WALWORTH COUNTY
Est. 1839
WISCONSIN

May 10, 2011 – Walworth County Board Meeting

Report of the County Clerk Regarding
Communications Received After the Agenda Mailing

County Clerk

Kimberly S. Bushey
County Clerk

The following items were placed on Supervisors' desks and are attached to this cover sheet:

- Statement of Claim and Collisions Center Estimate-Kelly Monahan – To be referred to the Executive Committee
- Claim for Vehicle Damage, Estimate of Repair, and Police Report – Christina Krause vs. Walworth County Public Works – To be referred to Executive Committee
- Communication from Gene Pulara concerning the subject "CAFOs and Potentially Inconsistent Conditional Use Processing" – To be referred to the County Zoning Agency
- Communication from Gene Pulara concerning the subject "Use of Innovative Technologies in Agriculture" – To be referred to the County Zoning Agency
- Communication from Nowlan & Mouat LLP regarding Center Pivot Manure Application – To be referred to the County Zoning Agency
- Communications from Wassel, Harvey & Schuk, LLP with Town of Bloomfield Ordinance No. 1061, Ordinance No. 1062, and Ordinance No. 1063 – To be referred to the County Zoning Agency
- Monroe County Resolution # 04-11-14 – Opposing Elimination of Municipal Recycling Grant Programs – To be referred to the Public Works Committee
- Monroe County Resolution 04-11-13 – Resolution of Support for the Indian Reservation Roads Program – Previously referred and to be placed on file
- Walworth County Sheriff's Office Annual Report 2010 – To be placed on file
- *Walworth County Aging & Disability Resource Center News*, May 2011 – To be placed on file

100 W. Walworth
PO Box 1001
Elkhorn, WI 53121
262.741.4241 tel
262.741.4287 fax

RECEIVED
WALWORTH COUNTY CLERK

2011 APR 29 PM 1: 19

STATEMENT OF CLAIM

To: Kimberly S. Bushy, Clerk,
100 West Walworth Street
Elkhorn, WI 53121

Claimant's Full Name: Kelly Monahan

Address: N7660 Ridge Road, Whitewater WI 53190

Home Phone: 1-262-473-7526

Cell Phone: 1-262-215-8413

Date and Time of Incident: January 14-15 between 11:00pm and 10:00am

Location: N7660 Ridge Road, Whitewater WI 53190

Description of Incident (including type of property damage and estimated costs of damage):

Claimant's car was parked by the side of the road, not at all on the road, by the driveway of the family cottage, N7660 Ridge Road, Whitewater WI 53190. Between 11pm and 10am a snowplow from the Town of Whitewater hit the side of the claimant's car causing a considerable amount of damage.

Description	Price
Front Fender	205.00
Panel	430.00
Front Door	122.00
Mirror	268.00
Deflector	54.04
Rear Door	110.00
Shield	51.90
Paint	493.00
Tax on Parts	95.86
Sheet Metal	1,845.80
Refinish	783.00
Tax on Labor	144.64

Net Total 4,613.24

More detail on Pope Collision Center Estimate.

Dated the 26 day of April, 2011.

Kellie Monahan

Claimant's Signature

POPE COLLISION CENTER
847 E. COMMERCIAL AVE. #D
WHITEWATER, WI 53190
PH: 262-472-0690

RECEIVED
WALWORTH COUNTY CLERK
2011 APR 29 PM 1:19

CD LOG NO 1344-1 DATE 04/18/11

SHOP:	POPE COLLISION CENTER	INSP DATE:	04/18/11
ADDRESS:	847 E.COMMERCIAL AVE.#D	CONTACT:	JASON WOLFE
CITY STATE:	WHITEWATER, WI	PHONE 1:	(262)472-0690
ZIP:	53190-	CELL PHONE:	(920)728-3555
		FAX:	(262)472-0691
EMAIL:	JWOLFE@IDCNET.COM		

OWNER:	MONAHAN, KELLY	CELL PHONE:	(262)215-8413
ADDRESS:	N 7660 RIDGE RD		
CITY STATE:	WHITEWATER, WI		
ZIP:	53190		

POINT OF IMPACT: 5

LIC#:	STATE:	VIN:	3VWTE29M1YM097523
BODY COLOR:	DARK GREEN	MILEAGE:	85,909
CONDITION:	GOOD	ACCTNG CTL#:	

*=USER-ENTERED VALUE	E=REPLACE OEM	NG=REPLACE NAGS
EC=REPLACE ECONOMY	UE=REPLACE OE SURPLUS	UC=RECONDITIONED PRT
UM=REMAN/REBUILT PRT	EU=REPLACE SALVAGE	EP=REPLACE PXN
OE=REPLACE PXN OE SRPLS	PC=PXN RECONDITIONED	PM=PXN REMAN/REBUILT
TE=PARTL REPL PRICE	ET=PARTL REPL LABOR	IT=PARTIAL REPAIR
I=REPAIR	L=REFINISH	BR=BLEND REFINISH
TT=TWO-TONE	CG=CHIPGUARD	SB=SUBLET
N=ADDITIONAL LABOR	RI=R&I ASSEMBLY	P=CHECK
AA=APPEAR ALLOWANCE	RP=RELATED PRIOR	UP=UNRELATED PRIOR

2000 VOLKSWAGEN JETTA GLX VR6 4DOOR SEDAN 6CYL GASOLINE 2.8
CODE: 61633C/B OPTNS E/24NYALBDEFGHK

OPTIONS:

TWO-STAGE - EXTERIOR SURFACES	TWO-STAGE - INTERIOR SURFACES
FOG LAMPS	MOISTURE SENSING WIPERS
HEATED FRONT SEATS	POWER FRONT SEATS
HEATED REMOTE CONTROL MIRRORS	POWER WINDOWS
MOONROOF	TRACTION CONTROL SYSTEM
AIR CONDITIONING	CLIMATE CONTROLLED A/C
CRUISE CONTROL	

OP	GDE	MC	DESCRIPTION	MFG.PART NO.	PRICE	AJ%	B%	HOURS	R
E	0103		FENDER,FRONT	LT 1J5821021B	205.00			2.4	1
L	0103	13	FENDER,FRONT	LT REFINISH				3.8	4
TE	0107	07	PANEL ASSY,BODY SID	LT PART/PARTIAL REPL	439.00				1

2000 VOLKSWAGEN JETTA GLX VR6 4DOOR SEDAN
CD LOG NO 1344-1

E 0209		PNL,FRONT DOOR OUTE	LT	1J4831111D	122.00	6.8 1
L 0209		PNL,FRONT DOOR OUTE	LT	REFINISH		3.0 4
L 0125		MLDG,FRONT DOOR SID	LT	REFINISH		0.5 4
E 0274		HOUSING,MIRROR OUTE	LT	1J1857507E01C	268.00	0.4 1
L 0227		HANDLE,FRONT DOOR O	LT	REFINISH		0.4 4
E 0077	01	DEFLECTOR,FRONT DOO	LT	ZVW452101	54.04	0.3 1
E 0441		PNL,REAR DOOR OUTER	LT	1J5833111D	110.00	7.1 1
L 0441		PNL,REAR DOOR OUTER	LT	REFINISH		2.2 4
L 0437		MLDG,REAR DOOR SIDE	LT	REFINISH		0.5 4
L 0305		HANDLE,RR DOOR OUTE	LT	REFINISH		0.4 4
ET0389		PANEL,QUARTER	LT	LABOR/PARTL REPLA		16.8 1
L 0389		PANEL,QUARTER	LT	REFINISH		3.7 4
E 0449		SHIELD,QUARTER INNE	LT	1JM810971	51.90	0.4 1

16 ITEMS

MC MESSAGE(S)
01 CALL DEALER FOR EXACT PART NUMBER / PRICE
07 STRUCTURAL PART AS IDENTIFIED BY I-CAR
13 INCLUDES 0.6 HOURS FIRST PANEL TWO-STAGE ALLOWANCE

FINAL CALCULATIONS & ENTRIES

GROSS PARTS				1,249.94
PAINT MATERIAL				493.00
PARTS & MATERIAL TOTAL				1,742.94
TAX ON PARTS & MATERIAL @			5.500%	95.86
LABOR	RATE	REPLACE HRS	REPAIR HRS	
1-SHEET METAL	54.00	34.2		1,846.80
2-MECH/ELEC	70.00			
3-FRAME	70.00			
4-REFINISH	54.00	14.5		783.00
5-PAINT MATERIAL	34.00			
LABOR TOTAL				2,629.80
TAX ON LABOR		@	5.500%	144.64
SUBLET REPAIRS				
TOWING				
STORAGE				
GROSS TOTAL				4,613.24
NET TOTAL				4,613.24

SHOPLINK UN710 ES CD LOG 1344-1 DATE 04/18/11 04:00:40PM R6.37 CD 04/11
PXN: Y/00/00/00/00/00 CUM 00/00/00/00/00 GEOCODE 53190
HOST LOG
(C) 1998 - 2008 AUDATEX NORTH AMERICA, INC.

3.0 HRS WERE ADDED TO THIS EST. BASED ON AUDATEX TWO-STAGE REFINISH FORMULA. AUDATEX TWO-STAGE EXTERIOR THRESHOLD OF 2.5 HOURS WAS CALCULATED IN THIS ESTIMATE.

I would like to file a claim against the Walworth County Hwy Department for the amount of $2180.74. For damage done to my 2006 Jeep Commander

On March 31, 2001 at about 11 AM I was travelling down County Hwy NN. and was approaching a skid steer with a street sweeper attachment. It appeared to be throwing gravel, Dirt + Grass across the Road. There was nobody directing traffic, and no warning signs of any sort. I decided it was best to stop, so my vehicle would not be damaged. As I came to a stop the sweeper + skidsteer stopped. I waited a moment for the debris to clear + proceeded to the hospital. Right as my vehicle passed in front of the skid steer with sweeper it began spinning again + pummeled my vehicle with Rocks + debris. I pulled over to check for damage + saw dents + dings on the passenger Door, fender + edge of the Hood, also the windshield was cracked it two places. I pulled into the Sherriffs Dept + Requested an officer. When the officer arrived it was hard to see anything for him because the dirt and dust had been thrown at my vehicle. He requested I wash it and bring it to Elkhorn P.D. I advised him that my daughter was going in for a minor surgery after the birth of her son and I needed to tend to her and would wash it and bring it by the P.D. in about an hour or so, which I did + we found more damage that was uncovered by the dust that had been thrown at me. The $2180.74 would cover the damage + cost of 4 day rental while being repaired.

SEE. Enclosed: Police Report
Estimate of Repair.

Christina Krause
13430. E. County Rd. A
Avalon Wi. 53505

Christina Krause
262-745-6322

RECEIVED
WALWORTH COUNTY CLERK

2011 MAY -3 PM 1:14

GORDIE BOUCHER FORD LINCOLN MERCURY
2727 US HWY 14
JANESVILLE, WI 53545

***** PRELIMINARY ESTIMATE *****

04/01/2011 01:30 PM

Owner

Owner: CHRISTINA KRAUSE
Address: 13430 E CNTY RD A
City State Zip: Avalon, WI 53505

Work/Day:
Home/Evening: (262)745-6322
FAX:

Inspection

Inspection Date: 04/01/2011 01:29 PM
Primary Impact: Non-Collision
Appraiser Name: SCOTT DAGENHART

Inspection Type:
Secondary Impact:
Appraiser License # :

Repairer

Repairer: GORDIE BOUCHER FORD
Contact: GORDIE BOUCHER FORD

Vehicle

2006 Jeep Commander Limited 4 DR Wagon
8cyl Gasoline 5.7 HEMI
5 Speed Automatic

Lic.Plate: 636-RWM
Lic Expire:
Prod Date:
Veh Insp# :
Condition:
Ext. Color: BRILLIANT BLACK
Ext. Refinish: Two-Stage
Ext. Paint Code: PXR

Lic State: WI
VIN: 1J8HG58286C268974
Mileage: 88,601
Mileage Type: Actual
Code: J7503C
Int. Color:
Int. Refinish: Two-Stage
Int. Trim Code:

Options

4-Wheel Drive	AM/FM In-dash CD Changer	Alarm System
Aluminum/Alloy Wheels	Anti-lock Brakes	Automatic Dimming Mirror
Boston Acoustic Speakers	Center Console	Cruise Control
Digital Signal Processor	Driver Seat Memory	Dual Air Conditioning
Dual Airbags	Dual Power Seats	Dual Sunroof
Dual Zone Auto A/C	Fender Flares	Fog Lights
Garage Door Opener	Head Airbags	Heated Front Seats
Heated Power Mirrors	Intermittent Wipers	Keyless Entry System
Leather Seats	Leather Steering Wheel	Lighted Entry System
MP3 Player	Overhead Console	Power Adjustable Pedals
Power Brakes	Power Door Locks	Power Steering
Power Windows	Privacy Glass	Rain-Sensing W/S Wipers
Rear Heater	Rear Window Defroster	Rear Window Wiper/Washer
Rem Trunk-L/Gate Release	Reverse Sensing System	Roof/Luggage Rack
Stability Cntrl Suspensn	Strg Wheel Radio Control	Tachometer
Theft Deterrent System	Third Seat (trucks)	Tilt Steering Wheel
Tinted Glass	Tonneau/Cargo Cover	Traction Control System
Trip Computer	Wood Interior Trim	

Damages

Line	Op	Guide	MC	Description	MFR.Part No.	Price	ADJ%	B%	Hours	R

1	I	83	Panel,Hood	Repair		2.5*	SM
2	L	83	13 Panel,Hood	Refinish		4.1	RF
				2.9 Surface			
				0.6 Two-stage setup			
				0.6 Two-stage			
3	I	104	Fender,Front RT	Repair		1.5*	SM
4	L	104	Fender,Front RT	Refinish		2.3	RF
				1.9 Surface			
				0.4 Two-stage			
5	RI	35	Flare,Wheel Opening RT	R & I Assembly		0.8	SM
6	E	914	Snsr,Frt Tire Pressure RT	56053030AB	$26.45	0.5*	ME
7	NG	172	Windshield,Shaded	NAGS DW1628-GB	$415.00	2.3	SM
8	I	208	Door Shell,Front RT	Repair		1.5*	SM
9	L	208	Door Shell,Front RT	Refinish		2.8	RF
				2.3 Surface			
				0.5 Two-stage			
10	RI	563	W/Strip,Belt Outer RT	R & I Assembly		0.2	SM
11	RI	198	Mirror,Outer R/C RT	R & I Assembly		0.7	SM
12	RI	220	Handle,Front Door Otr RT	R & I Assembly		0.8	SM
13	I		4 DAYS RENTEL	Sublet Repair	$180.00*		SM*

13 Items

MC	Message
13	INCLUDES 0.6 HOURS FIRST PANEL TWO-STAGE ALLOWANCE

Estimate Total & Entries

Gross Parts					$26.45	
Other Parts					$415.00	
Paint Materials					$303.60	
Parts & Material Total						$745.05
Tax on Parts & Material			@ 5.500%			$40.98

Labor	**Rate**	**Replace Hrs**	**Repair Hrs**	**Total Hrs**	
Sheet Metal (SM)	$56.00	4.8	5.5	10.3	$576.80
Mech/Elec (ME)	$100.00	0.5		0.5	$50.00
Frame (FR)	$58.00				
Refinish (RF)	$56.00	9.2		9.2	$515.20
Paint Materials	$33.00				

Labor Total			20.0 Hours	$1,142.00
Tax on Labor		@ 5.500%		$62.81
Sublet Repairs				$180.00
Tax on Sublet		@ 5.500%		$9.90
Gross Total				**$2,180.74**
Net Total				**$2,180.74**

Alternate Parts No

Audatex Estimating 6.0.514 ES 04/01/2011 01:41 PM REL 6.0.514 DT 02/01/2011 DB 03/15/2011
Copyright (C) 2010 Audatex North America, Inc.

