impacted by human activities. There are two ERWs within two miles of the proposed facility. Spring Brook is located 6,000 feet south of the facility and Turtle Creek is located 2 miles southeast of the proposed facility.

There are no mapped wetlands within the immediate vicinity of the proposed facility.

Manure Management

The most significant possible long-term biological impact is associated with the production of manure at the facility. It is anticipated that Rock Prairie Dairy will need to manage approximately 64,585,275 million gallons of liquid manure and 9,756 tons of separated solids per year. Manure quantity estimates were based on values found in Table 1, Manure Quantity Estimation for Crop Production, of the Wisconsin Conservation Planning Technical Note WI-1, dated September 2005 and historical data from two dairies in Nebraska under the same ownership and management as the proposed Rock Prairie Dairy. Additional waste water accounted for in the waste generation numbers and planned for collection includes: silage leachate from 80,000 tons of stored feed; 100% of precipitation runoff from 7.5 acres of feed storage pad; and 100% of the precipitation runoff from the sand lanes and storage area for a total of approximately 9,168,400 gallons of wastewater to be collected at Rock Prairie Dairy annually. Wastewater is generated on the farm from cleaning the milking system and parlor floors, and sprinkling cows with water during the summer months. This wastewater volume is already accounted for in the manure production estimates described above based on published Wisconsin dilution factors; discarded bedding is not included.

Approximately 73,753,578 gallons of total manure and other process wastewater is generated annually on site including liquid manure, normal precipitation on the waste storage pond surfaces, silage leachate and precipitation runoff from the feed pad surface. The waste storage system has a usable capacity of 80,175,861 gallons. The farm will have approximately 397 days of usable capacity for storage of liquid waste. State law requires a minimum of 180 days of storage for a facility like the one proposed.

Nitrogen, phosphorous, and pathogens associated with manure and process wastewater produced at livestock operations can have detrimental impacts on groundwater, surface waters and wetlands if not properly stored, handled, and land applied. Phosphorus and nitrogen in manure and other sources of nutrients that are applied to cropland to produce feed for livestock can also be a source of detrimental impacts to groundwater, surface waters and wetlands. Some forms of nitrogen are toxic to fish (ammonia) and can impact human health when present in drinking water (nitrate). Phosphorus in surface waters promotes algae growth (known as eutrophication), which can result in decreased oxygen levels, fish kills, and reduced recreational opportunities. Biochemical oxygen demand (BOD) associated with manure and process wastewater can consume oxygen in surface waters and contribute to fish kills. Soil erosion associated with crop production can result in sedimentation in roadside ditches and wetlands. Soil erosion can also alter streambed elevations which can increase the probability and severity of floods, degrade aquatic wildlife habitat and damage commercial and recreational fisheries. The possibility of pathogens from animal manure contaminating water supplies and recreation waters is also a potential concern. Diseases from bacteria (e.g., certain strains of *E. coli*), protozoans (e.g., *Cryptosporidium*), and viruses in animal manure can be contracted through direct contact with the manure, contact with contaminated water, or consuming contaminated water either in drinking supplies or as a result of recreating in contaminated waters.

The basis of the WPDES permit program is to require CAFOs such as Rock Prairie Dairy to implement Best Management Practices (BMPs) to minimize or eliminate the potential of the impacts listed above from occurring. This is accomplished through (1) the review and approval of structures and systems associated with manure and process wastewater storage/handling (2) the review and approval of an operation's Nutrient Management Plans that details how, when, where and in what amounts manure and process wastewater from the operation will be landspread, (3) issuance of a WPDES water quality permit that outlines operational requirements for the storage, handling and land application of manure and process wastewater, and (4) ongoing review and oversight of the CAFO once it is operating, which includes conducting oversight inspections and pursuing enforcement action when needed to obtain permit compliance and address water quality impacts.

The WPDES permit will require zero (no) discharge from the production area to prevent surface water impacts from the facility; proper manure management year-round through a Department approved Nutrient Management Plan will help protect surface water and groundwater in the surrounding landscape. All of the cattle at Rock Prairie Dairy will be housed in buildings where they are totally confined. Manure or wastewater from the animal housing buildings will be processed through a sand and solids separation facility and transferred to an engineered storage facility. All of the manure storage areas and transfer facilities at Rock Prairie Dairy have been designed to meet appropriate USDA-Natural Resources Conservation Service (NRCS) design standards to further protect groundwater. The NRCS standards, and specifically NRCS 313 for manure storage facilities, require an extensive site assessment to determine area soils and depth to groundwater and bedrock to ensure structures are properly designed and constructed. NRCS Standard 313 specifies concrete thickness, reinforcement and other design requirements for these structures, as well as separation distances between the bottom of the structure and groundwater / bedrock to minimize potential leaching from these structures that could contaminate groundwater.

The Rock Prairie Dairy is proposing to build four lagoons with a total volume of 80 million gallons. This will be one of the largest manure storage systems in Wisconsin. Three of the waste storage facilities will be lined with HDPE liners and one will be lined with 5-inch thick water tight concrete. Beneath both the HDPE and the concrete liners will be a layer of compacted soils that will act as a secondary liner. HDPE liner failures, when they occur, are typically the result of poor system management rather than materials. The Rock Prairie Dairy has been designed to minimize the risks associated with HDPE failures, for example, the lagoons will be covered and little to no equipment will be used in the lagoons. Due to the complex geology of the area, the selected liner type, and the extremely large size of the lagoon system, the Department concurs with the decision to install a monitoring well system for the manure storage units and through its plan and specification review will ensure that the monitoring system will provide the necessary data and comply with the appropriate administrative codes. This includes NR 140, Wis. Adm. Code, Groundwater Quality. Rock Prairie Dairy is required to install permanent markers that are used in the operation of these structures (e.g., maximum operating level, margin of safety) to help avoid potential overflows and discharges. Design requirements also protect against potential catastrophic failures of these structures.

If not conducted properly, the land application of manure on area cropland poses the greatest risk of environmental impacts. Impacts from nutrient loadings, biochemical oxygen demand, and ammonia create surface water quality concerns. Because Rock Prairie Dairy is required to obtain a WPDES permit, landspreading of its manure is regulated in accordance with a Department approved and NRCS 590 and NR 243-compliant Nutrient Management Plan. The Nutrient Management Plan is an effective tool to proactively address possible problems that would otherwise be associated with poor manure landspreading activities.

Traditionally manure application rates had been based on the nitrogen needs of the crop. Because crops utilize more nitrogen than phosphorus, if manure is applied to the nitrogen needs of the crop on a regular basis, phosphorus soil levels will become elevated over time. While phosphorus is a critical component of ensuring healthy crop growth, excessive phosphorus applied to land can make its way to surface waters where it contributes to excessive algal growth and stress on aquatic life. Landspreading manure in accordance with an acceptable Phosphorus-based Nutrient Management Plan is advantageous to both the farmer and the environment. The nitrogen and phosphorus from the manure provides nutrients for crop growth and lowers the need for commercial fertilizer. In many instances, the net nutrient application will not change, only the type of fertilizer utilized. When manure is spread in suitable amounts and promptly tilled into the soil, the potential of runoff causing off-site problems is minimized. The proposed WPDES permit will regulate the application rates, applied acreage, spreading techniques and other specifications through the phosphorus-based Nutrient Management Plan. The Permittee will also be required to conduct manure and soil sampling to determine appropriate application rates, depending on soil and crop types.

