DAIRY WASTE MANAGEMENT IMPLEMENTATION PROJECT

OCC Task #53 FY 1994 319(h) Task #300 EPA Grant #C9-996100-02-0

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EXECUTIVE SUMMARY

Oklahoma has a significant number of dairies that are faced with the need to properly dispose of waste collected in dairy lagoon systems. Smaller dairy operations in Oklahoma and other states have experienced economic hardship in recent years, limiting their ability to dispose of waste. This does not negate the continuing need to properly dispose of wastes collected in dairy lagoon systems, but it does increase the likelihood that violations of the lagoon design plans will occur as many farmers do not have the means to properly clean lagoons and dispose of the waste in an environmentally responsible manner. Previously, many lagoons were pumped to the capacity of the honey wagon, and the contents summarily dumped (often into a convenient stream).

With the introduction of the Dairy Waste Management Implementation Project, this problem is being addressed. The project provided funding and coordination for equipment purchases, methods development, and pumpout services, as well as educational demonstrations and presentations. The districts expanded beyond their original demonstration area goal of four to five surrounding counties to include dairies in 13 counties serviced by the Grady County C.D. and in 11 counties serviced by the Wagoner County C.D.

Waste utilization plans were developed for each producer who used the equipment, and encompassed such information as plant uptake estimates and soil application rates. Pumpouts generally lasted 3-4 days, considering transport of equipment, amount of time needed to agitate the lagoon and subsequently to pump it out, occasionally transportation of waste to a distant application area, and application at a rate recommended by the waste utilization plan.

The report will also outline the fiscal success of the program, which actually allowed districts to generate funds for maintenance, future equipment expenses, and program expansion. The districts may want to consider using some of these funds to hire personnel to work full-time on the program.

The project proved to be very successful, even in the face of economic constraints on producers and the logistical constraints on the districts. The project provided a service to many producers that would otherwise have been unavailable to them, and prevented pollution from events such as lagoon breaches or dumping of lagoon waste into inappropriate areas. In addition, awareness among producers about the need for testing of waste and soils as well as the need for timely pump-outs and clean-outs has clearly improved through the cooperative efforts guided by NRCS and conservation district personnel.

1.0 INTRODUCTION

1.1 **Project overview**

Oklahoma has a significant number of dairies that have been faced with the need to properly dispose of waste collected in dairy lagoon systems. Additionally there is an opportunity for writing waste management plans that will allow for the proper disposal and utilization of animal waste. With the success that has been demonstrated in Arkansas' dairy lagoon clean out program, a similar program is being recommended for two areas within Oklahoma. It is believed that a lagoon clean out program coupled with a sound waste management program will provide educational opportunities to dairy operators that have not been available. The term clean out implies removal of accumulated solids agitated into slurry from dairy lagoon systems, rather than simply removing the more liquid upper layers and leaving all the settled solids on the bottom.

For water quality purposes, proper dairy lagoon clean out and disposal of waste material on a periodic basis is a must. However, the cost of the equipment is prohibitive for an individual dairy operator. The first objective of this project was to purchase the necessary equipment for dairy lagoon clean out and to establish a cooperative effort coordinated by local conservation districts whereby this equipment is made available to dairies which would allow them to utilize this technology. A second objective was to educate dairy owners in other parts of the state concerning the need for proper lagoon clean out and the use of soil sampling and proper sampling of lagoon contents to determine where waste should be applied and the proper application rates. In addition, dairy operators were to be given information on animal waste management plans, the importance of having a plan on file and the reasons to follow the recommendations found within the plan.

1.2 Project Area Description

There will be two project demonstration areas within the State. One area will be located in eastern Oklahoma and will cover the counties of Cherokee, Mayes, Muskogee, Rogers, Adair, McIntosh, Ottawa, Craig, Delaware, Tulsa, and Wagoner Counties, with approximately 253 dairies with 20,100 cows. The other project area was in McClain, Pontotoc, Kingfisher, Blaine, Custer, Garvin, Comanche, Stephens, Canadian, Garfield, Cleveland, Caddo, and Grady County, located around the west central part of the State. This Grady County Demonstration Area had approximately 125 dairies with 39,300 cows. Grady County is Oklahoma's number one ranked county for dairies. Figure 1 illustrates the location of the demonstration areas and Table 1 details the distribution of dairies by county.