2.1 HRS WERE ADDED TO THIS ESTIMATE BASED ON AUDATEX'S TWO-STAGE REFINISH FORMULA.

THIS ESTIMATE HAS BEEN PREPARED BASED ON THE USE OF ONE OR MORE REPLACEMENT PARTS SUPPLIED BY A SOURCE OTHER THAN THE MANUFACTURER OF YOUR MOTOR VEHICLE. WARRANTIES APPLICABLE TO THESE REPLACEMENT PARTS ARE PROVIDED BY

Elkhorn Police Department

Joel Christensen
Chief of Police
Patrick Slattery
Captain

100 W. Walworth St., P.O. Box 920 • Elkhorn, Wisconsin 53121-0920

Phone (262) 723-2210
Fax (262) 741-5229

"USE OF THIS INFORMATION IS REGULATED BY LAW"

OPEN RECORD REQUEST

Photocopying rates according to State Statutes and Municipal Code

Standard cost is $0.25 per page. If request exceeds $5.00, payment will need to be paid in advance prior to picking up the request. If requested information is not picked up within 2 weeks after you are notified that it is available, a new request will be required.

Date of Request: 4-21-11

Requestor's Name: Christina Krause

Address: _____ **Phone:** 262-745-6322

City: _____ **State:** _____ **Zip:** _____

Records Requested: (please be as specific as possible, including names, dates, location, etc.)

11-1951

I would prefer:

- ☐ **To pick up the requested information in person.**
- ☐ **Have the requested information mailed to above address, at an additional cost to cover postage.**

Reason for Redaction:

- ☐ **Juvenile Information**
- ☐ **Personal Identifiers**
- ☐ **Patient Healthcare Record**
- ☐ **Other** _____

To Be Completed by Approving Authority

Request Approved: X **Denied:** _____ **By:** Theresa Bergh

Reason For Denial: _____

Fee: 75¢

ELKHORN POLICE DEPT

Incident Report

Case Number: 11-1951

Date/Time Reported	Nature of Incident	Case Status
03/31/2011 11:00 am	Assist Motorist	Closed

Date/Time Occurred	Case Outcome/Disposition
03/31/2011 11:00 AM to 03/31/2011 11:03 AM	CLEARED

Location of Incident
1800 BLK COUNTY HWY NN, ELKHORN WI 53121

Assigned Units

			Assign	Arrive	Clear
Assigned	Ptl. DANIEL M DIXON	EPD	11:00	11:20	11:35

DRIVER

KRAUSE, CHRISTINA LOUISE	*Birth Date:* [redacted]	*Age at Inc:*	41
13430 E COUNTY ROAD A	*Gender:* Female	*Race:*	White
AVALON, WI 53505	*Hair:* Blonde	*Eyes:*	Blue
Home Phone: (262) 745-6322	*Height:* 5' 7"	*Weight:*	180
DL State/No: WI/[redacted]			

OTHER

DOWELL, DANIEL G	*Birth Date:* [redacted]	*Age at Inc:*	56
W314 CIRCLE DR	*Gender:* Male	*Race:*	White
GENOA CITY, WI 53128	*Hair:* Brown	*Eyes:*	Brown
Home Phone: (262) 279-6985	*Height:* 6' 0"	*Weight:*	170
DL State/No: WI/[redacted]			

OTHER

WALWORTH COUNTY HIGHWAY DEPT., W4097 COUNTY HWY NN , ELKHORN, WI 53121 Phone: (262) 741-3114

Vehicle Driver: KRAUSE, CHRISTINA

Reg State/Number	*Vehicle ID Number*	*Make/Model*	*Year*	*Color*
WI/636RWM	1J8HG58286C268974	Jeep / COMMANDER	2006	BLK

Report Notes

Officer dispatched to a complaint of a street sweeper that shot stones at a vehicle and did damage to the vehicle. It was learned that a County Hwy worker was sweeping stones out of the grass on Hwy NN and when the complainant drove by some of the stones struck her vehicle. There were a couple of spots in the paint on the right side of the vehicle. The Highway shop advised that the complainant would have to file a claim with the Clerk of Courts.

Officer Signature _____ *Date* _____ ☐ Further Investigation

Supervisor Signature _____ *Date* _____

On Thursday, March 31, 2011 at approximately 11:20 A.M. I, Officer Dixon was advised to go to the Walworth County Law Enforcement Center and talk with a subject had had some stones from a sweeper strike her vehicle.

I arrived at the LEC and met with Christina Krause. She advised me that at approximately 11:00 A.M. on today's date she was driving her black Jeep Commander license 636RWN/WI on County Hwy NN in the City of Elkhorn, County of Walworth,WI.. Christina stated she was traveling east on Hwy NN and had just passed the drive to the Walworth County Highway Shop.

She stated she then stopped her vehicle as there as a subject driving a bobcat with a broom attached to the front sweeping grass and stones towards the road. Christina stated she had stopped so none of the debris and stones would hit her vehicle. She stated the bobcat then stopped and the broom stopped turning.

Christina stated she thought the driver had stopped to allow her to travel past. Christina stated that she started to travel east again and when she approached the area in front of the bobcat the broom started again and it threw stones and debris which struck her vehicle on the right side.

Christina stated she then stopped her vehicle and got out and checked for any damage. She stated she then drove to the parking lot of the Law Enforcement Center and went inside to report the damage.

I looked at the passenger side of Christina's vehicle and due to some mud and dirt was unable to tell if there was any damage to the vehicle. I did see two very small spots that looked and felt like the paint had been chipped. I took pictures of the vehicle and advised Christina to wash the vehicle and then have an officer check the vehicle for damage. She advised me that she was going to the hospital as her daughter was having surgery and as soon as that was completed she would wash the vehicle and bring it back to the police department to be checked by an officer.

I then went and talked to the driver of the bobcat. He was identified as Dan Dowell. He stated he had been on the south side of Hwy NN and was brushing the grass, debris and stones towards the road. He stated he had stopped and then started again and then saw Christina's vehicle pull over to the side of the road just east of him and saw her checking the right side of her vehicle. Dan stated that he then thought that the vehicle might have been hit by some of the stones and debris that he was sweeping in the grass.

I asked Dan if his supervisor was around and he advised me I would have to go to the Highway shop and talk to someone. I then went to the shop and talked to Vicki Price. I advised her as to what happened and she stated that Christina would have to file a claim with the Clerk of Courts. She then gave me a paper to give to Christina and asked if I could fax their department a copy of the report when it was done. I advised her I would have someone fax it to her.

I then went to the Lakeland Hospital and located Christina and gave her the paper Vicki gave to me and told her what I had been told. Christina stated she was now leaving the hospital and she was going to get her vehicle washed and would return to the police department when she does.

Christina later came into the police department and showed me her vehicle after she had washed it. She showed me several small chips in the paint on the right front fender and right front door. She

also showed me a small chip in the passenger side of the front windshield. Christina stated the chip in the windshield and the right front side of the vehicle was not there before.

PTL. D. DIXON

Officer Signature Date

Supervisor Signature Date

RECEIVED
MAY 2 2011
WALWORTH COUNTY ADMINISTRATION

To: Nancy Russell, Chair
From: Gene Pulera, Resident of Richmond Township, Walworth County, WI
Date: April 29, 2011
Subject: **CAFOs and Potentially Inconsistent Conditional Use Processing**

Dear Ms. Russell:

In some recent correspondence, I asked the Walworth County Zoning Committee and Board to consider two things – one of them pertained to CAFO spreading fields in Walworth County and the other to Center Pivots.

The Walworth County Zoning Committee met on Thursday, April 21, 2011, and one of the items on the agenda pertained to Center Pivots. After some discussion, this item was "tabled." This action was taken, in large part, on the basis of a letter from Mr. Russell Rasmussen of the Wisconsin Department of Natural Resources.

When the Center Pivot discussion was "tabled," the CAFO spreading fields issue was inadvertently tabled with it. Since they are two different issues, I am asking the Walworth County Zoning Committee and Board to review the CAFO spreading field issue again as I think we may have (through no one's fault) a potentially inconsistent Conditional Use review process.

On August 19, 2010, the Walworth County Zoning Committee approved a set of Conditional Use restrictions for the Nel-Farm dairy operation in Sugar Creek Township. For convenience, the Nel-Farm Conditional Use restrictions as published on the Internet follow:

> *"Nel-Farm, Inc. (Marc Nelson and Scott Nelson, Apps.), Town of Sugar Creek, Conditional Use for expansion of a dairy farm milking operation greater than 500 animal units to a capacity of 838 animal units on lands zoned A-1 (7:22:59 – 7:31:29) Mr. Weidensee described the property as being in Section 34, Town of Sugar Creek. The Town has approved the request. ... Marc Nelson said manure storage is under the building and they will not be using sand bedding so they will be able to inject all the manure. There is enough storage for a whole year and once a year they will be able to inject all the manure into the ground without making odor for neighbors. He said with sand bedding, you spread on top of the ground and cause a lot of problems with neighbors with odor. They will not be shipping milk from the home farm anymore when the new facility is in operation. There was no one to speak for or against this item.*
>
> *After the appropriate findings were made as required by State Farmland Preservation Program s91.75(5) a motion and second to APPROVE was made by Supervisors Brandl and Weber. The motion carried 6 – 0.*
>
> *Approval is subject to the following conditions:*

1. *Approved as per plan submitted as a commercial feedlot with a limit of 837.4 animal units subject to all additional conditions.*
2. *Hours shall be 24 hours per day. No animal waste spreading or deliveries shall occur between 6:00 p.m. and 6:00 a.m. Milk pick-up is allowed 24 hours per day.*
3. *The site must meet all applicable Federal, State, County and local regulations including any State well or water supple requirements.*
4. *The applicant must obtain the required zoning permit prior to construction.*
5. *Applicant must obtain approval of a nutrient management plan from the County Land Conservation Office. The plan must meet with all requirements of the County and the Wisconsin Dept. of Natural Resources. The applicant must comply with all recommendations of the approved nutrient management plan.*
6. *The applicant must provide adequate manure storage. Storage shall be available for at least 4 months on site in order to allow storage during the winter months when manure will not be able to be incorporated to reduce odor.* ***All manure from County approved storage facilities must be incorporated in the ground within 24 hours of spreading in order to limit odor from the farm operations.*** *The storage facilities must be emptied within two weeks of any time that spreading begins. The applicant shall keep a record of the date that spreading begins and the date on which the storage facility has been emptied. If the applicant cannot empty the manure storage facility in the required time frame using existing equipment and farmland then the applicant may need to make arrangements with a commercial manure disposal company.*
7. *All outside lighting must be shielded and directed on site.*
8. *The applicant will be responsible for cleaning tracked soil or manure resulting from the farm operations off the Township or County Roadways on a daily basis.*
9. *If the Land Management Department determines that changes in either the character of the use or the intensity of the use are not consistent with this approval, then those changes must be brought before the County Zoning Agency for approval.*
10. *Failure to actively exercise this conditional use within three years of the approval date shall result in automatic dismissal without prejudice. The property owner may request a time extension for actively exercising the conditional use. A time extension for actively exercising the conditional use must be requested in writing during the original three year period. Any extension requested during the three year active exercise period greater than one year beyond the original three year period shall require additional Town and County committee approvals.*

    Findings: A conditional use for more than 500 animal units on A-1 land is consistent with Farmland Preservation Statutes."

Since Nel-Farm does not have 1,000+ animal units, it is technically not a CAFO, yet the Walworth County Zoning Agency took the extra precaution to protect its residents and visitors from the waste generated by a dairy of this size.

An application for a proposed CAFO, the Rock Prairie Dairy in Rock County, is under review by the Wisconsin Department of Natural Resources. This proposed dairy with its 7,280 animal units (5,200 cows) is nearly 9 times larger than Nel-Farm's 837 animal units! According to the proposed Rock Prairie Dairy application, nearly 800 acres in Walworth County are under contract for spreading raw, untreated manure (see location of acres at the end of this memo). I assembled the following table from data in the proposed Rock Prairie Dairy application.

County	Proposed Rock Prairie Dairy Spreading Field Acres*
Rock	4,471.48 (84.8%)
Walworth	**799.02 (15.2%)**
Total	5,270.50 (100.0%)

* The proposed Rock Prairie Dairy has 5,340.8 under contract, but only 5,270.5 or 98.7% are spreadable after all setbacks and other restrictions are considered.

No Walworth County Conditional Use permit was discussed, reviewed, or granted for the proposed Rock Prairie Dairy. On the surface, there appears to be a procedural gap in our zoning process, resulting in the potential for inconsistent zoning treatment between CAFOs and smaller dairies. Please note that the proposed Rock Prairie Dairy may voluntarily follow many of the Nel-Farm Conditional Use restrictions – the point is that no formal Conditional Use review occurred. The point I am raising is not specific to the proposed Rock Prairie Dairy; it pertains to any CAFO.

It seems fair that we treat the large dairies at least as stringently as the smaller ones. Here is a thought regarding a Walworth County policy for CAFOs:

> **Any CAFO, that wants to dispose manure on spreading fields in Walworth County, must apply for a Conditional Use permit whether or not the CAFO facility is located in Walworth County. The Conditional Use conditions should be at least as strict as those for Nel-Farm.**

Since there are a limited number of CAFOs, enforcement of the above suggestion seems feasible.

Regards,

Gene Pulera

Gene Pulera

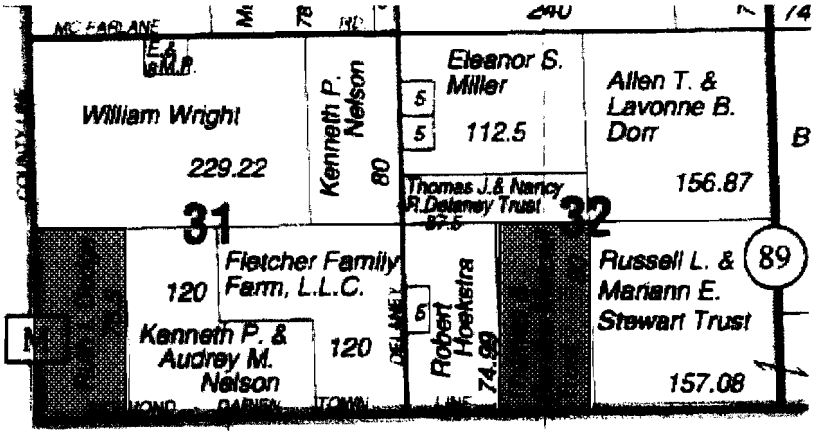
W9539 McFarlane Road
Darien, WI 53114
Cell: 323-363-8686
eMail: ITAmerica@aol.com

Walworth County Spreading Fields for the Proposed Rock Prairie Dairy

Richmond Township, Walworth County, Wisconsin

Number	Parcel Owner	Acres Under Contract
1.	Ruth I. Dodge	76.50
2.	Thomas & Sandra Metcalf Trust	80.00
Total Acreage in Richmond Township		**156.50**

Assuming 98.7% of these are spreadable once setbacks and other considerations are taken into account, we get 154.47 spreadable acres (156.50 x 98.7%).