Rock Prairie Dairy has developed field- and site-specific restrictions and practices as part of its Nutrient Management Plan. Restrictions and best management practices in the Nutrient Management Plan must take into account existing soil nutrient levels, buffers, crop rotations, and other relevant factors. Specific nutrient management restrictions will also be placed in the proposed WPDES permit. These restrictions will be designed to address phosphorus impacts associated with the operation's landspread manure as well as reduce potential for nutrient loss and runoff.

The Rock Prairie Dairy Nutrient Management Plan includes all field locations, restriction maps and land application rates for the manure generated at Rock Prairie Dairy. The application rates were developed in accordance with University of Wisconsin Extension

Publication A2809 recommendations and are based on manure nutrient values from the two existing Nebraska dairy farms owned and operated by Mr. Tuls. According to Mr. Andy Scholting, the Certified Crop Advisor who manages the manure from the Nebraska dairy farms, the nutrient values from the manure generated at those two farms are very consistent and only fluctuate when the farms experience large precipitation events. Rock Prairie Dairy will be operated and managed in the same manner as the Nebraska dairy farms, except that its manure storage facilities will be covered, and therefore less susceptible to the fluctuations that occur at the Nebraska dairy farms. As such, the manure values from the Nebraska farms are expected to be a more precise estimate than would be the book values from the Wisconsin Manure Quantity Estimation Table, which is based on Midwest Plan Service publication number MWPS-18 "Manure Characteristics" Section 1, copyright 2000.

This approach was approved by Department Water Resources Management Specialist Andrew Craig with the requirement that prior to the first land application of any manure from the Rock Prairie Dairy, the manure will be sampled and the Nutrient Management Plan will be updated and submitted to the Department for review and approval. This will ensure that all nutrients generated at Rock Prairie Dairy are accounted for. At the request of the Department and to ensure it had adequate acreage secured in its Nutrient Management Plan, the farm's nutrient management planner, Brian Mooney, completed a worst-case analysis and determined that even if "book values" were used, Rock Prairie Dairy still has more than adequate land base under its control to manage its nutrients in accordance with NR 243 and NRCS 590 nutrient management standards.

The Rock Prairie Dairy Nutrient Management Plan currently administers 5340.8 total acres and 5270.5 spreadable acres. "Spreadable acres" are the acres available for manure application after all setbacks and restrictions are accounted for. In addition to the 5340.8 total acres secured by written agreements, Rock Prairie Dairy has received verbal commitments on 1472 additional acres not presently included in the Nutrient Management Plan. Rock Prairie Dairy and the Department agreed that these commitments should be documented as extra acreage available for the Nutrient Management Plan, if needed.

The Rock Prairie Dairy Nutrient Management Plan provides that the farm will apply solid manure using manure spreaders, will apply liquid manure through dragline hose and will apply manure water through center pivots utilizing drop nozzles below the growing corn canopy. By utilizing all application methods, Rock Prairie Dairy will be able to apply nutrients as needed, in a precise manner. Specifically, solid manure applications will take place in the fall primarily on fields coming out of corn silage and going to corn grain; dragline applications on all corn grain acres will take place in the fall; center pivot applications are planned on corn silage acres from June-July (knee high to tassel) during the growing season when the nutrient uptake can be maximized by the crops. The Nutrient Management Plan provides that the duration and application rates will vary depending on field and weather conditions. The Nutrient Management Plan does not include any planned winter applications; any winter applications should only be on emergency basis and follow NR 243 restrictions.

Manure water application through a center pivot irrigation system will allow the farm to apply nutrients to crops throughout the growing season, maximizing nutrient uptake as the crop needs increase. Center pivot technology, although not yet widely utilized for manure applications in Wisconsin, has been employed for this purpose in many other states. Notably, between the two dairy farms Mr. Tuls owns in Nebraska, his team operates 40 fields with permanent center pivot irrigation systems that are used for manure water application.

Based on studies conducted at hog farms which utilized top-mounted spray nozzles and end guns, the Department expressed some concern that the proposed center pivot application of manure water would create strong odors during applications. The center pivots at Rock Prairie Dairy will utilize variable rate, low pressure drop nozzles, positioned approximately 36 inches from the ground surface, which will dramatically reduce odor from land applications. These nozzles operate by providing low-volatilizing, drip applications that continuously rotate over the surface of the field. "Variable rate" means the nozzles can be adjusted to the appropriate application rate to ensure there are no over-applications.

This center pivot application method is expected to result in less odor generation than traditional application methods. Center pivot applications also have the potential to significantly reduce the runoff potential because nutrients will be applied throughout the growing season in smaller doses instead of twice per year, and nutrients will be applied during the hot, dry months when soil and crop needs are greatest. Of the 16 fields planned for center pivot applications, none are reported to have tile lines, further reducing the potential for manure water discharges during or after applications. During and after center pivot irrigation applications, Rock Prairie Dairy will perform visual inspections of fields to ensure there is no ponding or runoff from the irrigation fields.

The center pivot application method is also considered a "precision agriculture" tool, which allows nutrient application events to be planned based on irrigation modeling. Irrigation modeling tools account for precipitation, evaporation potential, crop uptake, and soil available water holding capacity, and help ensure the crop and the soil will properly utilize the nutrients. Center pivot applications at Rock Prairie Dairy will be planned using the Wisconsin Irrigation Scheduler developed by UW-Extension or a similar model.

Rock Prairie Dairy submitted plans and specifications for approval to the Department for the center pivot installations, the irrigation pipeline to be installed to allow manure water to be irrigated, and groundwater monitoring wells to be installed near the center pivot

fields and the lagoon system. The Department is reviewing these plans. The pipeline will have two mainlines that will predominantly run north/south to the center pivot fields. Valves will be installed along the pipeline to direct the flow of the manure water to the desired center pivot fields. There will be air relief and pressure relief valves located along the pipeline to protect the pipeline during operation of the system. During installation of the irrigation pipeline, five waterways will be crossed. At all waterway crossings, directional (horizontal) boring will be used so the bed and bank (surface) of the waterway is not disturbed. As long as the bed and bank is not disturbed, a Chapter 30 permit will not be required for the irrigation pipeline installation. No wetlands or W soils are identified on the DNR Surface Water Data Viewer within the pipeline route.

Failure of these pipelines is a concern. During construction of the pipeline, hydrostatic pressure and leakage tests will be performed on pressure pipes selected by the design engineer. At the end of every irrigation season, the irrigation system will be drained and cleaned out. Liquid and any material from the lines will be discharged back into the waste storage ponds. The irrigation system will also feature switches to sense pressure deviations that will cause the system to shut down.

The plans and specifications also include the following details. Prior to conducting any center pivot applications, Rock Prairie Dairy will install, develop and survey twelve initial groundwater monitoring wells in the area of the center pivots to obtain regional groundwater elevations and groundwater flow directions. The initial monitoring wells will be sampled and monitored for three consecutive months following installation to assist in identifying the general groundwater flow direction and allow for a more accurate placement of additional wells. Placement of a minimum of ten additional groundwater monitoring wells will be conducted; locations will be determined based on initial well data. The first twelve monitoring wells will be sampled three times after installation, one month apart, to provide a baseline water flow data set. After the entire well network installation is complete, the wells will be sampled monthly during the irrigation season (May through August). After August, the wells would be sampled on a quarterly basis (November and February). This schedule will provide sample data for groundwater quality at critical times throughout the year. This schedule and other details may be adjusted during the plan review process.