Task 53, Dairy Waste Management May 6, 2003 Revision 0



Figure 1. Dairy Waste Management demonstration areas.

WEST CENTRAL OKLAHOMA			IOMA	E	ASTERN (OKLAHO	MA
County	# dairies	# cows	Avg # cows/dairy	County	# dairies	# cows	Avg # cows/dairy
Grady	44	24,000	545	Wagoner	6	800	133
McClain	10	1,600	160	Adair	69	5,000	72
Pontotoc	7	1,500	214	McIntosh	6	500	83
Kingfisher	12	3,200	267	Ottawa	19	1,600	84
Blaine	4	400	100	Craig	11	900	82
Custer	7	900	129	Delaware	36	400	11
Garvin	5	700	140	Rogers	14	1,000	71
Comanche	15	2,800	187	Cherokee	20	3,200	160
Stephens	3	800	267	Mayes	61	5,200	85
Canadian	9	1,500	167	Muskogee	8	1,200	150
Garfield	3	900	300	Tulsa	3	300	100
Cleveland	4	700	175	Totals:	253	20,100	79
Caddo	2	300	150				
Totals:	125	39,300	314				

Table 1. Numbers of dairies, cows, and average number of cows/dairy in the Grady and Wagoner County CD Demonstration Areas by county.

2.0 METHODS

The project objectives specified in the workplan included 1) purchasing dairy lagoon clean out equipment and establishing a cooperative effort coordinated by local conservation districts whereby this equipment is made available to dairies, and 2)educating dairy owners about the need for proper lagoon clean out and the use of soil sampling and proper sampling of lagoon contents to determine where waste should be properly applied and the proper application rates. Also, dairy operators were to be given information on animal waste management plans, the importance of having a plan on file and the reasons to follow the recommendations found within the plan.

The measure of success specified in the workplan was to be the clean out of thirty dairy lagoons and implementation of proper waste utilization plans; with an increase in lagoons pumped by 20% per year (109 total).

2.1 Acquisition of equipment

The Conservation Commission spent funds from the EPA §319 grant to purchase portable land application equipment for Wagoner County and Grady County Conservation Districts using the state-approved bid process. The equipment used by other states' conservation agencies was scrutinized for the specifications necessary to get the desired equipment. The required land application equipment included an agitator, a chopper pump, portable irrigation pipe, a traveling

gun sprinkler system, water tank for hose and gun clean out, and a truck to transport the equipment from one location to another for each district.

2.2 Establishing cooperative effort

Services for lagoon pump out projects were provided by the Grady/Wagoner County Conservation Districts and the Natural Resources Conservation Service of the U.S. Department of Agriculture (NRCS USDA) as outlined in Table 2 below:

Conservation District Responsibilities	NRCS responsibilities
Respond to requests for services from cooperators	Cooperate with conservation district in response to requests for assistance
Estimate costs for pump outs (incl. lab tests, soil tests)	Furnish information on the services available to the public in the service area
Sample sludge/effluent for lab tests	Survey empty retention facilities and calculate available capacity (with assistance from producer)
Furnish all equipment and manpower for pump outs	Furnish technical assistance to producer on any changes needed to lagoon system, including sizing of new or added storage space
Provide permanent marker for determination of retention structure water levels at cooperator's cost	With assistance from the producer, locate and set the permanent marker for determination of retention structure water level
Conduct soil test on the distribution field or require producer to do so.	Develop Waste Management Plans with specific recommendations for disposal location and application rates of sludge based on the nutrient analysis

Table 2. Division of conservation district and NRCS responsibilities.

Numerous planning meetings were held to establish the logistics of the program, such as appropriate fees for producers and how the various agencies would cooperate to maximize efficiency. Pump out fees and policies from other conservation districts in other states, such as the Clinton, Arkansas Conservation District and the Van Buren County, Arkansas Conservation District were scrutinized for their applicability. For instance, the fees for the Clinton Conservation District were too low and were not even covering the cost of the pumpouts themselves. A cost share program for dairies in the Cadron Creek watershed (serviced by Van Buren County C.D.) provided forty percent cost share up to \$7,500 if a waste management system was implemented. Examples such as this assisted the districts and OCC in establishing the fee schedules for this project.