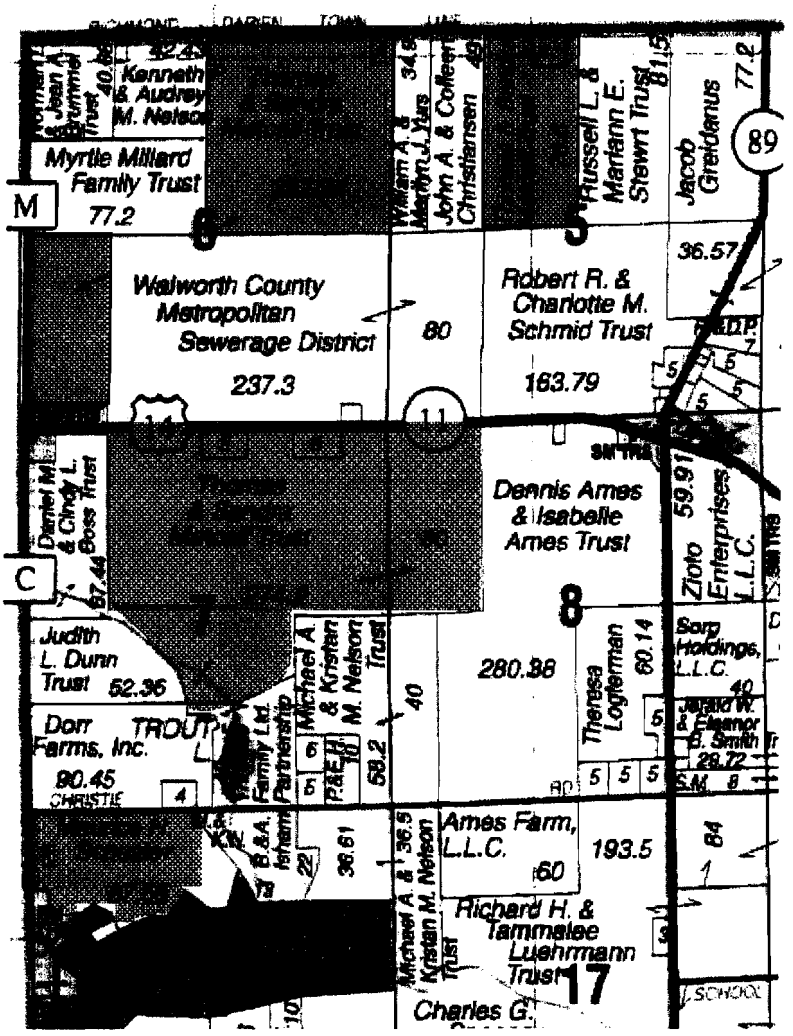
Darien Township, Walworth County, Wisconsin

Number	Parcel Owner	Acres Under Contract
3.	Thomas & Sandra Metcalf Trust	222.24
4.	Thomas & Sandra Metcalf Trust	76.60
5.	Thomas & Sandra Metcalf Trust	274.20

6.	Thomas & Sandra Metcalf Trust	80.00
Total Acreage in Darien Township		**653.04**

** An additional 87.55 (Maurice H. Schuster) acres are under contract for emergency use only. They were not counted in the above Darien totals.

Assuming 98.7% of these are spreadable once setbacks and other considerations are taken into account, we get 644.55 spreadable acres (653.04 x 98.7%).



Note.

If you look at Section 7 in the prior picture, you will see that Turtle Creek comes off of Trout Lake. <u>A section of Turtle Creek passes through the spreading field.</u> Hopefully, the appropriate setbacks are enforced.

Cc: Attorney Michael Cotter
Attorney David A. Bretl

Mr. Richard Brandl
Mr. Jerry A. Grant
Mr. Randy A. Hawkins
Ms. Kathy Ingersoll
Mr. Daniel G. Kilkenny
Mr. Carl Redenius
Mr. Joe Schaefer
Mr. Rick Stacey
Mr. Russ Wardle
Mr. David A. Weber
Mr. Richard Kuhnke, Sr.
Mr. Jim Van Dreser
Ms. Louise Olson

April 29, 2011

Richard Stadelman
Wisconsin Towns Association
W7686 County Road MMM
Shawno, WI 54166

Mark D. O'Connell
Wisconsin Counties Association
22 East Mifflin Street, Suite 900
Madison, WI 53703

Subject: Use of Innovative Technologies in Agriculture

Dear Mr. Stadelman and Mr. O'Connell:

Earlier this month, you received a letter from Secretary Brancel of the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) and Secretary Stepp of the Wisconsin Department of Natural Resources (DNR) regarding the use of Center Pivots to apply manure. In it they indicate there are "several farms [in Wisconsin] that have used center pivots to apply manure for many years with no demonstration of environmental or human health impacts."

They encourage you, as leaders of your respective organizations, "... to work with your members to make sure they do not adopt local ordinances that restrict the use of approved and accepted technologies unless it can be documented and demonstrated that there are environmental or public health risks associated with them."

Several local governments are discussing and enacting ordinances to regulate or ban the spreading of raw, untreated manure using Center Pivots, because this practice poses a serious public health risk. Please note that DATCP said the ban on Center Pivots in Johnstown Township in Rock County, Wisconsin was not in violation of Wisconsin's Livestock Siting Law, because the Livestock Siting Law covers CAFO (Confined Animal Feeding Operation) facilities and not their spreading fields.

Based on scores of comments regarding the Environmental Analysis for a proposed CAFO in Rock County, the DNR asked for an opinion from the Wisconsin Department of Health Services (DHS) regarding the use of Center Pivots for spreading manure.

Dr. Robert Thiboldeaux, the toxicologist who published the opinion on February 17, 2011 (see Enclosure) noted that "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."

Dr. Thiboldeaux said:

> "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 reduce the microbial load of the applied material, using some form of treatment** such as aerobic or anaerobic digestion, lime treatment, or composting; ...."
>
> "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 hazardous air pollutant emissions."

The more serious health risk is that of pathogens and resistant bacteria in raw, untreated manure. The literature is quite expansive on the health risks associated with CAFOs and spray irrigation of liquid manure.

Hydrogen sulfide gas causes respiratory and eye irritation, and at increased levels can also cause nervous system effects, unconsciousness, long-term neurological symptoms, and death. Ammonia is a respiratory and eye irritant that can cause numerous symptoms ranging from mild cough and sore throat to inflammation, burns, and at very high concentrations, death. Particulate particles from dried manure also pose a threat, lodging deep in the lungs where they may decrease lung function, worsen asthma and respiratory symptoms, and increase the risk of heart attacks and premature death.

The proposed Rock Prairie Dairy (RPD) application does not include any form of treatment to the liquid manure to be spread through Center Pivots.

The owner of the proposed Rock Prairie Dairy pulled the Center Pivots to allow the permitting process to continue forward. I believe Dr. Thiboldeaux's memo of February 17, 2011 prompted this action. However, the Center Pivots are in the Rock Prairie Dairy's revised Nutrient Management Plan for 2012.

This is not about a single CAFO owner. It pertains to any CAFO using or wanting to use Center Pivots to spread raw, untreated manure.

Dr. David Chakoian, a physician from Viroqua, Vernon County, Wisconsin, has done research on toxins and odors from CAFOs. In a paper he submitted to Wisconsin Resources Board in December 2007, he wrote ...

> "'Odor' from CAFOs does not simply represent an annoyance and nuisance. Odor represents a complex mix of elements that have the potential to cause damage to the health of people living near the facilities.
>
> There is strong evidence that emissions from CAFOs – emissions that are marked by the presence of odors – cause significant health problems to those who are chronically exposed at low levels. These emissions cause and worsen asthma and chronic lung disease, increase rates of pneumonia and diarrheal illness, and cause increased antibiotic resistance in human pathogens. They also contribute to conditions that affect quality of life, such as depression, headaches, fatigue, nasal congestion, and decreased mental function."

Dr. Chakoian says that ...

> "Because the predominance of the evidence is that CAFO emissions are dangerous, the State of Wisconsin should take the strongest possible actions to eliminate odors (and the toxins the odors represent) from the environment."

He treats patients who have gotten sick from CAFO toxins and odors.

The Secretaries of DATCP and DNR said that Center Pivots have been used in Wisconsin, though not widely, "with no demonstration of environmental or human health impacts." <u>This does not mean that there are none. More than likely, the human health impacts have gone unrecognized.</u> Furthermore, at least one of the facilities using Center Pivots to spread manure is treating it, as suggested in Dr. Thiboldeaux's memo.

Any research that is done or used to show that Center Pivots are safe to the public should be funded by a neutral party that will not benefit from the results – one way or the other. The tests and evaluation of the results must not be preordained or have the appearance of favoring a given outcome; otherwise, the validity of the results and the legitimacy of the conclusions drawn from them will be suspect and not acceptable. This is especially important given the enormous public health risk attached to their use.

In a February 3, 2011 DNR reply to a comment regarding the Environmental Analysis of the proposed Rock Prairie Dairy, the DNR notes that "Center pivot irrigation was not identified as a beneficial management practice ..." in reducing ammonia and hydrogen sulfide air emissions – two of the gases mentioned in Dr. Thiboldeaux's memo. This finding is based on an interdisciplinary study sponsored by the State of Wisconsin and published in December 2010.

Several lawsuits have been won because of the adverse impact of CAFOs on the public's health. A CAFO in Thief River Falls, Minnesota was forced out of business, because nearby residents had to be evacuated due to toxins and odors.

At one end of the public health risk continuum, we get the most effective technique to avoid infections, control toxins, odors, and hazardous air pollutant emissions – treated and injected manure. At the other end of that continuum, we get the least effective technique for controlling infections, toxins, odors, and hazardous air pollutant emissions – untreated and sprayed manure.

We are proud of our State, its residents, its dairy industry, and our beautiful natural resources. We look to the leaders of our State to protect us. Spraying raw, untreated manure through Center Pivot technology violates that trust. Let's be very careful adopting new agricultural technologies to grow food when those technologies harm the very people they are intended to feed!

The public health issue should be front and center the first issue to address.

Local governments are evaluating whether the use of Center Pivot technology for spreading raw, untreated manure puts their residents at a serious health risk. This is what local governments should be doing – protecting their residents.

Respectfully,

Gene Pulera

Gene Pulera [W9539 McFarlane Road, Darien, WI 53114; Richmond Township, ITAmerica@aol.com; 608-883-6712]

Cc: Secretary Brancel, Wisconsin DATCP
Secretary Stepp, Wisconsin DNR
Secretary Smith, Wisconsin DHS
Russell Rasmussen, Water Division, Wisconsin DNR
Dr. Robert Thiboldeaux, Wisconsin Department of Health Services
Attorney Michael Cotter, Walworth County, Wisconsin
Walworth County Board of Supervisors
Walworth Zoning and Planning Agency Committee
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Kenneth Monroe, Bloomfield Township, Walworth County, Wisconsin
Cecil R. Logterman, Darien Township, Walworth County, Wisconsin
Dorothy Burwell, Delavan Township, Walworth County, Wisconsin
Daniel L. Lauderdale, Geneva Township, Walworth County, Wisconsin
William Mangold, Lyons Township, Walworth County, Wisconsin
Wayne Redenius, Richmond Township, Walworth County, Wisconsin
David Duwe, Sugar Creek Township, Walworth County, Wisconsin
Daniel Cooper, Lafayette Township, Walworth County, Wisconsin
Jim C. Simons, Spring Prairie Township, Walworth County, Wisconsin
Ron Fero, Whitewater Township, Walworth County, Wisconsin
Frank Taylor, La Grange Township, Walworth County, Wisconsin
John Kendall, Troy Township, Walworth County, Wisconsin
Martin John Stoesser, East Troy Township, Walworth County, Wisconsin
Johnstown Township Town Board, Rock County, Wisconsin
Harmony Township Town Board, Rock County, Wisconsin

Enclosures: April 19, 2011 Letter from the Secretaries of DATCP and DNR to Richard J. Stadelman and Mark D. O'Connell

Memo from Dr. Thiboldeaux of the Wisconsin Division of Public Health to the Wisconsin DNR regarding the *Public Health setbacks for manure spray irrigation*, February 2011.

One page excerpts from Dr. David Chakoian's paper on *Odors and Confinement Animal Feeding Operations: Human Health Risks, a Review of the Current Medical Literature* submitted to the Wisconsin Natural Resources Board, December 6, 2007

State of Wisconsin
Governor Scott Walker

Department of Agriculture, Trade and Consumer Protection
Ben Brancel, Secretary

Department of Natural Resources
Cathy Stepp, Secretary

April 19, 2011

Richard J. Stadelman
Wisconsin Towns Association
W7686 County Road MMM
Shawano, WI 54166

Mark D. O'Connell
Wisconsin Counties Association
22 East Mifflin Street, Suite 900
Madison, WI 53703

Subject: Use of Innovative Technologies in Agriculture

Dear Rick and Mark:

As supporters of the state's livestock siting law and rules, we appreciate the advice and counsel you provide your members with respect to livestock siting issues. As you know, the law was put in place to try and eliminate local governments from making changes to their local ordinances with respect to acceptable farming practices unless environmental and public health risks can be demonstrated.

The latest technology that local governments want to prohibit (Rock and Walworth counties at the present time) is the use of center pivot technology to apply manure nutrients from farms. While not widely used in Wisconsin, there are several farms that have used center pivots to apply manure for many years with no demonstration of environmental or human health impacts. You may know that old center pivots have been modified using drop nozzles to place nutrients in a specified pattern directly on plants.

As you know, the application during the growing season has many benefits including getting nutrients on crops when they need them most and reducing the risk of nutrient runoff events that can happen with annual or semi-annual nutrient applications. The use of this system has the potential to significantly reduce truck traffic, thereby reducing the impact to town and county roads.

On the global level, improved agricultural technologies have focused on the improved genetics of plant seeds which has resulted in higher yield crops while reducing our dependence on pesticides, enhancing the health of our agricultural systems, and increasing the nutrient content of food. This is only part of the solution however. The entire system of agriculture production will see new applications of technology that will assist producers in

meeting increasing production demands in the future while complying with regulatory requirements and remaining economically viable.

With the challenge of feeding the world's population, which is expected to grow by 3 billion from the current 6.7 billion by 2050, on limited arable land resources and water availability, it is our obligation to utilize innovative technological solutions in order to feed the world. We support and encourage farmers to use new and/or innovative technologies to meet the challenges ahead of us.

As leaders of your respective associations, we encourage you to work with your members to make sure they do not adopt local ordinances that restrict the use of approved and accepted technologies unless it can be documented and demonstrated that there are environmental or public health risks associated with them.

Please contact of us for any assistance you may need.

Sincerely,

Ben Brancel
Secretary, DATCP

Cathy Stepp
Secretary, DNR

STATE OF WISCONSIN
Department of Health Services
Division of Public Health
Bureau of Environmental and Occupational Health

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.

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[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 that 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 that 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.

Odors and Confinement Animal Feeding Operations: Human Health Risks, a Review of the Current Medical Literature

Submitted to the Wisconsin Natural Resources Board
December 6, 2007

Submitted by Dr. David Chakoian, MD
Vernon Memorial Healthcare
Viroqua, Vernon County, WI

"Odor" from CAFOs does not simply represent an annoyance and nuisance. Odor represents a complex mix of elements that have the potential to cause damage to the health of people living near the facilities.

There is strong evidence that emissions from CAFOs – emissions that are marked by the presence of odors – cause significant health problems to those who are chronically exposed at low levels. These emissions cause and worsen asthma and chronic lung disease, increase rates of pneumonia and diarrheal illness, and cause increased antibiotic resistance in human pathogens. They also contribute to conditions that affect quality of life, such as depression, headaches, fatigue, nasal congestion, and decreased mental function.

B Recommendations

Because the predominance of the evidence is that CAFO emissions are dangerous, the State of Wisconsin should take the strongest possible actions to eliminate odors (and the toxins the odors represent) from the environment. Permanent rules to severely restrict odors beyond the property line of CAFO operations, with adequate penalties to ensure compliance, should be implemented immediately.