Due to the complex geology of the area and the size of the system, the Department concurs with decision to install a monitoring well system for the center pivots and through its plan and specification review will ensure that the monitoring system will provide the necessary data and comply with the appropriate administrative codes. This includes NR 140, Wis. Adm. Code, the groundwater standard.

Rock Prairie Dairy, along with all livestock operations in Wisconsin, are subject to the state standard for nutrient management, NRCS Standard 590. NRCS Standard 590 includes the following requirements:

- Manure and process wastewater must be sampled and analyzed to determine nutrient content. Soils receiving nutrients must also be sampled and analyzed. These analyses serve as the basis for determining rates of application of manure and other nutrient sources.
- Applications of nutrients (e.g., phosphorus and nitrogen) from manure and other nutrient sources on cropped fields must be balanced with the nutrient needs of the crops grown on these fields. Only in limited circumstances are field soil test phosphorus levels allowed to increase over a crop rotation (e.g., soil test levels are low or delivery of phosphorus will not exceed certain tolerances).
- Manure and other nutrients may not be applied on fields that exceed tolerable soil loss (T).

In addition, NR 243 and the WPDES permit for Rock Prairie Dairy will place additional restrictions on applications of manure and process wastewater, including the following:

- Applications may not occur on areas of fields with less than 24 inches to groundwater or bedrock.
- Applications may not occur within 100 feet of a private well or other direct conduits to groundwater (e.g., sinkholes, fractured bedrock at the surface) or within 1,000 feet of a municipal well.
- Applications on fields with soil test levels greater than 100 ppm of phosphorus must meet additional restrictions to limit phosphorus delivery to surface waters.
- Applications near navigable waters and their conduits, called Surface Water Quality Management Areas, are subject to additional BMPs designed to avoid acute runoff events.
- Liquid manure may not be surface applied when ground is frozen or snow-covered, except under very limited circumstances. In conjunction with this requirement, the farm must have 180 days of liquid manure storage to avoid applications during winter months. Solid manure may not be surface applied when ground is frozen or snowcovered during the months of February and March. Where applications of manure are allowed, the applications are subject to limitations on the amount of manure that can be applied, setbacks from streams and direct conduits to groundwater and slope restrictions (maximum 9% for solid manure, 6% for liquid manure).

The Department has the authority to implement further landspreading restrictions in the WPDES permit if there are additional water quality and environmental concerns. Rock Prairie will be required to conduct land spreading in accordance with an approved Nutrient Management Plan, maintain an adequate land base for landspreading, and properly inspect and maintain manure storage facilities and runoff control systems.

Because of the BMPs required under NR 243, the additional acreage covered under Rock Prairie Dairy's Nutrient Management Plan represents a significant potential reduction in pollutant delivery (e.g., nutrients, sediment) from cropped fields to area surface waters, groundwater and wetlands. In addition, this represents potential decreases in nutrient loadings to downstream impaired waterbodies. By balancing nutrient applications with crop need and avoiding applications during periods when the potential for runoff is increased (e.g., during winter months), manure, process wastewater and their associated pollutants are kept on the land and in the soil, thus reducing the potential for these pollutants to negatively impact water quality. Should Rock Prairie Dairy fail to comply with practices outlined above, including avoiding runoff except in the case of a 25- year, 24-hour storm or cause the fecal contamination of a well, it would be a violation of its permit and subject to Department enforcement.

Rock Prairie Dairy will be required to develop an emergency response plan to address potential spills from both the CAFO production area and land application areas. The advance planning associated with an emergency response plan can help to minimize or altogether avoid environmental impacts associated with unexpected problems.

The operation will be required to keep records and submit reports to the Department to document that they are properly operating manure handling and storage systems, runoff control systems and are complying with NMP requirements. Standards to conduct land spreading in accordance with its Nutrient Management Plan and WPDES CAFO permit, maintain an adequate land base for landspreading, and properly inspect and maintain manure storage facilities and runoff control systems, are required in order to reduce the threat to groundwater, wetlands and surface water under normal operating and climatic conditions.

Feed Storage

It is expected that the feed used for the animals at Rock Prairie Dairy will be grown using standard agricultural practices which will likely include the use of pesticides and other chemicals. There are a wide variety of EPA approved agricultural chemicals that can be used to control insects and weeds. Certain chemicals can travel far from where they are applied either by attaching to soil particles or being carried through the air. Agricultural chemical residues reaching surface-water systems can harm freshwater organisms and damage recreational and commercial fisheries. Agricultural chemicals in drinking water supplies may pose risks to human health. These impacts are not regulated under WPDES permit authority. Given the extent that raising feed for Rock Prairie Dairy will either increase or decrease the use of these chemicals is not known, it is not possible to assess this impact. However, the nitrogen, phosphorus, and organic material from Rock Prairie Dairy's manure will provide nutrients for crop growth and will lower, or in some cases eliminate, the need for chemical fertilizers. In many instances, the net nutrient application will not change, only the type of fertilizer.

Feed storage leak control and runoff control practices are addressed in the plans and specifications for the production area which the Department is currently reviewing. A feed storage complex which includes a concrete feed pad, four hay sheds, a commodity shed, and two sweet corn silage bunkers are planned. The feed storage bunkers will be designed with watertight concrete floors to eliminate leakage to groundwater. All runoff from these bunkers will be collected and directed into the manure storage lagoons.

Cultural Impacts

There are no known archeological or historical resources that will be impacted by the proposed Rock Prairie Dairy project.

The site will not be significantly changed in terms of land use as a result of the facility construction. The current Zoning Ordinance for the Township identifies the site as A-1 Agricultural. This district exclusively provides for agricultural uses and uses consistent with agriculture. No changes in zoning will be required for this project.

The Department has reviewed literature regarding property value impacts from livestock operations; however, the literature deals primarily with impacts from hog operations on property values, which may or may not be relevant to the proposed project. It is difficult to assess the extent or existence of such impacts on property values and these impacts are beyond the regulatory authority of the Department.

The area's economy will improve through job creation associated with the operation and an increase in the area's tax base that will benefit the community. After completion of the project, it is estimated that Rock Prairie Dairy will contribute nearly \$18 million annually to local goods and services, and will employ 50 full time employees. According to the *Wisconsin and the Agricultural Economy Study authored by UW Department of Applied Agricultural and Applied Economics*, for every dollar generated in dairy, \$1.98 is generated in other parts of the Wisconsin economy, and for every job created in dairy, an additional 1.3 jobs are created in other parts of the Wisconsin economy. In addition to the economic benefits, there may be permit conditions affecting the management of the operation that may be beneficial to the current land use. It is difficult to assess the extent or existence of such impacts on property values and these impacts are beyond the regulatory authority of the Department.

Energy Impacts

The proposed dairy will ultimately result in increased energy use. In the future, Rock Prairie Dairy may explore the possibility of installing a methane digester which would generate energy at the facility and help offset its purchased energy consumption. There are no current plans to install a methane digester.

2. Significance of Cumulative Effects

There is a trend in the livestock industry toward larger-scale facilities of this kind. Large scale operations have rapidly become an economic necessity due to changing pricing structures and the need to reduce capital inputs while maximizing production. Economies of scale associated with CAFOs have allowed producers to increase production without increasing costs. If numerous projects of this type are proposed in the same geographic area, there is a concern that the land base available for landspreading manure could be overwhelmed. This would make a number of such projects nonviable, primarily with respect to costs associated with hauling manure long distances for landspreading. The Department is not aware of additional projects of this type in the same geographic area such that the availability of land for manure application would be inadequate.