Lack of local support negated the planned establishment of Dairy Cooperatives that would be completely self-sustaining operations, but the districts have continued to seek out new cooperators and expand beyond the boundaries of the original demonstration area. In the future, additional funding sources may be needed, in which case the priority and importance of the continued availability of pumpout services may need to be evaluated.

2.3 Advertisement of the program, informational meetings, and demonstrations

Each district sent notification of pumpout services to producers at least twice during the project through mail-outs. Wagoner County recorded sending 185 inquiries to individuals with dairy lagoons as of November 1994, receiving 27 responses with 25 requesting the pumpout service. On April 8, 1997, Wagoner County reported 121 telephone contacts, 16 personal presentations on the program, and 145 letter notifications during January 1-March 31, 1997. Figure 2 provides an example of these mailings.

Wagoner County	Directore
	George Stunkerd
Conservation District	Coweta
Office of Directory	Mark Bethell Wagoner
1312 S.W. 3rd	Dan Robertson
Wagoner, OK 74467-5518	Wagoner
Phone 485-4010	J.W. Edwards Wagoner
	M.G. "Jerry" McReynolds
May 16, 1994	Wagoner
The Wagoner County Conservation District is purchasing dairy lagoon clean out equipment. to agitate a lagoon and pump the waste throw one-half mile from the lagoon on to adjacent	currently in the process of This equipment will be able ugh an irrigation system up to pastureland or cropland. We
will have an employee operating the equipmen to provide this service on a fee basis to da Rogers and Mayes Counties.	it. We are currently planning iries in Wagoner, Muskogee,
We are hoping to be pumping lagoons out by (Actober 1st of this year
Please contact us as scon as possible s	o we can place you on
We are trying to determine the extent of new appreciate your input. With this in mind, w the questions at the bottom of this page. P district office, 1312 S. W. 3rd, Wagoner, OM	ed for this service, and would we would like for you to answer Please mail this back to our 74467-5518.
Sincerely,	
Ployd round Banager Gunge	a Stuckard
George Stun Chairman	.kard
Name	
Currently Have Dairy Lagoon	YESNO
Util B. Construction (B. C.)	
will be Constructing A Dairy Lagoon	YESNO
Currently Have A Lagoon That Needs To Be Cle	aned Out YES NO

Figure 2. Letter to producers from Wagoner County C.D.

Grady County C.D. placed a half-page add in two local papers twice a year every year of the project describing the need for and purpose of the program and providing contact information for those interested. Johnny Pelley, formerly of the Grady County Conservation District, called all of the dairies listed on the Farm Services Agency's (FSA) milk subsidy list, although this strategy seemed to be of limited value because most of those dairies were very small and could not afford the service. Dee Surber of Grady County C.D. constructed a display promoting the project at the Oklahoma Association of Conservation Districts' (OACD) state meeting. However, according to Johnny Pelley (pers. comm.), the most effective promotion technique for

the Grady County C.D. was the amicable relationship the district had with the state dairy inspector for South-Central Oklahoma. The dairy inspector told the producer about the service whenever he observed a dairy that was in need of pumping, referring the producer directly to the Grady County Conservation District.

Three demonstration pumpouts were held in the Grady County demonstration area and four were held in the Wagoner County demonstration area. Wagoner County reported reaching 80 individuals as a result of a demonstration pumpout in 1996! Wagoner County C.D. published a newsletter article in the Muskogee County CD newsletter stating the existence of the program. Fliers were distributed in both districts describing the program and advertising demonstration days. Figure 3 is the newsletter article provided to the Muskogee County CD newsletter by the Wagoner County CD, and figure 4 is a flyer distributed by the Wagoner County CD. Appendix A is an informational packet for producers distributed by the Grady County CD.



Figure 3. Muskogee County CD newsletter publicizing Wagoner County CD's Dairy Waste Management Program.

Wagoner County Dairy Waste Management Program

Clean Out Services for Holding Ponds

Wagoner County The Conservation District offers cooperative dairy waste holding pond clean out services in Cherokee, Mayes, Muskogee, Rogers and Wagoner Counties. For a reasonable fee, the district will come to the farm, clean out the waste holding pond and apply the waste to nearby pasture and/or cropland in management plans. Dairies in these counties are receptive to this approach because time management is a factor in their decision to implement waste management.