Nowlan&Mouat LLP

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April 28, 2011

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RE: Center Pivot Manure Application

Dear County Board and Committee Members and Atty. Cotter:

I serve as Town Attorney for the Town of Richmond in Walworth County. On behalf of the Town of Richmond, I attended the Zoning Agency meeting of April 21, 2011, for the purpose of presenting Richmond's request that the County Board consider the placement of zoning restrictions on the use of center pivot manure application. At that meeting, the committee was kind enough to permit me a few minutes to explain what the Town is seeking and why. The committee chose to take no action at that time.

After the meeting I was made aware of a letter from Russell Rasmussen, Acting Administrator of the Water Division of the Wisconsin DNR, dated April 13, 2011. That letter was addressed to

100 SOUTH MAIN STREET • P.O. BOX 8100 • JANESVILLE, WISCONSIN 53547-8100 • FAX: 608-755-8110 • TELEPHONE: 608-755-8100
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Supervisors Russell and Stacey, and copies were sent to all other supervisors and Zoning Agency citizen members. I have also received a copy of a letter from Atty. Anna Wildeman of Michael Best & Friedrich of Madison directed to Mr. Cotter and dated April 27, 2011, and she enclosed with that letter a copy of a previous letter from her partner, David Crass, to me dated February 7, 2011. Atty. Wildeman and Atty. Crass represent both the Wisconsin Dairy Business Association and Rock Prairie Dairy, the large operator who is in the process of constructing a 5200 dairy cow operation in the Town of Bradford in Rock County.

Because of the arguments made in these letters, and because I am concerned about the impression left with the Zoning Agency during the meeting, I am sending this letter to clarify the Town of Richmond's position and to respond to the legal arguments made by Atty. Wildeman and Atty. Crass.

Although I represent multiple towns with an interest in center pivot manure application, including the Town of Bradford, the positions of all of these towns are not the same. Four of the towns I represent, including the Town of Bradford, have taken action or are planning to take action in relation to center pivot manure application. The towns are not agreed on the manner of regulation. The possible actions run from banning the practice entirely to requiring conditional use permits. As you know, towns in Rock County have zoning powers, and the County does not, so the options available in Rock County are broader than they are for the Town of Richmond.

With regard to Richmond in particular, I was asked to draft an ordinance declaring center pivot manure application to be a nuisance. I was also asked to contact the County to pursue possible zoning regulation of center pivot manure application. I have advised the Town that there may be legal advantages to zoning-based regulations over nuisance-based regulations. Specifically, Atty. Crass has argued in his February 7 letter that the Wisconsin Right to Farm Law, Wis. Stat. § 823.08, prevents towns from regulating center pivot manure application through a nuisance ordinance. In light of the health concerns raised in a memo from toxicologist Robert Thiboldeaux of the Wisconsin Division of Public Health, dated February 17, 2011, I believe Atty. Crass is wrong. The issue raised is one of health and safety, and the Right to Farm Law does not forbid regulations based on a substantial threat to health and safety. A copy of the Thiboldeaux memo is enclosed for your reference.

If Atty. Crass is correct, however, in claiming that the Right to Farm Law prevents towns from adopting nuisance ordinances to regulate center pivot manure application, that law nonetheless does not prevent a municipality from exercising its zoning powers to control a use of this nature. The Right to Farm Law applies to nuisance claims, not to zoning regulations. Sec. 823.08(1) states quite specifically the legislature's belief that "local units of government, through the exercise of their zoning power, can best prevent" what the statute calls "conflicts between

agricultural and other uses of land." That is why Walworth County's zoning powers need to be exercised in this situation.

In response to Mr. Rasmussen's letter, I understand that the County may not want to pursue banning center pivot manure application. However, I want to make it clear that there is a substantial difference between banning the proposed use and regulating it by means of the conditional use permit process. Even assuming that center pivot manure application is perfectly appropriate in some places, that does not mean a zoning authority must or should allow it in any place where agricultural uses might take place. I have no argument with the statements made in Mr. Rasmussen's letter to the effect that there may be benefits in relation to nutrient management associated with the proper use of center pivot manure application. As Mr. Rasmussen states, I am not aware of any particular problems currently associated with center pivots in general. The question here, however is not one of irrigation, but manure application. I am unaware of any extensive use of center pivots in Wisconsin for manure application. The potential danger of using this process is outlined in the enclosed Thiboldeaux memo. The odor concerns are documented in a publication of the University of Nebraska – Lincoln Extension from 2007, a copy of which is also enclosed for your reference.

Any action taken by the County should certainly be based upon a concern for public health, safety and odors. If no process is in place that would allow the County to control the process of center pivot manure application, then the door is open for the use in any agricultural area. By simply providing that center pivot manure application requires the issuance of a conditional use permit, the County will at least be able to determine the health, safety and odor implications of a particular operation and act accordingly. I agree that the County should consult with DNR officials before denying an application or imposing restrictions. The immediate question is simply whether the County wants to have any say at all in the process. If the County does not require a conditional use permit, it will have no say. Thus, in this case, taking no action is the equivalent of allowing center pivot manure application on an unrestricted basis until after it becomes a problem.

In his letter dated February 7, 2011, Atty. Crass argues that the "State of Wisconsin has developed a comprehensive regulatory framework for the operation and management of livestock facilities and nutrient management in Wisconsin." He apparently contends that this pre-empts counties and towns from regulating the location of center pivot manure application. On this point, I heartily disagree. While the State has largely taken over the process of regulating the location of large livestock operations under Wis. Stat. § 92.15 and regulations adopted under that statute and included in Chapter ATCP 51 of the Wisconsin Administrative Code, those regulations, by their terms, apply to the farm operation itself, and not to off-site manure distribution.

In her April 27 letter to Mr. Cotter, Atty. Wildeman challenges my characterization of a "regulatory vacuum" in my abbreviated remarks to the Zoning Agency. Please allow me to explain, and to take issue with Atty. Wildeman's representation that the County need have no concerns about center pivot manure application because "center pivot nutrient applications are a highly regulated activity in the state, and many such systems have been operating in Wisconsin for years with no demonstrated or documented environmental or public health impacts." First, I am not aware of any extensive use of center pivot irrigators for manure application in Wisconsin. Second, I think that there is, indeed, a dearth of regulatory standards with regard to that process.

It is true that Chapter NR 243, entitled "Animal Feeding Operations", of the Wisconsin Administrative Code includes a brief provision in § 243.15(6) that simply says "proposed permanent spray irrigation and other treatment systems shall at a minimum meet the requirements of s. NR 214.14, soil and groundwater monitoring criteria in ss. NR 214.20 and 214.21, and land application requirements specified in s. NR 243.14." However, it is also clear that Chapter NR 214 was not originally intended to deal with liquid manure issues. In fact, § 214.02(3)(b) specifically excludes "liquid manure applied in accordance with sound agricultural practices," without defining those practices. Further, the provisions in Chapter NR 214 referenced in NR 243 appear to be more oriented to issues of runoff than to issues of air pollution and odor. The "wastewater spray" referenced in NR 214.14 is simply required to be "at least 500 feet from the nearest inhabited dwelling," while the Department "may require a greater distance depending on the type of distribution system and potential for aesthetic and public health impacts."

Thus, it is accurate to say that the DNR has the power to regulate center pivot manure application. However, it is also true that the DNR has not completed any detailed technical standards for the application method for large scale spraying of manure onto fields. More importantly, it has created only minimal standards for the location of "spray irrigation systems." I am quite aware that the DNR is in the process of reviewing the Rock Prairie Dairy proposal for manure application with the idea of creating some objective standards. I am also aware that local governments have been invited to participate in the process of creating reasonable standards. It is my sincere hope that the standards developed will be sufficient to assure that center pivot liquid manure application will be done in a manner which does not unreasonably endanger health, safety and aesthetics. In the meantime, however, I do believe it is accurate to say that there are no particular standards in place governing the location of such systems, and only minimal regulations for the application process.

It therefore behooves local governments who are concerned about the impact of large scale center pivot manure application to assure that they have a process in place that would permit

them to control the location of such systems. It may well be that, in the future, a court might hold that local municipalities are pre-empted from regulating center pivot manure application because such regulation would interfere with a state-created system. However, at this point, I see no disadvantage, and a great deal of potential advantage, in the creation of a requirement that such application requires at least a conditional use permit.

With all respect, I appreciate the County's desire not to interfere with the DNR. However, I do not believe that adopting a conditional use permit requirement will create any unnecessary interference, and it may well prevent an unnecessary future problem.

Sincerely,

NOWLAN & MOUAT LLP

David C. Moore

DCM:LKG
Encls
pc: Attorney David Crass (w/encls)
Attorney Anna Wildeman (w/encls)
Mr. Mark Cain (w/encls)
Mr. Russell Rasmussen (w/encls)

STATE OF WISCONSIN
Department of Health Services
Division of Public Health
Bureau of Environmental and Occupational Health

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.

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[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 that 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 that 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.

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[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.

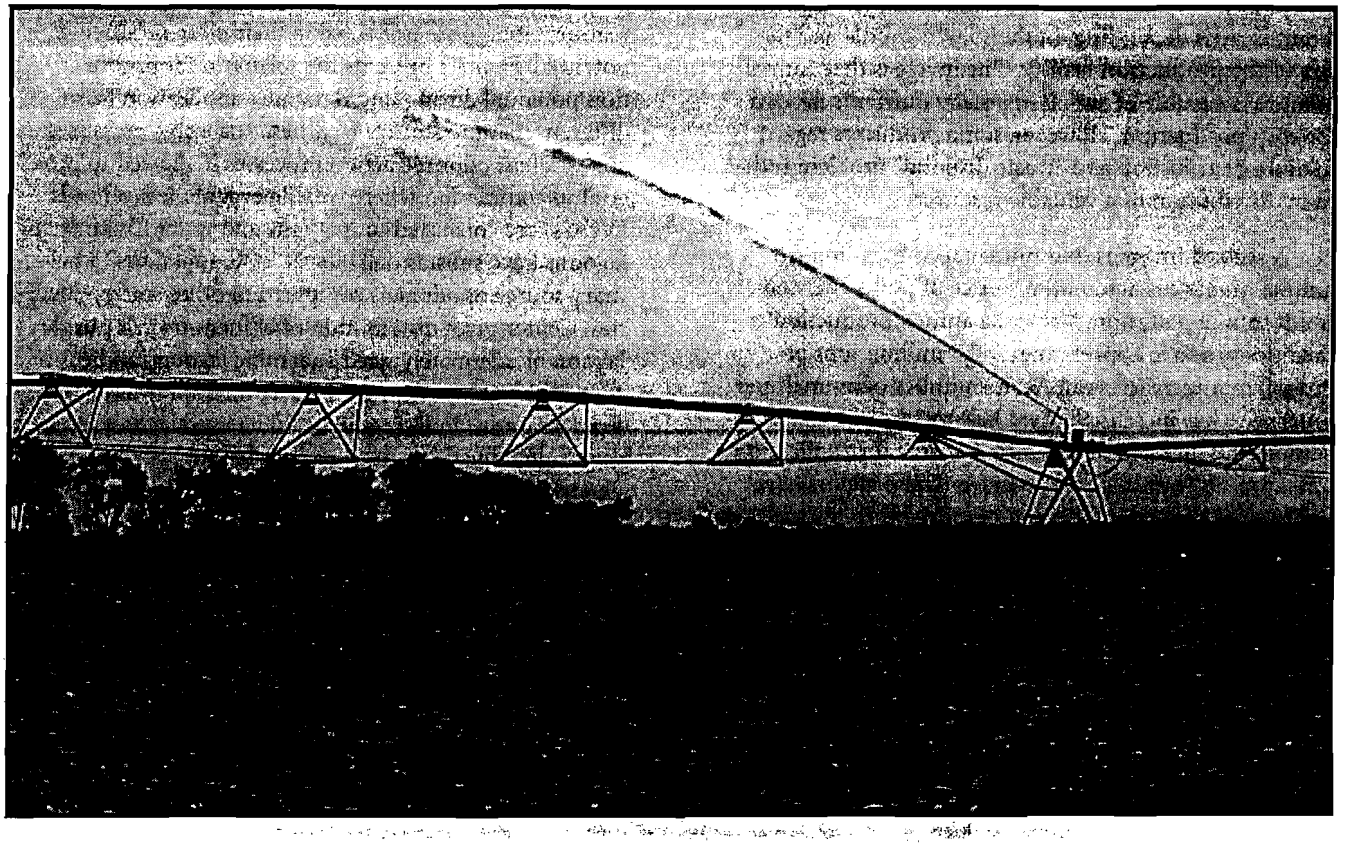
[10] Burton, CH. 1997. Manure management - treatment strategies for sustainable agriculture. Silsoe Research Institute, Silsoe, Bedford, UK. *In* Casey KD, Bicudo JR, Schmidt DR, Singh A, Gay SW, Gates RS, Jacobson LD, Hoff SJ. 2006. Air quality and emissions from livestock and poultry production/waste 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.

Nebraska EXTENSION

EC778

Application of Liquid Animal Manures Using Center Pivot Irrigation Systems



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IANR

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Animal manure management practices are being scrutinized to ensure that the potential for environmental pollution is minimized. Manure from large and small production facilities must be distributed in a manner that limits the potential for surface runoff, deep percolation and drift to off-target areas. The purpose of this Extension Circular is to provide guidance in selecting center pivot equipment and system management needed to safely apply manure to the land.

Introduction

Animal manure by its very nature conjures up different images depending on the source animal and the size of the production facility. One image is that animal manure is capable of supplying many nutrients needed for crop production. However, some producers regard manure distribution as a "waste disposal" problem rather than distribution of a valuable resource.

A second image is that unmanaged land-applied animal manure is a potential source of point and non-point source pollution. Nebraska animal production facilities produce approximately 7.5 million tons of animal manure each year. As the number of animals per enterprise has increased, there has not always been a corresponding increase in the land available for application and crop utilization of the manure. These factors have led to state and federal regulation of manure storage and distribution systems.

The selection of an appropriate application method for manure can be important for several environmental, agronomic and engineering issues. Application methods should be evaluated based upon their potential impact on:

- Odors
- Water quality
- Soil conservation and quality
- Pathogen transmission
- Phytotoxic effects on plants

Odor Control

It is important to recognize that various types of manure storage are not equal in their odor-producing potential. *Figure 1* presents the relative odor production potential during liquid manure application from different manure storage facilities. Anaerobic processes are excellent odor reduction processes if allowed to proceed to completion where volatile organic compounds (VOCs) are converted to methane and water. Treatment lagoons have substantially lower VOC emissions (a primary source of odor) as compared to other storage facilities. Center pivot distribution of effluent from a purple lagoon or adequately sized anaerobic lagoon can be accomplished with minimal odor while spray irrigation from an under-building pit or undersized lagoon has a very high odor potential. Lower odor storage systems illustrated in *Figure 1* provide environments that allow anaerobic processes to proceed to completion.