The facility has stated that they have no plans to expand the operation at this site after the initial construction is completed. Any future projects will be examined at the appropriate time. With each new operation or proposed expansion, cumulative effects such as impacts from manure landspreading activities are considered. Unless these facilities are poorly sited or concentrated in a small area, the cumulative impacts to the environment should not be significant.

3. Significance of Risk

All the animals at the Rock Prairie Dairy facility will be totally confined within free-stall barns and therefore the risk of soil erosion resulting from animal hoof impact is not an issue at this site.

All manure storage facilities at the facility will be operated and maintained to minimize leakage for the purpose of complying with groundwater standards. The proposed WPDES permit will require manure storage facilities to have 180 days of storage for all manure and process wastewater generated at the operation to ensure that wastes can be properly stored and land applied in compliance with the conditions and timing restrictions of the permit.

Rock Prairie Dairy has confirmed that the operation will have 397 days of storage – well above the 180 day requirement. Rock Prairie Dairy will be required to maintain at least 180 days of storage as long as it operates. Rock Prairie Dairy may not exceed the maximum operating level (MOL) in liquid storage or containment facilities except as a result of recent precipitation or conditions that do not allow removal of material from the facility in accordance with permit conditions. The facility must maintain a margin of safety in liquid storage or containment facilities so that levels of manure, process wastewater, and other wastes placed in the storage or containment facility do not overtop, even in the event of unexpected precipitation or other weather events. The waste management system proposed for Rock Prairie Dairy, LLC has been designed to prevent the possibility of a spill. All components of the system have been designed to withstand all anticipated loads: internal, external, hydrostatic uplift and concentrated surface and impact loads. System capacity has been checked to ensure pipelines and other transfer components function as intended without premature wear. The waste storage facilities were designed to ensure overfilling one of the facilities is not possible. The waste storage ponds are connected by two crossover pipes. The crossover pipes between each pond are located at two different elevations. The lower pipe will be 2 feet above the floor of the waste storage structure and the upper pipe will be 7.5 feet above the floor of the waste storage pond. The crossover pipes will have valves to allow operational flexibility of the waste storage system.

The proposed WPDES permit will require that permanent markers for the margin of safety level and 180-day level be installed. All storage facilities shall be monitored and inspected by Rock Prairie Dairy employees weekly for cracks and corrosion and compliance with the effluent limitations. In addition, the level of material in all liquid storage and containment facilities shall be measured weekly in feet or inches above or below the margin of safety level and be emptied to the point that the 180-day level indicator is visible on at least one day between October 1 and November 30 each year.

The proposed WPDES permit will require a minimum distance of 250' between wells and manure storage facilities. The permit also will contain language requiring all storage facilities to temporarily store manure to meet the intent of the performance criteria of USDA Natural Resources Conservation Service standards. Please refer to the Nutrient Management Plan for details concerning how Rock Prairie Dairy has implemented BMPs to meet these requirements. If any upgrading or modifications to the storage facilities are necessary, formal engineering plans and specifications must be submitted to the Department for approval.

The Permittee must comply with all terms and condition of any WPDES permit issued and the associated Nutrient Management Plan. Rock Prairie Dairy's Nutrient Management Plan will manage acres that may not have previously been managed in accordance with a nutrient management plan, which could mean significant environmental improvements resulting from more stringent nutrient

management requirements as compared to existing manure application practices. The proposed WPDES permit will require that no liquid manure be spread during the winter on frozen and snow covered ground. Rock Prairie Dairy has committed in their Nutrient Management Plan that no solid manure shall be spread under the same conditions except in an emergency situation. NR 243 only requires this limitation during the months of February and March. Since cold weather and frozen fields pose the highest risk for manure runoff, these restrictions will significantly reduce the risk to the environment.

The nutrient content of manure temporarily stored in the storage facility may vary. Unidentified variations in nutrient content may result in over-application of nutrients (nitrogen in particular) that could impact groundwater. Any WPDES permit issued to Rock Prairie Dairy will require manure and soil testing to ensure this does not occur.

It is inappropriate to state the risk for water pollution from this project is eliminated entirely; the risk can only be minimized via required implementation of pollution prevention best management practices. This is the case with every WPDES permit the department issues. The WPDES permit will require the Nutrient Management Plan to be fully implemented at all times and for Rock Prairie Dairy to report periods of non-compliance with the permit. Should Rock Prairie Dairy fail to comply with the WPDES requirements, it would be in violation of its permit and subject to department enforcement.

4. Significance of Unknowns

Groundwater Impacts

Historic and ongoing groundwater contamination concerns are prevalent throughout Wisconsin. These impacts are generally associated with historic agriculture production in the state. The Department expressed concern about local nitrate and arsenic levels near the Rock Prairie Dairy facility site. Arsenic is an element that occurs naturally in some of Wisconsin's aquifers and may contaminate well water drawn from those aquifers. It is a particular problem in parts of the Fox River valley of northeastern Wisconsin. However, arsenic has been detected in wells in every county in Wisconsin, and arsenic concentrations greater than the drinking water limit of 10 µg/L have been documented in 51 of Wisconsin's 72 counties. In southeastern Wisconsin, the mechanism by which arsenic is released from geologic materials is different. The arsenic is associated with iron oxides and is released by natural reduction reactions that cannot readily be prevented or controlled. In such areas, alternatives are limited to treating water or using another (often shallower) aquifer for water use.

There are historic groundwater contamination concerns prevalent throughout Rock County. These concerns are in no way limited to the area immediately surrounding the Rock Prairie Dairy facility site, and originate from a number of sources, including agricultural fertilizer applications, legume cropping systems and on-site wastewater systems (septic systems). According to the 2009 Rock County Health Department Annual Report, 32% of private wells tested for nitrates in 2009 exceeded the ten (10) parts per million enforcement standard. The percentage of private wells testing unsafe for bacteria decreased in 2009, which has been the trend over the past five years. Rock County has a Groundwater Protection Plan, which includes sampling private and public supply wells for nitrates and other contaminants. To promote citizen awareness of groundwater issues, Rock County also provides a Ground Water Educational Program, a Well Abandonment Program, and a Prescription Drug Community Collection Program. Educational programs have also been put in place around Wisconsin to help citizens and farmers limit nitrogen inputs to groundwater. Agricultural programs emphasize soil testing and proper crediting of nitrogen sources already in place to avoid over fertilization, and good management practices for fertilizer storage and handling to minimize spills and other losses. The substance of these programs has been codified in NR 243, which requires the Rock Prairie Dairy Nutrient Management Plan to incorporate soil test requirements and second year nutrient crediting when developing nutrient application plans for each field.

The Rock Prairie Dairy is proposing to build four lagoons with a total volume of 80 million gallons. This will be one of the largest manure storage systems in Wisconsin. Three of the waste storage facilities will be lined with HDPE liners and one will be lined with 5-inch thick water tight concrete. Beneath both the HDPE and the concrete liners will be a layer of compacted soils that will act as a secondary liner. HDPE liner failures, when they occur, are typically the result of poor system management rather than materials. The Rock Prairie Dairy has been designed to minimize the risks associated with HDPE failures, for example, the lagoons will be covered and little to no equipment will be used in the lagoons. Due to the complex geology of the area, the selected liner type, and the extremely large size of the lagoon system, the Department concurs with the decision to install a monitoring well system for the manure storage units and through its plan and specification review will ensure that the monitoring system will provide the necessary data and comply with the appropriate administrative codes. This includes NR 140, Wis. Adm. Code, Groundwater Quality.