The district technician hauls the equipment to the farm, sets up on-site and completes the pond clean out. The farmer supplies a waste management plan and an 80hp (or larger) tractor.

Charges for the clean out service include a set up fee and a cost per hour pumping fee. Total cost is based on condition of lagoon and pumping time.

A grant from the U.S. Environmental Protection Agency was used to purchase portable pond clean out equipment. The equipment consists of:

> *Ag-Rain hard hose reel 1050 ft

\$1/4 Mile 6" aluminium irrigation pipe

#High clearance sprinkler cart Nelson SR 150 big gun
32' Balzer raised agitation gun slurry pump
32' Balzer 2-wheel agitator with 23.5" and 28" diameter propeller \$1500-gallon Balzer MaCum "Honey Wagon" 参Six cylinder Doda chopper pump



Animal nutrient application using a high pressure traveling gun

Technical Assistance to Livestock Producers

Proper utilization of manure requires careful planning. The input of nutrients from the manure must be balanced with the crop needs to assure maximum utilization and minimal losses. In addition, pathogens and organic matter must be contained on the farm to prevent them from becoming pollutants in our streams. Trained technicians are available to assist farmers with this effort. The Oklahoma Conservation Commission and the Environmental Protection Agency have provided funds for water quality technicians in the Wagoner County Conservation District. They specialize in dairy waste management planning. Technical assistance is provided to the technicians by the Natural Resources Conservation Service area staff. Wagoner County Conservation District Working for a better world... We are here to serve the customer...

For additional information on the Dairy Waste Management Program, contact the Wagoner County Conservation District office at 918-485-4010. The office is located at 1312 Southwest 3rd, Wagoner



handicap.

Figure 4. Wagoner County flyer advertising the Dairy Waste Management Program.

The Conservation Commission, in conjunction with local conservation districts and the USDA NRCS, held informational meetings/demonstrations in the areas where the program was offered. This allowed information to be given to dairy owners concerning the project, how to sign up for the program, cost to operators, and provided an opportunity for dairy operators to ask questions concerning the program. At least one formal meeting was held in Chickasha, Grady County, for

the education and training of agency personnel and board members who would be involved in the program, including members of the Wagoner/Grady County CDs' boards of directors and staff, OCC staff, and OSU Cooperative Extension Service researchers. Figure 5 is a photograph of this meeting in April 1995. Appendix B is the agenda and minutes from this meeting.



Figure 5. Meeting in Chickasha, April 1995

2.4 Lagoon and soil testing

Waste utilization plans advised all landowners to have their slurry and soils tested prior to the application of any waste effluent, except for the first-time pumpout, which was applied according to the local County Extension Agent's recommendations. The agitated slurry was sampled during pumping for use in future Waste Utilization Plans. The Agricultural Services Laboratory of the University of Arkansas-Fayetteville was the laboratory performing the "Liquid Manure for Fertilizer Analyses." The lab reported Total Nitrogen (N), Total Phosphorus (P), Total Potassium (K), and Total Calcium (Ca) as well as pH, conductivity, and percent solids. Generally, an analysis of typical pumpout waste or an average of other pumpouts in the area was used to determine application rates for first-time pumpouts.

Most producers, following their waste utilization plans, had soil tests done on the land to which the effluent was to be applied. These tests, conducted according to NRCS standards, were utilized to calibrate the amount of effluent needed for each pasture application.

2.6 Lagoon pump-out and application of waste to fields

Figure 6 shows the format of the effluent test report form. This form was used by the laboratory at the University of Arkansas-Fayetteville when recording the results of the test. For every producer in the program, district personnel collected a sample during the pumpout/land application process for laboratory testing.