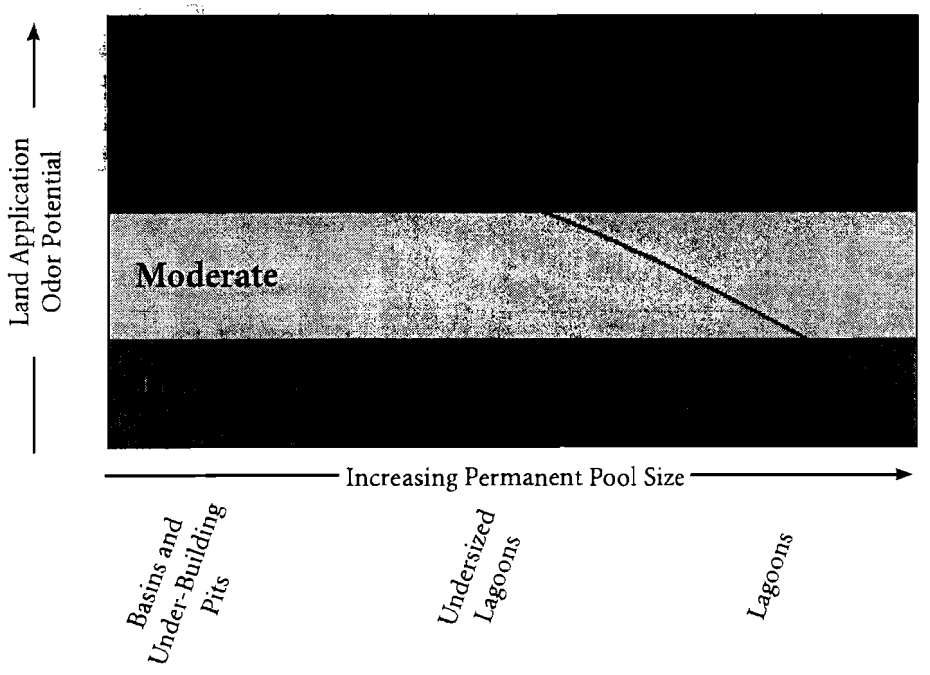

Figure 1. Relative odor emissions of liquid manure application from different manure storage systems.

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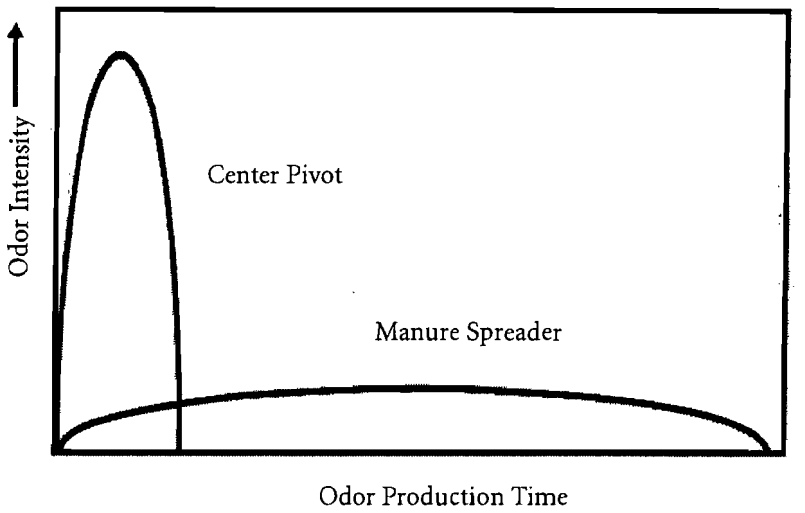

Figure 2. Odor intensity vs. Duration of odor exposure for two manure application systems.

Properly functioning lagoons can often be identified by measurement of electrical conductivity (EC). An EC of less than 6 mmho/cm is generally necessary for purple sulfur bacteria to thrive and produce a low odor purple lagoon. Anaerobic bacteria that convert VOCs to odorless methane and water perform poorly as EC levels exceed 8 to 10 mmho/cm, resulting in lagoon contents that will be more odorous during irrigation.

Effectiveness of anaerobic treatment processes (anaerobic lagoons) to control odor is also affected by management factors that affect the biological processes. Thus, management of a facility is a critical factor in defining the potential odor emissions during land application. For example, center pivot distribution from an anaerobic lagoon in July will produce much less odor than in March because of the increased biological treatment that occurs during the warmer summer months. Design and management recommendations for reducing the odor associated with the manure storage will be discussed later. Minimizing manure storage odor is the first step in reducing odor associated with center pivot application.

From strictly an air quality perspective, there is little question that center pivot distribution systems offer a large potential for odor release during a short time period. These systems deliver a large volume of manure to the field in a short time and provide substantial opportunity for releasing odor-producing compounds directly into the air (more intense but shorter period of time for odor exposure). In contrast, surface application with a tanker or a spreader will release significant odors. However, because of this equipment's inability to deliver product rapidly, some level of odor will be produced over a longer period of time (see *Figure 2*). The significance of the intensity and duration of odors often depends on the location of the field site and the ability to minimize application when the wind direction would carry odors in an undesirable direction.

Minimizing Pivot Application Odors

Manure storage and center pivot design considerations for minimizing odor production and release by the pivot include:

- *Anaerobic lagoons with a large permanent pool.* Total lagoon storage capacity should be adequate to maintain up to 50 percent of the manure storage needs in a permanent pool. This level of permanent pool will assure a stable bacteria population for processing odor-producing compounds and satisfactory dilution of new manure additions.

- *Use low pressure drop nozzles (if nozzle plugging can be minimized).* Distribution of the lagoon water close to the soil surface will reduce the potential for transport of the lagoon water off the application area by wind. Use of low-pressure nozzles on drop tubes will also reduce the intensity of odor production when compared with high-pressure impact sprinklers mounted on top of the pivot pipeline. However, selection of low-pressure nozzles on drops must assure that no runoff occurs. This topic is discussed in more detail later.

- *Earthen basins, formed storages, and undersized lagoons* are less acceptable for pivot irrigation. Since these types of storage facilities typically do not support appropriate bacterial populations, the intensity of odor production can be much greater than for properly sized anaerobic lagoons. Consequently, since these storage facilities also do not

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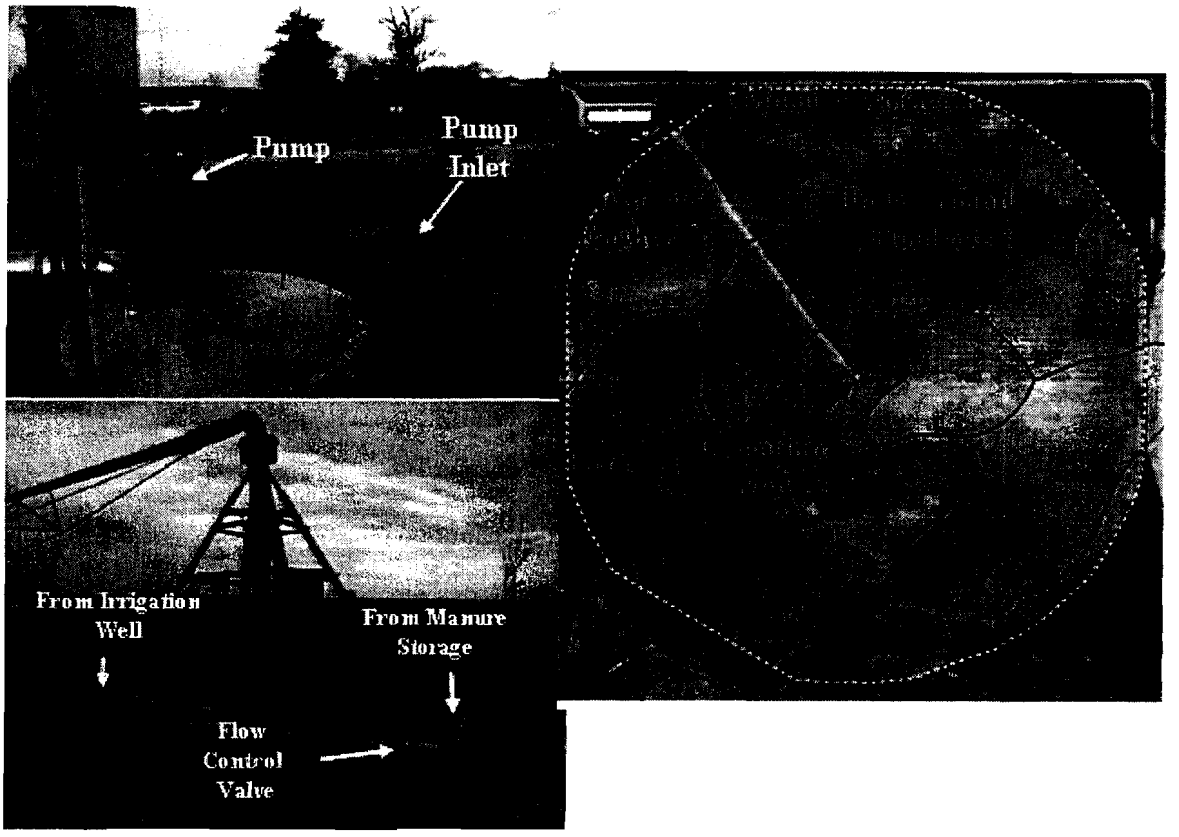

Figure 3. Inset upper left shows a pump installation. Inset to lower left shows a connection at the pivot point. Far right image shows an aerial view of a swine growing/finishing facility with manure storage pit and buried PVC pipeline to a center pivot used for application of a manure fresh water mixture.

contain very large volumes of water, use of ground applicators should be considered especially when the distribution site is close to neighbors.

- *Dilute liquid manure with fresh water (four to five parts fresh water to one part liquid manure).* Dilution to this level will assure that the application does not result in direct or indirect crop damage and will reduce the intensity of odors produced during lagoon water application. To accomplish this goal, the center pivot will need to be plumbed so that both fresh water and lagoon water can be applied simultaneously. An example of this arrangement is presented in *Figure 3.*

Manure storage management considerations for minimizing odor production and release during application using a center pivot include:

- *Apply liquid manures during periods when biological processes are most active.* June through fall application of anaerobic lagoon effluent has the least odor. Winter and spring applications will produce the greatest odors due to limited biological activity to stabilize odor-producing chemicals.

- *Establish purple sulfur-fixating bacteria by maintaining a sufficient permanent pool.* Three of the criterion for maintaining a purple lagoon are to: 1) Annually pump a portion of the lagoon storage volume off the lagoon surface to prevent salt buildup (higher EC) due to water evaporation from the lagoon surface; 2) Leave approximately half of the lagoon water in storage to provide a continual source of purple bacteria; and 3) Do not agitate the lagoon.

- *Annually test liquid manure electrical conductivity (EC) and ammonia (NH_3) levels.* Regular chemical analysis of the lagoon water will clearly identify chemical buildups that could be toxic to desirable anaerobic bacteria. EC levels can be tested more regularly using inexpensive handheld meters available from laboratory supply stores. An EC reading

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greater than 10 mmho/cm and an NH_3 concentration greater than 670 ppm (150 lbs. NH_3/acre-inch) are indications of a poorly functioning lagoon.

- *Increase fresh water addition.* When high evaporation or low rainfall increase EC levels above 10 mmhos/cm, increase the volume of water used for flushing manure from the barn, cleaning, pit recharging, or other facility maintenance activities. Retest the liquid regularly to assure that the proper dilution is reached and maintained.

- *Stop adding manure to the lagoon for two weeks* prior to pumping effluent to allow bacteria to process odorous compounds.

Management practices specific to the center pivot that can reduce odor production during application include:

- *Irrigate during late morning and early afternoon hours* since odors disperse more quickly when air temperature and winds are rising.

- *Monitor wind direction* and stop the application when the wind direction can impact neighbors. One way to monitor wind direction is to install a wind vane or windsock at the storage facility. Historical prevailing wind information can be found for 28 Nebraska sites at *http://manure.unl.edu/wind/wind.html.* Real-time wind direction can be obtained from local weather forecasts or from the Internet.

- *Monitor wind speed.* Shut down pivot when wind is likely to remain calm. Wind is necessary to mix odors with fresh air to decrease the overall odor level. The best option is to purchase and use a handheld wind speed detector. Several Internet sites such as the Weather Channel (*http://www.weather.com*) can be used to obtain real-time local humidity, wind, and air temperature conditions and forecasts.

Water Quality

When water quality issues are considered, application of lagoon water via a center pivot has the least potential environmental impact if the system is properly designed and operated. Key advantages of a center pivot from a water quality point-of-view are:

- The ability to apply nutrients more uniformly than spreaders or tankers. Uniform applications allow producers to be confident in the nutrient application rate.

- Application can occur during the growing season when soil water deficits are likely and high crop uptake limit losses due to surface runoff and leaching.

One of the advantages of using center pivots to apply liquid animal manures — the ability to apply a large volume of material in a short amount of time — also can be a disadvantage. The biggest concern associated with center pivot application of liquid animal manure is the ability to over-apply liquid and/or nutrients. Though most center pivots are capable of applying water at rates similar to land applicators (0.2-0.3 inches per acre), the temptation to use the system to supplement rainfall with liquid animal manure could result in over-application of manure. One of the goals of a Comprehensive Nutrient Management Plan (CNMP) is to determine the appropriate application rate. The Nebraska Livestock Waste Permit system requires documentation of nutrients applied and how soil chemical properties change over time. To avoid over-application, a nutrient analysis must be completed for the liquid manure being applied and application rates must be adjusted to not exceed crop nutrient requirements.

The timing of center pivot application, similar to any other method of manure application, influences the risk to ground and surface water quality. Applications in the early spring and late fall can result in surface runoff and leaching of nitrates due to rainfall on wet soils. Multiple applications during the late spring and summer months limit opportunities for surface runoff and leaching when applications are based on scientific irrigation scheduling procedures.

Finally, application of manure through a center pivot provides the potential for contaminating fresh water resources that may be located within the application area. Some field sites include small surface water catchments or streams that should not receive manure application. To guard against contamination of surface waters, the CNMP process includes requirements for setbacks and manure application restrictions. Some of these may control the use of center pivots near surface water and other environmentally sensitive areas.

Soil Conservation and Quality

Ground application methods can have a negative impact on soil quality due to soil compaction and destruction of crop residue leading to greater erosion potential. Center pivot irrigation has little negative impact on soil physical properties.

Application of manure slurry can have a positive impact on soil quality including increased organic matter

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content and reduced runoff potential. Field research at the Haskell Agricultural Laboratory has documented an increase in organic matter due to improved biological activity in the soil resulting from the carbon and nutrients contained in liquid swine manure. However, the low solids content of most irrigation-applied lagoon water is likely to result in only modest increases in soil organic content or runoff reduction when applied at agronomic rates.

In drier regions of the state, repeated application of liquid manures with high salt content can lead to salt buildup in the soil profile if the combination of precipitation and irrigation is not sufficient to leach the salts from the crop root zone. Salt contained in liquid animal manure can also be a problem if the soil profile contains an impermeable layer. In this case, the water that normally moves salt through the profile is held above the impermeable layer and can result in a salt buildup if plants remove the water leaving the salt behind. High soil salt content can result in loss of soil structure, increase plant water stress, and change plant ecosystems. In areas with limited precipitation and irrigation, chemical analysis results should be compared with information indicating when salt content is too great.

It is recommended that baseline soil samples be collected and analyzed to determine the Sodium Adsorption Ratio (SAR), Electrical Conductivity (EC), and Base Saturation level to get the exchangeable sodium percentage. If these values change over time, adjustments in application can be made before there are negative impacts to soil, soil drainage rates, and plant stress.

Pathogen Transmissions to Animals and Humans

The risk to grazing animals for *E. coli* O157:H7 transmission following effluent irrigation of forages appears to be modest according to Dr. Dale Hancock, Epidemiologist, College of Veterinary Medicine, Washington State University. He further judges the risk for salmonella transmission to be greater, but not well defined. Grazing animals are likely to experience exposures to these same pathogens through other pathways and from other sources. Though the risk of transmission to grazing animals is low, following effluent application with a fresh water application can minimize the risk. If possible, apply manure at the beginning of the pasture rest time to assure that any pathogens will be washed from vegetative surfaces.

Effluent applications to harvested forages and grains pose a greater risk. Pathogens can live for extended periods in and on grains and forage. Significant increases in some pathogen populations are possible during storage. However, the biological process associated with silage and high moisture corn storage fermentation appears to inhibit pathogen survival. For any animal feed that is to be harvested, manure or effluent should not be applied within one month of harvesting. Application of animal manure to crops grown for direct human consumption must be avoided due to potential health issues.