Antibiotic Use and Pathogens

There are currently no drinking or surface water standards for antibiotics and hormones that could result from livestock operations. The use of antibiotics and hormones by CAFOs is a growing public health concern. The USEPA recognizes the need to improve manure management practices at all farms. A number of other U.S. governmental entities including: USEPA, U.S. Department of Agriculture (USDA), U.S. Geological Survey (USGS), and Centers for Disease Control and Prevention have also recognized the need

for control of pathogens from farms and have undertaken research and surveillance aimed at improving the outcomes for public health and welfare in the U.S.

Though there are currently no standards for pathogens, antibiotics, and hormones for CAFOs, the proposed WPDES permit will require zero (no) discharge from the production area. All of the animals at this operation are totally confined, significantly reducing the risk of contaminated runoff. Also, a Department approved nutrient management plan will require that manure application rates be dependent on crop nutrient need. The greatest risk of pathogen transfer from manured land to surface waters is through runoff into tile lines and Karst soils. There are no known karst features on or near the Rock Prairie Dairy facilities and very few fields in the Nutrient Management Plan contain tile lines. These BMPs do not reduce the risk of pathogens, but do reduce the risk that pathogen transfer from the dairy operation.

Manure Storage and Runoff Controls

The Department has determined that all proposed manure storage facilities will be built in accordance with currently accepted standards and will be operated in compliance with all applicable rules and regulations. If the Department later determines that construction or operation of any waste storage facility fails to meet current standards, the Permittee will be required to upgrade the facilities to meet current standards in accordance with a schedule in the proposed WPDES permit.

Current regulations require that there be no discharge of pollutants from any manure storage facilities, composting and leachate containment systems, milking center wastewater treatment/containment systems, raw material storage areas, or other areas of the production area to navigable waters, except in the event a 25-year, 24-hour rainfall or greater event, or where a chronic rainfall event causes a discharge of pollutants to navigable waters from a facility, structure, or area which is properly designed for a 25-year, 24-hour rainfall event. In addition, current regulations prohibit (1) overflow of manure storage facilities, (2) direct runoff from a feedlot or manure storage facility to waters of the state, (3) unconfined manure piles/stacks in water quality management areas, and (4) unlimited access by livestock to waters of the state in locations where high concentrations of animals prevent maintenance of adequate sod cover.

Possible operating problems that could impact the environment include the failure of manure handling and storage facilities, or improper land application practices that lead to nutrient runoff to surface waters or leaching of nutrients to groundwater. The Department's review and approval of proposed manure storage facilities, and its review and approval of Permittee's nutrient management plan will make it unlikely that any storage facility would fail or that improper land application would occur.

Within 30 days of permit issuance, Rock Prairie Dairy will be required to implement a Department approved Emergency Response Plan to address small-scale manure spills. The Emergency Response Plan is part of the overall operation and maintenance plan for the facility. This plan will address spills associated with general operation and maintenance of the dairy operation. Small spills that occur as a result of the general operations often do not create an immediate environmental impact, but they do need to be addressed by the Permittee (e.g., scraping areas where small amounts of "spilled" manure have collected, changing operating procedures to avoid small "spills"). These response actions help ensure that impacts to waters of the state, primarily through runoff resulting from storm events, do not occur.

A massive failure of a manure storage facility would likely be formally defined as a spill under ch. NR 706, Wis. Admin. Code. Chapter NR 706 describes requirements for immediate notification of the Department in the case of a spill. A requirement to follow ch. NR 706 will be included in the proposed WPDES permit. Inappropriate or inadequate responses (i.e., time frame of response and action taken to eliminate or mitigate environmental impact) to spills and associated environmental impacts are subject to Department enforcement. Specific Department and Permittee response actions will depend on a case-by-case evaluation of actual environmental impacts and corrective actions taken by the Permittee.

Department inspections based on complaints or general compliance efforts will help the Department evaluate whether the Permittee is properly addressing minor "spills." In addition, the Permittee will be required to conduct regular inspections of storage facilities to ensure that more significant problems are addressed prior to any sort of massive facility failure.

5. Significance of Precedent

All future projects will be evaluated by their own specific adverse and beneficial impacts. There are 195 permitted CAFOs in Wisconsin, 167 of which are dairy farms. Each individual project is considered separately based on its own merits.

In conducting this EA, the Department primarily considered issues that fall within its regulatory authority. The proposed facility is not known to conflict with plans or policy of local, state, or federal agencies. Permittee will need to apply for and receive the appropriate approvals from all involved agencies prior to operating. Permitting this operation would not foreclose future options for taking

necessary actions to protect the environment (i.e., revocation, modification of the permit). In actuality, through enforcement of the WPDES permit, the Department has a means to avoid or address possible environmental impacts associated with the operation.

6. Significance of Controversy over Environmental Effects

Public controversy may be generated as a result of the permitting of this operation. Citizens may express concerns about the environment such as concerns over levels of odor or air emissions as well as water quantity/quality issues. The size of the proposed operation may also generate controversy.

Rock Prairie Dairy, as with any source of air pollution, is required to evaluate existing information, determine its air emissions, and comply with any air regulatory requirements that apply. Water quantity issues are addressed to the extent possible by the high capacity well approval process. However, water quantity issues are not addressed by plan review or permit issuance associated with the WPDES CAFO permit program. The WPDES permit program is strictly a water quality protection based program. It is expected there will be a positive impact to the economy, tax base, and employment as a result of this project. Area farms that currently only market crops as grains will now have that the option to market forages. Also, nearby farms will have the chance to reduce their expenditures by entering into contracts for acceptance of manure nutrients, potentially in exchange for crops for animal feed.

There may also be socio-economic concerns such as animal confinement issues, the trend towards large-scale farming in the state, impacts larger-scale farming may have on the viability of smaller operations, and concerns of smaller operations and non-farming rural inhabitants regarding changes in the agricultural landscape associated with CAFOs. The socioeconomic issues are difficult to quantify and there is significant disagreement as to the validity of these concerns. These socio-economic issues are beyond the scope of the proposed WPDES CAFO permit and the Department's overall regulatory authority. At this point, some of these issues may be addressed through local zoning and through implementation of comprehensive land use planning by the local unit of government.

Information Submitted by the Public

The Department received information from the public for consideration in the development of this document. A summary of this information is included in this section and the information is available for public review. The information that is applicable to this document has already been included or addressed. Other information may be more applicable to the processing of the permit application and the development of the WPDES permit. Some information is not applicable to either process.

The submittals include water quality information/concerns for this specific project area. This concern focuses on overall phosphorus concerns and specifically those concerns in the Turtle Creek watershed. This topic is specifically identified in the water quality sections.

Information was provided on past compliance issues at the owners existing operations in Nebraska. This information is not included in this document, but could be reviewed in the permitting process.

An EPA document titled Risk Assessment Evaluation for Concentrated Animal Feeding Operations was provided. Risks from a operation such as this are summarized in the Significance of Risk section above. This information is also important for policy development and is typically part of rulemaking.

Information was provided to highlight the concern with climate changes and the possibility of more numerous and severe storms. This issue may be addressed in future policy and rulemaking changes and revised calculations of storm intensity and frequency, but is currently outside of the scope of this document.

ALTERNATIVES

Briefly describe the impacts of no action and of alternatives that would decrease or eliminate adverse environmental effects. (Refer to any appropriate alternatives from the applicant or anyone else.)

Facility Alternatives

The applicant studied four alternatives before deciding to expand at the facility.