AGRICULTURAL SERVICES LABORATORY UNIVERSITY OF ARKANSAS- FAYETTEVILLE

Name:	GRADY CO. CONS. DISTR	ICT Received:	8-24-99
Address:	828 CHOCTAW AVE.	Mailed:	9-17-99
City:	CHICKASHA	State,Zip:	OK 73018
County:	GRADY	Check #:	1280
Lab. No.	M91397		
Sample I.D.	NONE GIVEN		
pH	7.3		
Ec(umhos)	5960		
% Solids	2.61		
	m	ng/L on "as-is"basis	
Total N	1092		
Total P	265		
Total K	775		
Total Ca	742		
Ammonia-N			
Nitrate-N			
	lt It	os/1000 gal on "as-is" l	basis
Total N	9.1		
TOTAL P AS			
"P2O5"	5.1		
TOTAL K AS			
"K20"	7.8		
Total Ca	6.2		
Ammonia-N			
bilitante bi			
tibe/1000col 5	P205 = mo/L Total P on "as is" has	is multiplied by 2 29*0 008	33
Albe/1000gal I	K20 = mail Total K on "ae-ie" hasis	multiplied by 1 2*0 00833	
ios roougal i	N2O - myre rotai k oli as-is basis	manpied by 1.2 0.00000	
			7,-
			and le

Figure 6. Effluent test form.

In the Wagoner County demonstration area, agitated slurry was sampled from the top of the pump after each day of pumping one lagoon, and the combined sample was analyzed for future Waste Utilization Plans. In the Grady County demonstration area, a sample was taken from an air spigot in the side of the hose reel when the lagoon is pumped about halfway down. In

addition, catch-can samples were taken during some field applications in the Grady County demonstration area for use in future Waste Utilization Plans.

Soil tests were administered on most of the application plots. An example of these test results is seen in Figure 7.

OKLAHOMA COU SOL	OPERATIVE EXTEN	SION SERVICE YTICAL LABORATORY ources • Oklahoma State University tillwater, OK 74078
	SOIL TEST REPORT	
MCINTOSH CTY EXT OF BOX 191 1ST NATIONAL CENTER EUFAULA, OK 74432 (918) 689-7772	C Name: John Poris Location: East Queeks of Doury	Lab I.D. No.: 197915 Customer Code: 46 Sample No: 813 Received: 03/17/99 Report Date: 03/18/99
TEST RESULTS		
 Soil Reaction – pH: 5.0 Buffer Index: 6.7 Surface SO4-S (lbs/acre): Subsoil SO4-S (lbs/acre): 	 NO3-N (lbs/acre) – Surface: 15 Subsoil: atrients Ca (lbs/acre) : Mg (lbs/acre): 	 — Test Index —— P (lbs/acre): 37 K (lbs/acre): 132 — Micronutrients —— Fe (ppm): Zn (ppm): B (ppm):
INTERPRETATIONS AND REQUIREM	MENTS FOR Bermudagrass (YIELD GOAL =	2.00 tons/acre)
- Test Interpretation - pH Lime needed	Requirement I.4 tons ECCE/acre to pH 6.8	- Recommendations and Comments - Fertilizer Mix
Nitrogen Deficient Phosphorus 93% Sufficient Potassium 81% Sufficient	85 lbs/acre N23 lbs/acre P2O5 annually48 lbs/acre K2O annually	165 165 46-0-0 50 162 18-46-0 80 165 0-0-60
Apply 1.4 tens of 2	CCE (100 %) Love perace.	
	•	Persell W B
∿a State University. U.S. Department of Agr to all eligible persons regardless of	culture, state, and local governments cooperating. Oktahoma Ce race, color, national origin, religion, sex, age or disability and is a	Signature coperative Extension Service offers its programs an Equal Opportunity Employer.

Figure 7. Example of soil test results from OSU Cooperative Extension Service Laboratory.

3.0 RESULTS

3.1 Acquiring equipment

The Conservation Commission purchased portable land application equipment for Wagoner County and Grady County Conservation Districts. The accepted bidder was Knutson Irrigation Design of Yukon, Oklahoma. Several companies' products were investigated by the Knutson, including Lister-Petter Limited, KIFCO, and Balzer Manufacturing Corporation. The land application equipment included an agitator, a chopper pump, portable irrigation pipe, a traveling gun sprinkler system, a water tank for hose and gun clean out, a truck to transport the equipment from one location to another for each district, and a vacuum tanker (honey wagon). In addition, improvements and modifications made to the equipment by each district maintained the continuity of the program. The staff gages were recommended and installed in most of the lagoons, and used by dairy operators to indicate when to schedule the next clean out.

Figure 8 is a copy of the purchase order for the pumpout equipment and the costs. The specifications follow.