Phytotoxic Effects to Plants

Concentrated manures contain salt and ammonia at levels that can damage plants if applied directly to plant leaves. Research conducted at the Haskell Agricultural Laboratory indicated that manure electrical conductivity (EC) levels greater than 6 mmho/cm could damage corn and soybeans if applied before the 8-leaf stage in corn or the V3 stage in soybeans. When EC levels were greater than 12 mmho/cm, some plant mortality and stunting was documented when liquid swine manure was applied regardless of the timing of application. EC levels less than 6 mmho/cm were safe when applied any time of the growing season. *Table 1* presents a summary of data collected following liquid swine manure to corn and soybeans during the 2002-growing season. Similar results have been reported by producers following application of concentrated liquid swine manure to alfalfa and pasture.

Table 1. Effect of liquid swine manure EC level and application timing on corn and soybean yields at the Haskell Agricultural Laboratory. (ns=statistically not significant, and s=statistically different yields between treatments)

	Manure EC Level mmho/cm			
	0.6	*6.4*	*11.7*	*20.3*
Corn Growth Stage				
8-leaf	175	181	154	149
14-leaf	163	186	179	185
Significance Level	*ns*	*ns*	*s*	*s*
Soybean Growth Stage				
3-trifoliate (V3)	46	41	42	5
Beginning Flowering (R1)	44	43	39	24
Significance Level	*ns*	*ns*	*ns*	*s*

Rules and Regulations

The storage and distribution of animal manure is governed by rules developed by the Nebraska Department of Environmental Quality based on enabling legislation passed by the Nebraska Unicameral and signed by the governor. The rules are presented as Title 130 Livestock Waste Control Regulations that describe requirements for small, medium, and large production facilities (see details at *http://www.deq.state.*

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ne.us/). Included in Title 130 is a permitting system that defines what manure management systems are required and provides a means of documenting the manure storage, handling and distribution practices that will be followed by the facility.

Setback Requirements

The most recent revision of Title 130, Chapter 9 includes setback requirements to protect surface and groundwater supplies. Section 005 of Title 130 states that

"**005**. For large concentrated animal feeding operations, manure, litter, and process wastewater may not be stockpiled or applied closer than 100 feet to any down-gradient surface waters, open tile line intake structures, well heads, or other conduits to surface or ground water, except that one of the following two compliance alternatives may be substituted for the application setback requirement:

> **005.01** A 35 foot wide vegetated buffer where the application of manure, litter, or process wastewater is prohibited. For the purposes of these regulations vegetated buffer means a permanent strip of dense perennial vegetation established parallel to the contours of and perpendicular to the dominant slope of the field for the purposes of slowing water runoff, enhancing water infiltration, and minimizing the risk of any potential nutrients or pollutants from leaving the field and reaching surface waters; or

005.02 A satisfactory demonstration that a setback or buffer is not necessary because implementation of alternative conservation practices will provide pollutant reductions equal to or better than reductions that would be achieved by the 100 foot setback.

006 For small and medium concentrated animal feeding operations and animal feeding operations not required to seek permit coverage, manure, litter, and process wastewater may not be stockpiled or applied closer than 30 feet of any streams, lakes and impounded waters identified in Chapter 6 and Chapter 7 of Title 117 (Nebraska Administrative Code) – Nebraska Surface Water Quality Standards, unless in accordance with a Department approved nutrient management plan. "

A key interpretation of the rule by the Nebraska Department of Environmental Quality is that if land for a distance of 100 feet down-gradient around the wellhead drains away from the well, the well is not down-gradient and thus the 100 foot setback requirement is not applicable. If the land does not drain away from the wellhead for 100 feet, there are two ways to meet setback requirements: 1) sprinklers on a portion of the center pivot can be shut off when manure is being applied; or 2) if the well is located within the irrigated area but away from the center point, manure application could be discontinued when the center pivot crosses over the well location.

Determining Manure Application Rates

The nutrient management planning approach requires farmers to account for all nutrient sources available from soil, water, commercial fertilizer and manure and balance them with the best estimate of crop needs. Proper application rates depend upon manure chemical analysis, expected crop yield, field slope and drainage, application method, and water resource vulnerability. New rules require animal production facility permits to conduct a phosphorus risk assessment before manure application based upon topography and proximity to surface water. This method helps minimize soil phosphorus (P) movement to sensitive waters that can help reduce the development of algal blooms in surface water. For some crops, however, using P-based manure application rates may require commercial fertilizer application to fully meet crop nitrogen requirements.

Application Rates

Soil testing is essential to accurately determine application rates and to evaluate the impact of manure application on soil chemical levels. The key to determine the appropriate application rates is using proper soil sampling methods. For phosphorus, surface samples (0-8 inches) should contain 12 to 20 individual soil cores. Samples for nitrate analysis should be taken from a minimum soil depth of 2 feet. Fields should be subdivided into sampling units based on soil, topography, crop, yield, and fertilizer histories so that each sample represents an area of no more than 40 acres.

Liquid Manure Testing

Chemical analysis of a representative sample is the foundation of an economic and environmentally sound liquid manure distribution plan. The best scenario is to ascertain the nutrient content of the liquid manure prior to application. Proper sampling of liquid manure requires acquiring samples from several locations (at least 4) of the storage facility. Surface samples are adequate if the liquid will not be agitated prior to application. Detailed discussion of liquid manure sample collection is presented in NebGuide G1450 *Sampling Manures for Nutrient Analysis.*

Keep the sample refrigerated, tightly sealed in a plastic container, and deliver it to the laboratory within 24 hours. Compare manure analysis results with tabular values available from the Comprehensive Nutrient

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Management Planning Web site (*http://cnmp.unl.edu/landapplicationworkbook.html*).

Example: Effluent Application Rate: *Determine the manure application rate assuming that the expected yield for irrigated corn is 200 bu/acre (EY = 200 bu/ac), organic matter = 2 percent, average soil nitrate of 5 ppm NO_3-N, irrigation water NO_3-N concentration of 10 ppm and the normal annual irrigation application =10 inches. Chemical analysis of the liquid manure showed an NH_4-N content of 88 lbs N/ac-in and organic N at 30 lbs N/ac-in.*

Based on the University of Nebraska algorithm, nitrogen need should be calculated using the following equation:

$$Lb\text{-}N/ac = 35 + (1.2 \times EY) - (8 \times NO_3\text{-}N_s) - (0.14 \times EY \times OM) - (0.228 * NO_3\text{-}N_w * IRR)$$

Where:

EY	=	expected yield, bu/ac
NO_3-N_s	=	average soil nitrate concentration, ppm
OM	=	average soil organic matter content, %
NO_3-N_w	=	average nitrate concentration in irrigation water, ppm
IRR	=	seasonal irrigation depth applied x 0.75, inches.

For this example:

- 275 lb N/acre needed for 200 bu/acre corn *200 (bu/acre)x1.2(lb/bu) +35)*

Entering values into the equation:

- *275 (lb N/acre) - (8 x 5 ppm) - (0.14 x 200 x 2) – (0.228 x 10 x 7.5)*
- 162 lb N/acre needed from lagoon water
- Lagoon water N = Ammonoia N + Organic N
- Lagoon water N = (88 lbs N/ac-in x 0.50) + (30 lbs N/ac-in x 0.35)**
- Lagoon water N = (44 + 10.5) lbs N/ac-in
- Lagoon water N = 54.5 lbs N/ac-in
- Lagoon water application = 162 lb N/ac/54.5 lb N/ac-in
- Lagoon water application = 3.0 ac-in
- (162 (lb N/acre) / 54 (lb N/acre-inch as NH_4-N)
- **3.0 inches of lagoon water should be applied.**

**The University of Nebraska–Lincoln recommendations also ensure that 35% of the organic N is available during the first year after application.

Depending on the weather conditions and the sprinkler package used on the center pivot, 30-70 percent of the ammonia can volatilize during and immediately after application. University of Nebraska recommendations assume that 50 percent of the lagoon water N volatilizes and is not available for plant use. This application should be distributed in three or more application events timed to supply N to match crop uptake.

Nitrogen concentrations vary greatly depending on the type of manure in storage and the type of storage facility. For example, analysis conducted at several demonstration sites in Nebraska indicates that ammonia concentrations equivalent to over 250 lbs N per acre-inch are common in swine lagoons. Holding ponds designed as runoff catchments for outdoor feedlots typically contain concentrations of ammonia of 50-60 lbs N per acre-inch, since most of the ammonia volatilizes off the feedlot area. The key is to collect a representative sample and have it analyzed to accurately determine how much N is in the liquid manure.

Application Equipment

Factors affecting the equipment needed to distribute liquid animal manures are the location of the storage site relative to the application site, the amount of liquid to be pumped, whether the manure will be pumped directly into the center pivot or mixed with fresh water, and the type and makeup of the manure. Some swine lagoon systems forgo application of solids until the storage capacity becomes limited. Likewise, most beef feedlot operators pump just the liquid from their runoff storage facilities postponing the distribution of solids. Dairy facilities typically distribute all of the manure on an annual basis. Different types of liquid manure and concentration of solids in the liquid will require different equipment and management practices.

Backflow protection – Chapter 10 of Title 130 Livestock Waste Control Regulations provide safety equipment requirements necessary when applying liquid animal manure through an onfarm irrigation system. Title 130 requires inclusion of an irrigation pipeline check valve assembly consisting of an irrigation pipeline check valve, vacuum relief valve, inspection port and low-pressure drain. The assembly must be located in the pipeline between the irrigation pump and the point of liquid manure injection into the irrigation pipeline. The Rules and Regulations relevant to application of liquid manure through an irrigation system are equivalent to those expressed in Title 195 — Rules and Regulations Pertaining to Chemigation.

Pump — Centrifugal pumps designed to pump liquids having high solid contents are preferred. Design pump speed should be below 2000 rpm to prevent solids separation inside the pump bowl assembly. *Table 2* presents selection criteria for different types of pumps that could be used to pump liquid manure. When pumping

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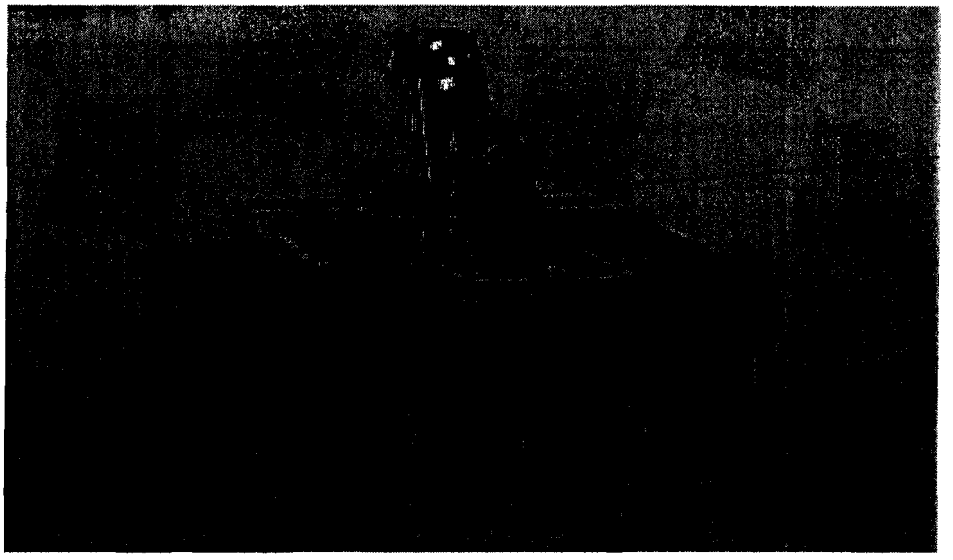

Figure 4. Floating pump installation for pumping lagoon water to a center pivot.

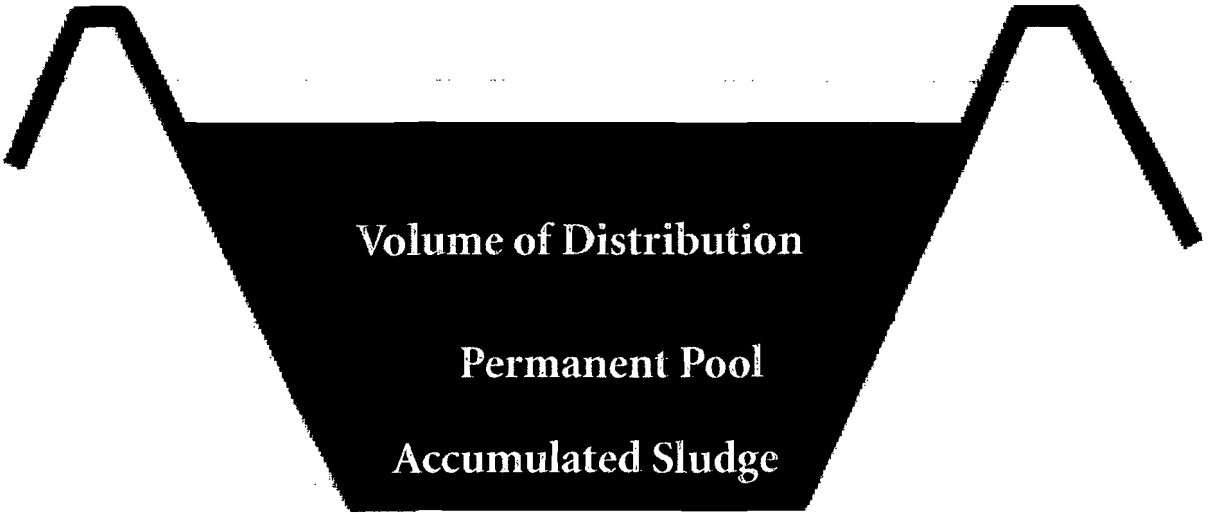

Figure 5. Stratification and design allocation of storage capacity in an anaerobic lagoon.

from large lagoons, it is beneficial to locate the pump inlet away from the sidewalls of the lagoon. This allows the pump to remove liquid closer to the bottom of the lagoon. *Figure 4* shows a floating pump that can be anchored in the lagoon.

Pump inlet — In anaerobic lagoons, most of the solids settle to the bottom of the lagoon to form the sludge layer. An important criterion of the treatment pool (volume for distribution) is sufficient dilution to allow anaerobic bacteria to thrive. Thus, most of the treatment pool typically has solids content less than 1percent *(Figure 5)*. When pumping from a nonagitated lagoon, it is best to position the pump inlet pipe approximately 1.5 to 3 feet below the water surface. If the sludge has accumulated so that it extends into the treatment pool, it is time to remove some of the sludge. The sludge layer has significant solids suspended in the water and will require a pump and distribution system that can handle solids contents in the 3 to 7 percent range.

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Table 2. Manure handling pumps.