Alternative #1: No build. The "No build" alternative would not introduce any new environmental threat to the community; however, this alternative would also not provide any new environmental benefits to the community. Most fields included in Rock Prairie Dairy's nutrient management plan are not currently part of a NR 243-compliant nutrient management plan. As such, nutrient applications on those fields are not currently regulated to the stringent standards that NR 243 requires.

Mr. Tuls is currently trucking milk from his Nebraska farms for sale in Wisconsin and would likely continue to do so if this facility is not built.

In addition, if the “no build” alternative were selected, those fields would continue to utilize imported petroleum-based commercial fertilizer, instead of utilizing local organic sources of nutrients. Use of local nutrients will reduce truck traffic throughout the community, resulting in fewer air emissions and fewer local resources needed to continually repair and upgrade local roads.

Finally, the “no build” alternative would not provide any new economic development, employment opportunities, or tax revenue at the local and state levels.

Alternative #2: Build another dairy facility in Nebraska. An expansion at another farm owned by the applicant was considered; however, the applicant’s other farms are located in Nebraska. Although its Nebraska farms have been very successful and additional expansions in Nebraska may occur in the future, the applicant intentionally sought out agricultural opportunities in Wisconsin, America’s Dairyland. Currently Mr. Tuls is exporting milk from his Nebraska farms to Wisconsin. A facility in Nebraska would not meet the goal of having a facility in Wisconsin to reduce this shipping distance. As demonstrated by its existing and remarkably successful agricultural economy, Wisconsin offers many unique and valuable opportunities for dairy farmers that other states simply cannot compete with. The environmental and community benefits / detriments of this alternative are the same as the “no build” alternative above.

Alternative #3: Choose a location other than the proposed site. Rock Prairie Dairy spent nearly a year exploring possible sites in southeast Wisconsin to develop this project. Other sites were eliminated due to the presence of other dairy farms in the vicinity, proximity to urban areas, lack of adequate cropland for feed production and/or manure application, less than ideal topography, or an inadequate infrastructure of agri-business supplies or services. The site selected by the applicant provides all necessary physical and economic infrastructures to successfully develop this project and contribute, not only to the local community, but to Wisconsin’s unique and thriving agricultural economy.

Alternative #4: Build the facility as proposed. This is the selected option because the location provides the necessary physical and economic infrastructure for this project. The proposed size of the operation is an economic necessity due to changing pricing structures and the need to reduce capital inputs while maximizing production. Economies of scale associated with CAFOs have allowed producers to increase production without increasing costs. A facility the size of the one proposed may provide some environmental advantages as a result of having more resources available than if it were smaller in size. A CAFO is required to obtain permits from State and Local governments and must follow restrictions and requirements, including a Nutrient Management Plan. A smaller operation does not have these requirements. Finally, building the facility as proposed will provide new economic development, employment opportunities, tax revenue at the local and state levels and satisfy the goal of having a dairy operation in Wisconsin for the reasons stated above.

WPDES Permit

Within the constraints of the Department’s existing permitting authority for CAFOs, the Department has limited alternatives to the issuance of a WPDES permit for the Rock Prairie Dairy operation. Based on the information available to the Department, the Department cannot justify denial of the proposed WPDES permit for the operation since it is expected that the operation will comply with the conditions of the proposed permit which does not allow then to exceed water quality standards. The Department could require more stringent conditions in the permit if it determined the conditions were necessary to protect water quality. The Department will use the information collected as part of the environmental analysis as well as part of the public comment period associated with the issuance process of a WPDES permit to make its final determination on issuance of the permit and to determine if additional restrictions in the proposed permit are necessary.

SUMMARY OF ISSUE IDENTIFICATION ACTIVITIES

List agencies, citizen groups and individuals contacted regarding the project (include DNR personnel and title) and summarize public contacts, completed or proposed.

- Mark Cain, DNR Wastewater Engineer
- Brian Ellefson, DNR Wastewater Specialist
- Susan Josheff, DNR Lower Rock River Basin Supervisor
- Martin Nessman, DNR Water Supply Specialist
- Emily Groh, DNR Conservation Biologist
- Rori Paloski, DNR Conservation Biologist
- Brian Barbieur, DNR Air Management Engineer
- David Panofsky, DNR Air Management Engineer
- Eric Heggelund, DNR Environmental Analysis and Review Specialist
- Russ Anderson, DNR Environmental Analysis and Review Supervisor
- Norm Tadt, Technician, Rock County Land Conservation Department
- Jennifer Keuning, Project Manager – Conestoga Rovers & Associates
- Todd Boehne, Design Engineer – Conestoga Rovers & Associates
- Brian Mooney, Nutrient Management Consultant – The DeLong Company
- Anna Wildeman, Michael Best and Friedrich, LLP

The proposed WPDES permit for the operation will be public noticed for comments as part of the permit issuance process. An informational hearing will be held on the proposed WPDES permit to receive additional comments.

DECISION (This decision is not final until certified by the appropriate authority)

In accordance with s. 1.11, Stats., and ch. NR 150, Wis. Admin. Code, the Department is authorized and required to determine whether it has complied with s. 1.11, Stats., and ch. NR 150, Wis. Admin. Code.

Complete either A or B below:

A. EIS Process Not Required X

The attached analysis of the expected impacts of this proposal is of sufficient scope and detail to conclude that this is not a major action which would significantly affect the quality of the human environment. In my opinion, therefore, an environmental impact statement is not required prior to final action by the Department on this project.

B. Major Action Requiring the Full EIS Process _____

The proposal is of such magnitude and complexity with such considerable and important impacts on the quality of the human environment that it constitutes a major action significantly affecting the quality of the human environment.

Signature of Evaluator	Date Signed
Noted: Regional Staff Specialist or Bureau Director	Date Signed

Number of responses to news release or other notice: _____

CERTIFIED TO BE IN COMPLIANCE WITH WEPA	
Regional Director or Director of BISS (or designee)	Date Signed

NOTICE OF APPEAL RIGHTS

If you believe you have a right to challenge this decision made by the Department, you should know that Wisconsin statutes, administrative codes and case law establish time periods and requirements for reviewing Department decisions.

To seek judicial review of the Department's decision, sections 227.52 and 227.53, Stats., establish criteria for filing a petition for judicial review. Such a petition shall be filed with the appropriate circuit court and shall be served on the Department. The petition shall name the Department of Natural Resources as the respondent.

Rock Prairie EA Comments received on 02/03/2011 from the applicant's attorney David A. Crass, Michael Best & Friedrich LLP

Responses are added after each section below;

February 3, 2011

VIA EMAIL (mark.cain@wisconsin.gov)
AND U.S. MAIL

Mr. Mark R. Cain
Wastewater Engineer
Wisconsin Department of Natural Resources
3911 Fish Hatchery Road
Fitchburg, WI 53711

Re: Rock Prairie Dairy - Environmental Assessment

Dear Mark:

As you know, we represent Rock Prairie Dairy, LLC ("RPD"). On January 14, 2011, the Wisconsin Department of Natural Resources ("WDNR") publicly noticed an environmental assessment ("EA") for the proposed Rock Prairie Dairy. On behalf of RPD, this letter provides RPD's comments on the EA and the Department's preliminary determination to issue a Wisconsin Pollutant Discharge Elimination System ("WPDES") permit for the proposed dairy. By publishing public notice, providing public access to the EA on the WDNR website and providing 21 days for the public to submit comments on the EA, WDNR has more than satisfied the public notice and comment procedural requirements of NR 150.^[1] Furthermore, as drafted, the content of the EA is adequate

^[1] We are aware that the Department has received at least one request to extend the EA public comment period beyond the 21- day period already provided. We understand that the putative reason for this request is that the requester asserts that more public outreach on the project should be performed by the Department. We note here that, since before the permit applications for the proposed dairy were submitted to WDNR, there has been significant and consistent community outreach by the applicant and significant media coverage, such that any affected party has had more than enough opportunity to learn about the proposed dairy and contact Mr. Tuls, WDNR or DATCP staff with questions or concerns about the project. Specifically, in December 2010, RPD invited all of the citizens of the Town of Bradford to attend an open house at the Bradford Town Hall. At the open house, RPD consultants and experts were available to answer questions and address concerns about the project and WDNR and DATCP staff were in attendance to answer questions about the WPDES permit process, the nutrient management plan and the livestock siting process. In addition, as part of the livestock siting process, the Town of Bradford held two public hearings on the livestock siting application – again WDNR and DATCP staff were in attendance to address questions about the agencies' permit processes. Finally, in early December 2010, the Janesville Gazette – the most widely circulated local daily paper nearest the proposed dairy – reported on the front page, for three consecutive days, facts about the proposed dairy and Mr. Tuls' Nebraska dairies. Simply put, there has been more than adequate time and opportunity for the public to become educated about the proposed dairy and to reach out to the applicant and/or agency staff to provide comment. There is no need for any additional time for the public to comment on this EA.

and satisfies the substantive requirements of Wis. Stat. § 1.11 and Wis. Admin. Code ch. NR 150.

Response: Noted

The balance of this letter provides comments and clarifications on some specific points included in the EA. Our comments are provided in the order the matter commented on appears in the EA; page references are provided.

1. Page 3, paragraph 4 of the EA states that WDNR stormwater regulations “are not intended to address water quantity (flooding) issues that may result from new development.” We agree, but note that, as required by the Rock County Stormwater Ordinance, the RPD production area was engineered and designed so that stormwater runoff from the constructed facility is the same as, if not less than, the runoff that occurred prior to the development.

Response: Noted

2. Page 4, carryover from 3 and page 7 of the EA state, “some of the area surrounding the proposed dairy has been identified as major bedrock aquifer recharge area[s].” We disagree with that characterization and do not believe it accurately presents the information in the Zaporozec publication cited. The Zaporozec publication provides a narrative description of recharge characteristics in Rock County and specifically states, “Rock County does not have any distinctive recharge area, and recharge to ground water occurs over the entire land area of the county...” Zaporozec at 33 (emphasis added). We understand the Department has referenced Figure 13 of the publication, as indicating that the RPD production area is within a “major bedrock aquifer recharge area”; however, the recharge areas delineated on Figure 13 are “only those areas where the ground water flows predominantly downward. Recharge to ground water can occur anywhere in the county.” It is our position that the Department’s characterization and concern over the RPD production area as “major recharge area” is exaggerated and inconsistent with the substance of the Zaporozec publication upon which it relies.

Response: The Department disagrees with this comment. The Department’s characterization of the RPD production area as a “major recharge area” is directly derived from both Figure 13 of the Zaporozec document and the narrative description of recharge in the document, which specifically states, “The ground-water flow systems are complex and multi-layered. In the intervening areas between the major recharge areas indicated in figure 13 and major discharge areas (the major streams of the county) are many local systems where ground water flows from a local recharge area to a local discharge area...” Zaporozec at 35 (emphasis added). We feel this is both consistent with Figure 13 and the substance of the Zaporozec publication.

3. Page 5, paragraph 5 of the EA states, “losses of incoming nitrogen into uncovered manure storage from 10 to 30 percent loss of nitrogen as ammonia.” This statistic is

irrelevant to the Rock Prairie Dairy because all of the manure storage facilities will be covered. As such, the comment should be stricken as it inappropriately elevates air quality concerns for the public.

Response: The emissions estimates for uncovered manure storage are relevant, unless there are enforceable conditions specific to the design, operation and maintenance of impermeable covers on manure storage facilities. Although the Department did not explicitly discuss the air quality benefits of impermeable manure storage basin covers, this technology has been evaluated by Wisconsin stakeholders (see response to item 4. below for additional detail) as the most effective mitigation practice for reducing ammonia and hydrogen sulfide emissions (and other pollutants emitted from uncovered manure storage) from dairy liquid manure storage systems. We recognized the environmental benefits of covers on manure storage in the EA with the following:

The facility is proposing a geomembrane cover on manure storage facilities which is expected to greatly mitigate air emissions from manure storage. The geomembrane waste facility storage cover system will be combined with a biofilter treating exhaust air from under the cover. Covering the waste facility storage with a properly designed geomembrane cover may reduce air emissions and odors by 90% from the waste storage facility. However, appropriate land application techniques should be combined with waste facility storage covers to ensure that air contaminants (and beneficial nutrients) which are prevented from volatilizing with waste facility covers are not lost during the land application process. It is unclear how much ammonia (and other air pollutants) will be volatilized with the center pivot irrigation system proposed, but it is expected that significantly larger ammonia losses may be associated with this practice when compared to injection techniques.

4. Page 5, paragraph 7 of the EA discusses potential air emissions from land spreading activities. Although direct injection of manure may be an effective air emission reduction BMP for land spreading, there is no basis for the statement that “it is expected that significantly larger ammonia losses” may be associated with center pivot applications. Although significant odor and ammonia volatilization may result from traditional top-mounted spray nozzles and end guns, the center pivots at RPD will be fitted with low pressure drop nozzles, positioned approximately 36 inches from the ground surface. Based on years of drop nozzle center pivot applications at Tuls’ dairies in Nebraska, RPD expects this application method to result in less odor generation than traditional application methods. Moreover, the drop nozzle center pivot applications planned at RPD have similar characteristics to an application method called “banding”, which was recently identified in WDNR’s Beneficial Management Practices for Mitigating Hazardous Air Emissions from Animal Waste in Wisconsin (the BMP Report). The BMP Report describes banding as the application of liquid manure in narrow bands applied under the canopy of a growing crop via a drop tube or hose. See BMP Report, Appendix F, page 7. The BMP Report provides a 30% reduction of ammonia emissions when manure is applied with drop tube or hose application on

cropland, compared to traditional surface application without incorporation. The banding and drop nozzle center pivot application characteristics which provide emission reductions are the same: low pressure applications near the ground surface to growing crops. As such, WDNR should attribute a 30% ammonia reduction for applications made via drop nozzle center pivots, as is the case with RPD.

Response: Peer-reviewed journal articles and university extension references corroborate that large nitrogen (N) loss usually occurs through irrigation (Rotz 2004, Jokela 2000, Koelsch 1995). Rotz 2004 provides a range of “typical N losses for major manure application methods” expressed as a percentage of the initial total N applied. Ammonia losses (per Rotz 2004), are presented in a range from 25 to 50% total N, with an average ammonia loss of 30% total N. A value of 25% loss of total N or roughly 55% of total ammoniacal nitrogen (TAN) was used in the estimates provided within the EA.

The Department in coordination with an advisory group which included animal agriculture producers, academia, NRCS and DATCP, published a report in December 2010, which included a list of beneficial management practices (BMPs) that reduce ammonia and hydrogen sulfide air emissions (Beneficial Management Practices for Mitigating Hazardous Air Emissions from Animal Waste in Wisconsin). The Advisory Group included thirteen members, representing agriculture, environmental groups, academia, Federal and state government agencies. They used science-based information, as well as their collective knowledge, experience and expertise to develop what the group describes as “technically sound” practices through a collaborative process. Center pivot irrigation was not identified as a beneficial management practice within the report.