Pump type	*Maximum solids content %*	*Agitation ability*	*Agitation range ft.*	*Pumping rate gpm*	*Pumping head ft. of water*	*Power requirements hp*	*Applications*
Centrifugal Open & semi-open impeller Vertical shaft chopper	10-12	Excellent	50-75	1,000-3,000	25-75	65+	Gravity irrigation Tanker filling Pit agitation Transfer to storage
Inclined shaft chopper	10-12	Excellent	75-100	3,000-5,000	30-35	60+	Earth storage agitation Gravity irrigation Tanker filling
Submersible transfer pump	10-12	Fair	25-50	200-1,000	10-30	3-10	Agitation Transfer to storage
Closed impeller	4-6	Fair	50-75	500+	200+	50+	Recirculation Sprinkler irrigation
Elevator	6-8	None	0	500-1,000	10-15	5+	Transfer to storage
Helical screw	4-6	Fair	30-40	200-300	200+	40+	Agitation Sprinkler irrigation Transfer to storage Lagoon pumping Tanker filling
Piston Hollow	18-20	None	0	100-150	30-40	5-10	Transfer cattle manure without long fibrous bedding
Solid	18-20	None	0	100-150	30-40	5-10	Transfer cattle manure with unchopped bedding
Pneumatic	12-15	None	0	100-150	30-40	—	Transfer to storage
Self loading tanker Centrifugal, open impeller	6-8	None	0	200-300	N/A	75+	Tanker loading
Vacuum pump	8-10	Poor	20-25	200-300	N/A	50+	Tanker loading

Source: MWPS-18 Livestock Waste Facilities Handbook

Inlet screening — If the storage facility is uncovered, various types of debris will be deposited in the lagoon by wind (plastic, corn leaves, etc.). Other debris enters the lagoon directly from the production facility. Though most of the debris poses few problems for pumps, larger debris should be screened out prior to entering the pump inlet. Large debris can be excluded using a coarse screen with half-inch or smaller perforations. Centrifugal pumps typically have screens included with the foot-valve used to maintain prime.

Low-pressure shutoff — To prevent the system from running dry, a low pressure or flow sensing shutoff switch should be wired into the pivot system. The shutoff should be activated based on the pressure in the pipeline leading from the manure pump to the irrigation system. The low-pressure shutoff switch should be protected using a diaphragm or a diffuser fitting to prevent the switch from being plugged with small solids contained in liquid manure. The goal should be to shut both the manure pump and the irrigation system down should the manure pump fail or reach the bottom of the storage facility.

To achieve this goal there are two options: 1) place a low pressure switch on the manure pump outlet to shut it down and run a wire to the pivot to also cause the pivot to shut down; and, 2) place low pressure shutoffs at the manure pump and where the pipeline enters the fresh water that will shut down both systems inde-

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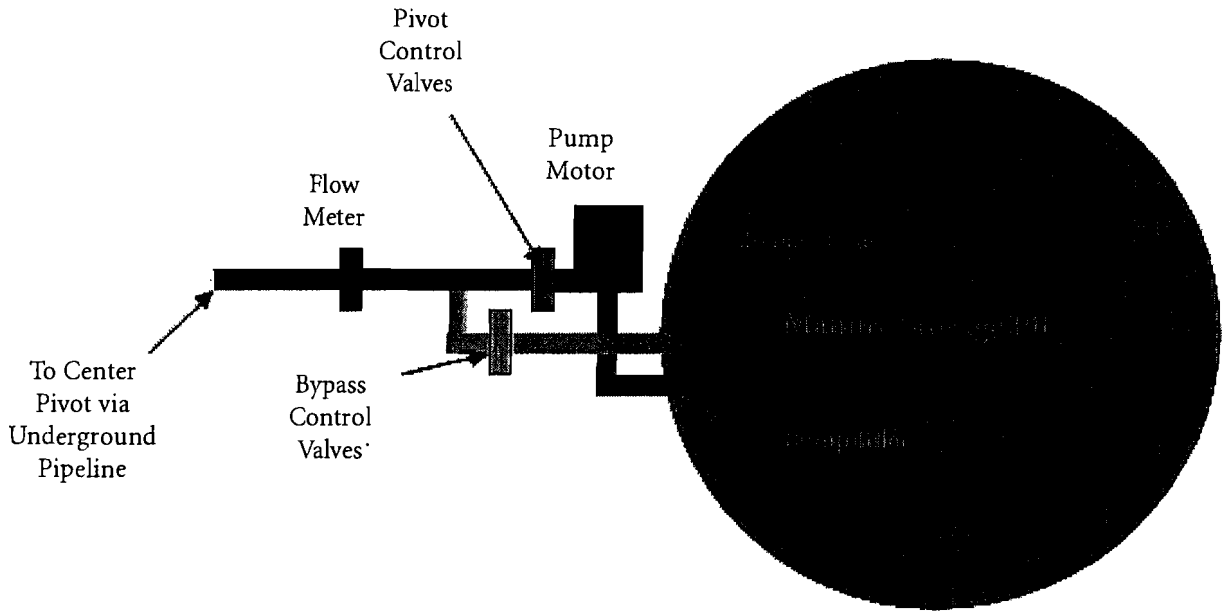

Figure 6. Schematic of a liquid manure pumping installation showing a flow meter, dual flow control valves and the bypass line to direct flow back into the storage facility if necessary.

pendently. Since the manure will contain solids, design should also include a valve at the pivot point to prevent flow from the lagoon into the pivot and also prevent fresh water flow toward the manure storage facility when only fresh water is being applied.

Flow rate regulator — A control valve with flow meter should be installed to allow the flow rate to be monitored and regulated during the application event. The meter and control valve should be placed at the manure pump outlet so that the rate can be adjusted if necessary.

Delivery pipelines — Pipelines should be made of materials resistant to oxidation. The most preferred pipeline material is glued poly-vinyl chloride (PVC). PVC resists chemical degradation due to acids or salty water common to animal production facilities. The delivery pipelines should be installed underground and below the frost line to prevent frost damage. In addition, and particularly if aluminum pipeline is used, the delivery line should be plumbed to allow the liquid manure to be flushed from the pipeline back into the source. Flushing is necessary to prevent the ammonia content in the lagoon water from oxidizing the aluminum pipeline that could result in pipeline leaks. This design option will require a pair of valves at the pump: one to control the flow rate to the center pivot, and a second valve to direct flush water to bypass the pump into the lagoon *(Figure 6)*.

Sprinkler packages — The flow rate distributed by a sprinkler is controlled by the diameter of the nozzle and the operating pressure supplied to the base of the sprinkler. To prevent the nozzles from plugging, it is desirable to have relatively large nozzle openings with medium to high pressures. However, to attain high fresh water application efficiency, it is desirable to have small sprinklers distributing water closer to the soil surface at low pressure. Center pivots equipped with a large number of narrowly spaced sprinkler heads will have small nozzles when compared with center pivots with a few widely spaced sprinklers. Consequently, low to medium pressure impact sprinklers are less prone to plugging than low pressure spray nozzles because the sprinkler spacing is wider and thus the nozzle opening is larger. To reduce the need for dual sprinkler packages, a compromise is often struck between the goal of low susceptibility to plugging and high water application uniformity and efficiency.

When dairy manure is being distributed, large volume guns are usually placed on the center pivot and sequenced on and off to maintain a relatively constant flow rate and pressure entering the system. This is done because of the high solids content of the liquid manure. Sequencing the sprinklers on and off is necessary to equalize the depth of liquid manure applied along the length of the center pivot.

When pumping lagoon water with solid content less than 1 percent, low-pressure sprinklers can generally be used. The nozzle structure should have an open cage with few restrictions that could catch solids. Solids are more likely to get caught on stationary pads with coarse grooves than flat or fine grooved pads. Extremely low operating pressures should be avoided because if solids begin to plug a nozzle, the water pressure (energy) will be insufficient to force solids from the nozzle opening.

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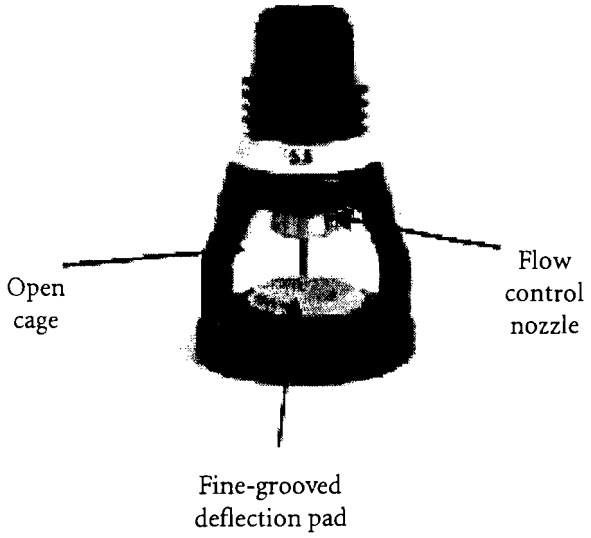

Figure 7. Picture of low pressure spray nozzle with an open cage and fine-grooved deflection pad to prevent solids buildup on the pad, and a flow control nozzle to maintain appropriate pressure in rolling terrain.

Animal hair and grain hulls are prime examples of solids that could easily get caught on sprinklers.

Some production facilities reuse flush water by pumping from the lagoon back into the building. The salt concentration in the lagoon water is increased by this process and can impact the function of the sprinkler heads. Salt-saturated solutions result in crystallization of salt on the sprinkler head. In some instances, the coating on the sprinkler has become thick enough to affect the impact arm operation on medium and high-pressure sprinklers. Low-pressure spray heads with grooved pads can experience buildup on the pad causing water distribution to be less uniform. Though the exact salt concentration that could cause this problem is linked to the nozzle type and operating pressure, electrical conductivity levels below 12 mmhos/cm are typically not a problem.

One issue that commonly occurs when distributing liquid manure through center pivots is that most large solids remain in the pivot lateral. The one thing center pivots have in their favor is that most of the liquid exits the pivot pipeline close to the end of the system rather than near the pivot point. To keep solids in suspension, it is important to maintain the pipeline flow velocity above 4 feet per second for as long as possible. At about 800 feet from the pivot point, the liquid flow velocity typically drops below 4 feet per second in 1300-foot center pivots with 800 gpm flow rates and 6.675-inch diameter pipes.

To prevent solids from building up at the end of the pipeline and to maintain a greater average flow velocity, center pivot design should include sprinklers with relatively large flow rates located at the end of the pipeline. In addition, solids can be directed out of the pipeline through smaller sprinklers by keeping the solids in suspension. Placing a relatively large nozzle or two near the end of the pivot lateral ensures that a significant amount of liquid is discharged near the end of the pipeline. At least one of these sprinklers should run full time to provide an exit point for solids that remain in the pipeline. One way to accomplish this is to install part circle sprinklers for use along field boundaries and a large volume gun for field corners.

Pressure control — Spring-operated pressure regulators should be avoided when pumping animal manure. Solids such as animal hair, bugs, feed-grain hulls and pieces of plant leaves will become trapped in the regulator inlet rendering it nonfunctional and eventually the regulator and sprinkler will become plugged. If the center pivot is installed on rolling terrain, flow control nozzles can provide some consistency in flow sprinkler rate while allowing solids to pass on through.

Corner systems and some end guns are controlled using hydraulically activated valves made for fresh water distribution. Liquid from the pivot lateral is used to activate the valves that are normally closed. If solids make their way into the valve, the valve may become plugged rendering the valve nonfunctional. To prevent control valve malfunction, install a screen in the delivery line between the lateral pipeline and the hydraulic valve. Small T-type filters can be used for this because small amounts of liquid are used when activating the valves. The filter should remove solids larger than 0.01 inch in size. A small 4-inch long T-type housing with an 80-mesh screen should be sufficient, but will need to be cleaned periodically.

Agitation — In order for production facilities to distribute most of the manure solids on an annual basis, the solids must be kept in suspension when pumping. Agitation is necessary when attempting to distribute both liquid and solid components from an earthen storage facility. Agitation is not recommended when pumping from a purple sulfur-fixating lagoon. Without agitation most solids will remain at the bottom of the storage facility and will be very difficult to pump. Large PTO driven agitators are available to back into a lagoon or pond from the edge *(Figure 8)*. Smaller electric motor driven agitators are designed to extend vertically into a below-ground or above ground pit *(Figure 9)*. Depending on the size of the lagoon or pond, agitators need to be operated for at least 6-10 hours prior to starting to ensure that most solids are in suspension. Larger solids will settle to the bottom within about an hour after agitation ceases, so it is important to continue agitation while

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Figure 8. Large liquid manure agitation pump used to keep solids in suspension during application via ground applicator or center pivot.

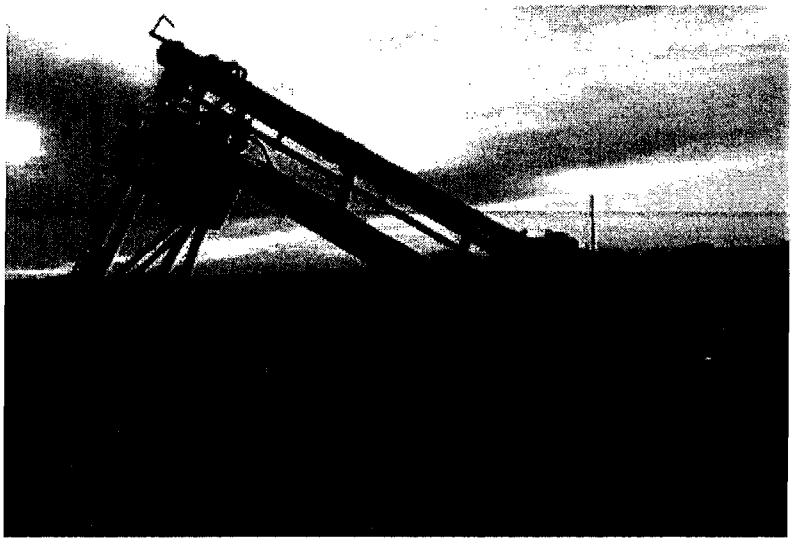

Figure 9. Agitation pump for liquid manure storage pits or tanks. This style of pump can be powered by electric motor or tractor PTO.

pumping liquid manure from the lagoon or pit storage. A number of manufacturers market agitators for use in manure agitation. Commercial applicators sometimes rent agitators to serve this purpose.

Summary

Nebraska's Title 130 Rules and Regulations outline the design, installation, monitoring, and management of animal waste storage and distribution facilities. Center pivots can provide an excellent means of distributing liquid animal manures. The pumping and distribution system must first be designed to apply liquid manure and fresh water application must be secondary. Systems should be designed to apply the liquid manure as uniformly as possible without producing surface runoff or excess odor. Application rates should be based on soil and manure chemical analysis and crop nutrient requirements. Finally, consider environmental conditions and location of neighbors before applying liquid manure using center pivot irrigation systems.

UNL Extension publications are available online at *http://extension.unl.edu/publications.*

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RECEIVED
WALWORTH COUNTY CLERK
2011 MAY -4 AM 10: 32

May 4, 2011

Re: Town of Bloomfield Zoning
Ordinance No. 1061
Fairwyn Farms

Dear Madam Clerk:

Enclosed herewith please find eight (8) copies of the Zoning Ordinance for the Town of Bloomfield regarding Fairwyn Farms Subdivision. Pursuant to Wisconsin statute, all zoning amendments by the Town of Bloomfield must be approved by the County Board. In further discussing this matter with Attorney Mike Cotter, the Town of Bloomfield is to submit all Town zoning requests to your office for dissemination to the County Zoning Committee for review. Please find one copy for the County's official records, and 7 copies for the Zoning Committee. I ask that you please forward these on to the County Zoning Committee for review before its May 19, 2011 Committee meeting.

Thank you for your attention to this matter.

Sincerely,

Brian A. Schuk

hsh
enclosure

To: Walworth County Clerk's Office (via hand delivery)

MAY 2, 2011
ORDINANCE NO. 1061

ORDINANCE AMENDING THE ZONING ORDINANCE OF THE TOWN OF BLOOMFIELD

THE TOWN BOARD OF THE TOWN OF BLOOMFIELD DOES HEREBY ORDAIN AS FOLLOWS:

That the Zoning Ordinance for the Town of Bloomfield, Wisconsin, is hereby amended by rezoning the following described property:

Tax parcels: MB 100001 and MB 100007

FROM

A1 Farmland Preservation District

TO

R-1 Single Family Residence District (unsewered)

as shown on the proposed rezone area map located at the Town Clerk's office.

Pursuant to Sec. 66.0103, 60.80(1) and (3), and 985.02, Wis. Stats., this Ordinance shall be effective the day after its publication subsequent to its adoption.

Adopted this ___ day of _____, 2011.

_____
Ken Monroe, Town Chair

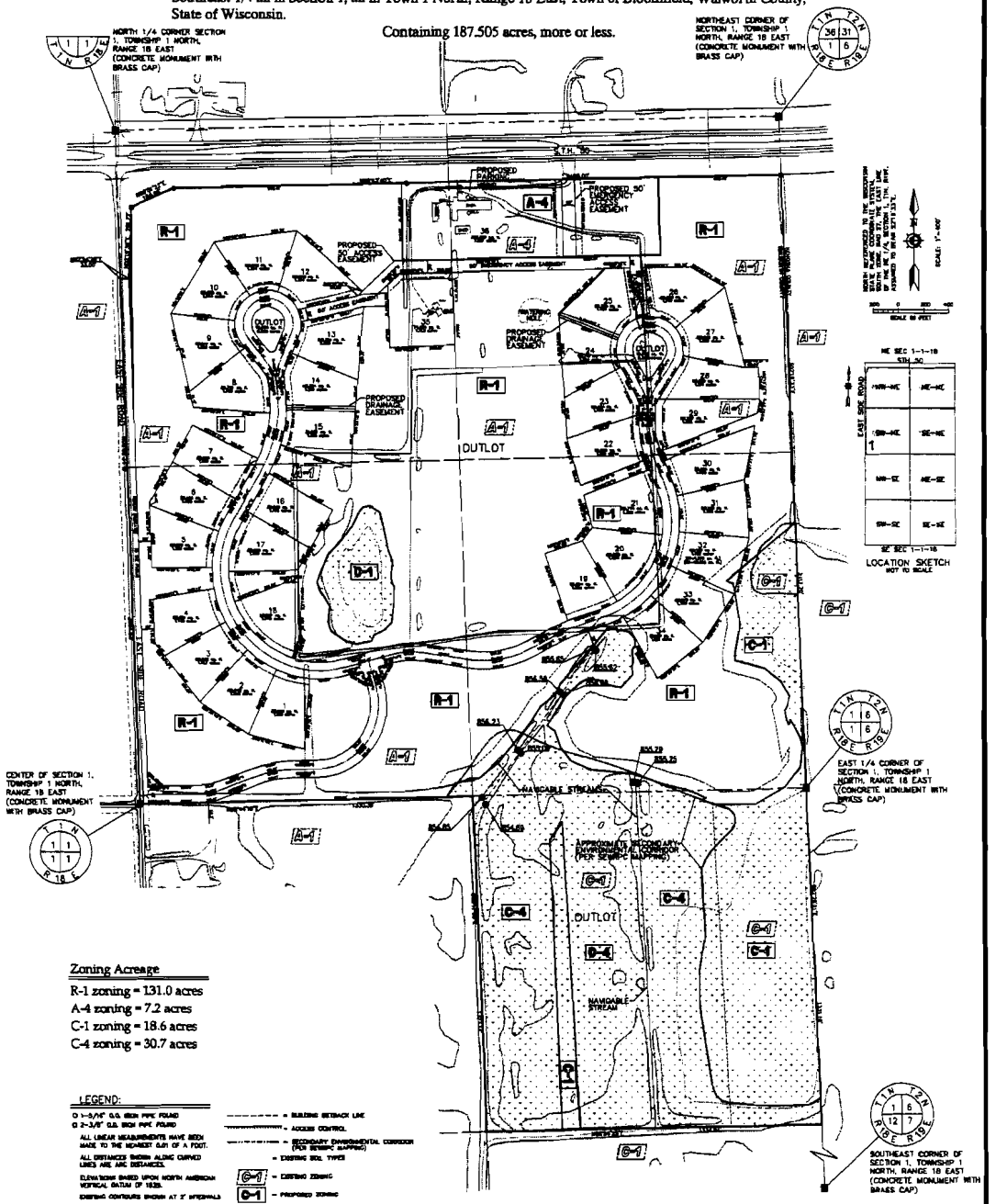
Attest:_____
Martie Wells, Town Clerk

ZONING EXHIBIT

FAIRWYN FARMS SUBDIVISION

Part of the Northwest 1/4 of the Northeast 1/4 and the Northeast 1/4 of the Northeast 1/4 and all of the Southeast 1/4 of the Northeast 1/4, the Southwest 1/4 of the Northeast 1/4 and the Northwest 1/4 of the Southeast 1/4 all in Section 1, all in Town 1 North, Range 18 East, Town of Bloomfield, Walworth County, State of Wisconsin.

Containing 187.505 acres, more or less.



Zoning Acreage

R-1 zoning = 131.0 acres
A-4 zoning = 7.2 acres
C-1 zoning = 18.6 acres
C-4 zoning = 30.7 acres

LEGEND:

- 1-3/16" O.D. IRON PIPE FOUND
- 2-3/8" O.D. IRON PIPE FOUND
- ALL LINEAR MEASUREMENTS HAVE BEEN MADE TO THE NEAREST 0.01 OF A FOOT.
- ALL DISTANCES SHOWN ALONG CURVED LINES ARE ARC DISTANCES.
- ELEVATIONS BASED UPON NORTH AMERICAN VERTICAL DATUM OF 1929.
- EXISTING CONTOURS SHOWN AT 2' INTERVALS
- R.A. = RECORDED AS
- = WETLANDS (WATER EL.= 763.44)
- = BUILDING SETBACK LINE
- = ACCESS CONTROL
- = SECONDARY ENVIRONMENTAL CORRIDOR (PER SEWRPC MAPPING)
- = EXISTING SOIL TYPES
- C-1 = EXISTING ZONING
- C-1 = PROPOSED ZONING
- = ORDINARY HIGH WATER MARK

LAND OWNER/LAND DIVIDER:
FAIRWYN TRADING COMPANY, LLC.
875 TOWNLINE ROAD
LAKE GENEVA, WI. 53147

KAPUR & ASSOCIATES, INC.
CONSULTING ENGINEERS

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DELAVAN, WISCONSIN 53115-0524

RECEIVED
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FAX: (262) 728-0300

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May 4, 2011

Re: Town of Bloomfield Zoning
Ordinance No. 1062
Clover Road

Dear Madam Clerk:

Enclosed herewith please find eight (8) copies of the Zoning Ordinance for the Town of Bloomfield regarding the above matter. Pursuant to Wisconsin statute, all zoning amendments by the Town of Bloomfield must be approved by the County Board. In further discussing this matter with Attorney Mike Cotter, the Town of Bloomfield is to submit all Town zoning requests to your office for dissemination to the County Zoning Committee for review. Please find one copy for the County's official records, and 7 copies for the Zoning Committee. I ask that you please forward these on to the County Zoning Committee for review before its May 19, 2011 Committee meeting.

Thank you for your attention to this matter.

Sincerely,

Brian A. Schuk

hsh
enclosure

To: Walworth County Clerk's Office (via hand delivery)

May 2, 2011
ORDINANCE NO. 1062

ORDINANCE AMENDING THE ZONING ORDINANCE OF THE TOWN OF BLOOMFIELD

THE TOWN BOARD OF THE TOWN OF BLOOMFIELD DOES HEREBY ORDAIN AS FOLLOWS:

That the Zoning Ordinance for the Town of Bloomfield, Wisconsin, is hereby amended by rezoning the following described property:

Tax parcels: MB 1600001, MB 1600001C, MB 1600001D, MB 1600001E, MB 1600001F, MB 1600001G, MB 1600001H, MB 1600001K, MB 1600001L, MB 1600001M, MB 1600001N, MB 16000010, MB 1600001P (Clover Road and Litchfield Road).

FROM

A-2 Agricultural Land District

TO

R-1 Single Family Residence District (unsewered)

as shown on the proposed rezone area map located at the Town Clerk's office.

Pursuant to Sec. 66.0103, 60.80(1) and (3), and 985.02, Wis. Stats., this Ordinance shall be effective the day after its publication subsequent to its adoption.

Adopted this ____ day of _____, 2011.

_____
Ken Monroe, Town Chair

Attest:_____
Martie Wells, Town Clerk

WASSEL, HARVEY & SCHUK, LLP
1034D ANN STREET P.O. BOX 524
DELAVAN, WISCONSIN 53115-0524

STEVEN R. WASSEL
STEVEN C. HARVEY
BRIAN A. SCHUK

NATHAN M. JUROWSKI

TELEPHONE: (262) 728-0700
FAX: (262) 728-0300

WWW.WASSELHARVEYSCHUK.COM

RECEIVED
WALWORTH COUNTY CLERK
2011 MAY -4 AM 10: 32

May 4, 2011

Re: Town of Bloomfield Zoning
Ordinance No. 1063
Substandard Lot

Dear Madam Clerk:

Enclosed herewith please find eight (8) copies of the Zoning Ordinance for the Town of Bloomfield regarding the above matter. Pursuant to Wisconsin statute, all zoning amendments by the Town of Bloomfield must be approved by the County Board. In further discussing this matter with Attorney Mike Cotter, the Town of Bloomfield is to submit all Town zoning requests to your office for dissemination to the County Zoning Committee for review. Please find one copy for the County's official records, and 7 copies for the Zoning Committee. I ask that you please forward these on to the County Zoning Committee for review before its May 19, 2011 Committee meeting.

Thank you for your attention to this matter.

Sincerely,

Brian A. Schuk

hsh
enclosure

To: Walworth County Clerk's Office (via hand delivery)

ORDINANCE NO. 1063

Date: May 2, 2011

This is an ordinance to repeal and recreate the Town of Bloomfield, Walworth County, Wisconsin Zoning Ordinance Existing Substandard Lots.

The Town Board of the Town of Bloomfield, Walworth County, Wisconsin, does hereby ordain as follows:

Section One: Section 27-143, 1), b) for Town of Bloomfield, Walworth County, Wisconsin is hereby amended as follows:

Unsewered lot: Minimum 10,000 square feet.

Section Two: Pursuant to Sec. 66.0103 and 60.80(3) and (5), Wis. Stats., this Ordinance shall be effective the day after its publication subsequent to its adoption.

Adopted this ____ day of _____, 2011.

_____
Ken Monroe, Town Chairperson

Attest:_____
Martie Wells, Town Clerk

RESOLUTION # 04-11-14

MONROE COUNTY BOARD RESOLUTION OPPOSING ELIMINATION OF MUNICIPAL RECYCLING GRANT PROGRAMS

WHEREAS, recycling provides a host of environmental benefits, including conserving Monroe County Landfill space; and

WHEREAS, recycling also provides extensive economic benefits, providing material feedstock for manufacturing, business development, state and local tax revenue and four times more jobs than the disposal industry; and

WHEREAS, the State of Wisconsin mandated recycling in 1990 under 1989 Wisconsin Act 335 and Administrative Code NR 544; and

WHEREAS, the State of Wisconsin originally proposed to cost share 66% of the Municipalities' costs for establishing and maintaining Effective Recycling Programs; and

WHEREAS, Monroe County responded by becoming a Responsible Unit for Recycling accepting the responsibility to provide an Effective Recycling Program; and

WHEREAS, the State of Wisconsin has imposed levy limits on Municipalities placing Monroe County under severe financial constraints; and

WHEREAS, the 2011-2013 Executive Budget Bill proposed by Governor Walker (AB 40 and SB 27) seeks to eliminate the requirement that Municipalities operate a recycling program; eliminates all financial assistance for Municipal recycling programs; converts the Recycling and Renewable Energy Segregated Fund to a newly created Economic Development Fund and directs revenue collected on the landfill tipping fee surcharge into this Fund; and

WHEREAS, since 1990, the State has taken over one hundred forty million dollars ($140,000,000.) from monies raised to support Municipal Recycling Programs as part of a failed attempt to balance the State's budget and proposes to do so again, while becoming the first State in the Nation to repeal a mandatory recycling program; and

WHEREAS, the strength of Wisconsin's recycling program comes from its ability to ensure sufficient feedstock for economical recycling collection, processing and manufacturing by both public and private sector entities and to eliminate financial assistance in such a dramatic way (as of July 1st) will devastate Wisconsin's recycling program; and

NOW, THEREFORE, BE IT RESOLVED, that the Monroe County Board of Supervisors opposes the elimination of the financial assistance program for municipal recycling during the 2011-2013 biennium; and

STATE OF WISCONSIN) SS
COUNTY OF MONROE)
I, SHELLEY R. BOHL, Monroe County Clerk,
DO HEREBY CERTIFY that the foregoing is a true and correct copy of 04-11-14
adopted by the County Board of Supervisors at the meeting held 04-27-11

SHELLEY R. BOHL, MONROE COUNTY CLERK

BE IT FURTHER RESOLVED, that the Monroe County Board of Supervisors cannot condone the collecting of the landfill fee surcharge without financial assistance for municipal recycling programs; and

BE IT FURTHER RESOLVED, that a copy of this resolution be forwarded to Wisconsin Counties Association, Wisconsin Towns Association, League of Wisconsin Municipalities, Monroe County State Representatives and State Senators, Joint Committee on Finance and Governor Scott Walker.

Dated this 4th day of April 2011.

Authored by Gail Frie

Offered by the Monroe County Solid Waste Management Committee:

Solid Waste Committee vote: 4-0-1

Approved as to form by Corporation Council. AK 4/21/11

RESOLUTION NO. 04-11-13

REOLUTION OF SUPPORT FOR THE INDIAN RESERVATION ROADS PROGRAM

WHEREAS, Monroe County and all counties in the State of Wisconsin are responsible for the upkeep and maintenance of roads, and

WHEREAS, three major industries in Wisconsin, namely tourism, forestry, and agriculture rely heavily on well-maintained roads, and

WHEREAS, the Indian Reservation Roads Program allows Native American Tribes to place State, County and Township routes on their Indian Reservation Roads Inventory, and

WHEREAS, the routes are then able to generate funding for tribal transportation projects including cooperative projects involving State, County and Township routes on the IRR Inventory, and

WHEREAS, several Wisconsin Counties have entered into cooperative agreements with Wisconsin Tribes to repair County Trunk Highways that make travel safer for both the traveling public and Native American Tribal members, and

WHEREAS, the present funding formula for the IRR program is in jeopardy of being changed, which could reduce or possibly eliminate funds available for cooperative projects, and

NOW, THEREFORE, BE IT RESOLVED that the Monroe County Board of Supervisors supports the Department of the Interior, Bureau of Indian Affairs, Indian Reservation Roads Program as established under SAFETEA-LU, and

BE IT FURTHER RESOLVED that the Clerk is directed to forward a copy of this Resolution to the Wisconsin Counties Association, the Wisconsin County Highway Association, and Monroe County's U.S. Congressional Representatives.

Dated this 27th day of April, 2011

Purpose:

To express support for the United States Department of the Interior, Bureau of Indian Affairs (BIA), Indian Reservation Roads (IRR) Program as established under the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, (SAFETEA-LU), Public Law 109-59.

Fiscal Note: none

Drafted by: Jack Dittmar, Co. Hwy. Commissioner

Approved by Corporation Counsel:

ACK 4/20/11

Highway Committee Vote:
4 - yes 1 - no

Recommended for introduction by the Monroe County Highway Committee on April 15, 2011, Monroe County, Wisconsin

James S Schroeder
James Schroeder, Chairman

LS McTaggart
Larry McTaggart, Vice Chairman

Gene Treu

Anne A Rice
James Rice

Daniel Olson opposed
Daniel Olson

STATE OF WISCONSIN
COUNTY OF MONROE } SS
I, SHELLEY R. BOHL, Monroe County Clerk, DO HEREBY CERTIFY that the foregoing is a true and correct copy of 04-11-13 adopted by the County Board of Supervisors at the meeting held 04-27-11
SHELLEY R. BOHL, MONROE COUNTY CLERK