The use of center pivot systems for untreated liquid manure is not common in Wisconsin, according to the Department’s Watershed Management Program. Any relevant, peer-reviewed technical information on the fate and transport of nitrogen species (ammonia, in particular), and other air quality co-benefits, for center-pivot irrigation system, particularly those specifically proposed by the applicant, would be welcome.

Appendix F of the BMP report provides the following description of band spreading of manure:

“..the application of liquid manure in narrow bands either directly from a spreader hose or through a sliding shoe that rides *along the soil surface* [emphasis added]

A drop tube (or hose) spreader is a boom which has a number of hoses connected to it, distributing the liquid manure close to the ground in strips or bands. It is fed with liquid manure from a single pipe, relying on the pressure at each of the hose outlets to provide even distribution. Advanced systems use rotary distributors to proportion the liquid manure evenly to each outlet.

A drop tube or hose with immediate incorporation entails immediate incorporation of ammonia using standard agricultural practices such as tillage, or other practices that are the equivalent, directly behind the tube or hose nozzle.

A trailing shoe/sliding foot spreader is similar in configuration to the drop tube spreader with a shoe added to each hose allowing the liquid manure to be deposited in neat rows under the crop canopy onto the soil surface or just below the soil surface.”

The applicant proposes “low pressure drop nozzles, positioned approximately 36 inches from the ground surface.” This is not what was intended with the description of band spreading provided above.

5. Page 6 of the EA contains air emission estimates developed by WDNR. The inclusion in the EA of these air emission estimates is inappropriate at best and irresponsible at worst. Air emission estimating and dispersion modeling is a very technical science which relies on site-specific weather, climatic and geographical data as well as facility-specific design, construction, operation and management practices. We note that in generating the EA air estimates, WDNR relied in large part on emission data from California and Oregon – two states with significantly different geographical and climatic characteristics than those of Wisconsin. We also note that the EA fails to provide any explanation as to how the emission factors it relied upon were developed and if they are even relevant, given the specific design elements of the RPD production area. In fact, footnote 5 on page 6, which admits that the hydrogen sulfide analysis “does not consider the effect of waste facility storage cover”, makes crystal clear that at least some of the emission factors WDNR relied upon are not relevant to this project and do not provide legitimate estimates for the proposed RPD production area. Perhaps most troubling is WDNR’s estimate that RPD will generate “less than 28 tons/year” of methanol. The Department’s own BMP Report, released in December 2010 states, “To the Department’s knowledge, no state has made a regulatory decision based on methanol emissions, nor has the EPA published or cited information to suggest this pollutant could exceed 10 tons/year...” (BMP Report at 19, emphasis added). It is troubling that WDNR air staff published a report clearly stating that EPA has not generated any data or provided any guidance to suggest methanol emissions could exceed 10 tons/year, and then less than one month later generate an emission estimate (which again does not consider the effect of waste facility storage cover (page 6, footnote 11)) that is almost three times that amount. The EA should be revised to remove the air emission estimates as they are inaccurate, inappropriate and cannot be legitimized or verified.

Response: The Department recognizes the myriad challenges posed by estimating air emissions from animal agriculture. There is, however, a vast body of literature, particularly where nitrogen compounds are concerned. Professional judgment and the best available emissions estimating tools were consulted. Emissions estimates for PM₁₀ and N₂O were based on average values of compiled data sources from the Oregon Department of Environmental Quality, not Oregon-specific estimates. In addition, VOC and methanol estimates were provided based on the best available science at the time, from California reference documents cited in the footnotes to the table listing total estimated annualized emissions for Rock Prairie Dairy.

As of January 13, 2011, data from the National Air Emissions Monitoring Study (NAEMS) have been made available to the public. VOC data as well as speciation of those VOCs are provided for dairy barns, including one monitoring location in St. Croix County, Wisconsin. The Department is presently reviewing VOC emissions and specific federal and/or state hazardous air pollutant emissions associated with NAEMS. If the Department's Air Management Program is requested to provide air emissions estimates for future EAs associated with WPDES permits, the Department will consider dropping the following estimates: 1) the limited flux chamber study from UC Davis for which the methanol estimates were derived; and, 2) VOC emissions estimates from San Joaquin Valley Air Pollution Control District in exchange for NAEMS-specific VOC qualitative and quantitative data sets, where deemed most appropriate.

6. Page 7 of the EA discusses potential groundwater impacts from the proposed RPD. We disagree with the Department's statement that production area groundwater monitoring is necessary "[d]ue to the complex geology of the area, the selected liner type, and the extremely large size of the lagoon system." In fact, not only were the RPD waste storage facilities designed to exceed the required technical standards, they were designed with a built-in leak detection system that will provide more real-time information about the function of the waste storage facilities than the WDNR's groundwater monitoring system. Waste storage #1 will be concrete lined and waste storage # 2 , 3, and 4 will be constructed with a high density polyethylene (HDPE) liner. All four waste storage facilities will be underlain with an additional liner constructed of three feet of compacted low permeability soil – twice the depth required by the technical standard - with a permeability value of 2×10^{-7} ft/min. Although the risk of a waste storage facility leak is considered minimal based on the design components noted above, waste storages #2, #3 and #4 have been designed with a leak detection system comprised of layflat underdrain tubing that is installed between the double liners and outlets to a dedicated manhole without a permanent sump. The manholes will be monitored on a weekly basis which will ensure that any breach of the HDPE liner will be identified quickly. The over-designed facilities, coupled with the built-in leak detection system render a production area groundwater monitoring system redundant and unnecessary.

Response: Noted, however, the Department does not support the conclusion in the last sentence that the proposed production area groundwater monitoring system is redundant and unnecessary. A production area groundwater monitoring system like the one RPD has included in their plans will be included in the proposed permit.

7. Page 10 of the EA also discusses the production area facility designs, but fails to mention that the facilities have been designed to exceed relevant NRCS technical standards. This point is important when evaluating the potential risks involved with the construction and operation of a facility – the more over-design elements that are incorporated into a facility design, the less potential risk there is of failure during operation.

Response: Noted

8. Page 11 of the EA discusses potential odor from center pivot land application activities. The EA specifically references studies conducted at hog farms, but does not reference any studies done at dairy farms. As the Department is well aware, odors from hog manure are significantly more intense than odors from dairy cow manure. Studies of center pivot land application of hog manure are not relevant to the environmental assessment of proposed center pivot land application of dairy cow manure.

Response: The Department acknowledges that for some large-scale animal agricultural operations, particularly hog operations, there is potential for the generation of significant odors. Experience and studies with center pivot irrigation systems, even with hog manure or manure from another dairy with different production methods, could potentially inform on fate and transport of aerosols, volatilization and odors

9. Finally, we agree with the statement on page 16 of the EA that the Department's review and approval of proposed manure storage facilities, and its review and approval of RPD's nutrient management plan "will make it unlikely that any storage facility would fail or that improper land application would occur."

Response: Noted

We appreciate the opportunity to provide comment on the EA and we look forward to working collaboratively with the Department to finalize the permitting process for the proposed RPD. Please contact me if you have any questions or if you would like to discuss this further.

Sincerely,

MICHAEL BEST & FRIEDRICH LLP

David A. Crass