MAIL SEALED B		OFFICE CENTRAL P Room B4 Oklahoma (ITATION T OF PUBLI URCHAS State Cap City, Okl	TO BID C AFFAIRS SING DIVISION itol Building ahoma 73105		88-3000
DIT 707794 BIC	PND. Y027216	SUMER CHARLES PRATT	ED PRACT	and the second	PHONE	405 521-2129
NO SID RECEIVED AF	TER (Closing Cate) 2:00 P.M.	AGENCY REQ NO. 53-195	VENDO	Net 20 Log	15 .	VENDORS DELIVERY DATE
BIDDER'S F.E.I. N	10,/SSN	1122 571	s	HIP TO:		order or Sooner
Name of Firm, Company	tson Ir O Sans	hive Rd.	sign	OKLAHOMA CONS 2800 LINCOLN	ERVATION BLVD. STR	COMMISSION (I) 160
- Jules	2	01× 730	199.	OKLA CITY,		OK 73105
8101	DER AGREES TO C	OMPLY WITH ALL TERMS A	AND CONDIT	TIONS BELOW AND ON R	EVERSE SIDE	OF THIS BID.
NOTICE: Bidder's in	nformation must	be entered in space prov	vided abov	e and the bid must be	signed and i	PRICE AMOUNT notarized below.
2.00	EA 0981- PUMPS J	57 AND PUMP ACCESSORI	ES	Y027216 00	1	Su Below
	PUMPIN SYSTEM GRADY (828 CH	G SYSTEM, PER THE 1 DELIVER TO: COUNTY CONSERVATIO OCTAW AVENUE	ATTACHEI N DISTRI	SPECIFICATIONS	•	
	(405) 2 ATTN: SYSTEM WAGONEH	224-0523 JOHNNY PELLEY 2 DELIVER TO: 8 COUNTY CONSERVAT	P ION DIST	RICT		± 43.665,∞
	WAGONEH (918) (TTN:	W. SRD STREET R, OK 74464 185-4010 FLOYD YOUNG	5 yr	e		- \$ 61360.00
	REMARKS		_BRAND N		nice	# 10502500
- Cer	TH	IS BID INVALID IF	NOT SIG	NED AND NOTA	RIZED	10,000.
AFRIDAVIT: STATEOF	oklahoma	COUNTY OF CA	Innd	in	, of lawful ag	e, being first duly sworn, on path says that:
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Figure 8. Purchase order for pumpout equipment

3.1.1 Pumping System 1

LAGOON PUMPOUT SPECIFICATIONS

1. PTO PROPELLER AGITATOR

The agitator will be 30 feet (plus or minus 2 feet) in length, of the 2 wheel trailer type. Maximum PTO horsepower requirement should be not more than 90 HP at 540 RPM. The agitator shall have a propeller at least 23 inches in diameter with multi-pitch blades and an adjustable sheer plate. The prop to be protected from hitting the bottom of the lagoon, with a minimum clearance of 3 feet. Agitator shall have a hydraulic control system to be operated from the tractor seat. The main body shall be constructed of 4 inch x 1/4 inch wall square steel tubing (or equivalent strength) f or rigidity. The shaft shall be 1 15/16 inch diameter (or equivalent strength). The shaft bearings will be fitted with grease fitting. The shaft to have a safety shield and have a display warning sticker. The trailer to be equipped with 16 inch (new) wheels and (new) 4 ply or 6 ply rating tires. The tires to be automotive tires and not equipment tires.

2. IRRIGATOR:

The irrigator will consist of reel, traveling irrigation system and solid hose in one unit. The solid hose (1,100 ft.) pulls the traveling gun. The system will travel with an adjustable speed and be equipped with an electronic speed indicator. The drive system must be independent of water application rate, self contained hydraulic system using orbit motor to drive the reel, powered by a 5 HP ORV gasoline engine with electronic ignition. Equipped with a turntable to allow the hose to be pulled in several directions from one-setting of the irrigator. Auxiliary equipment to include: stabilizers, anchors, turntable, sprinkler lift system and a water hose purge system. Hose should be high density polyethylene hose, at least 3.75 inch I.D. with a five year warranty. Sufficient hose to reach 1,100 feet. Application will be by a "Big Gun" type sprinkler with a minimum volume of 300 GPM mounted on a wheeled sprinkler cart for stability. Area covered by the sprinkler to be 200 feet to 240 feet diameter at 70-90 PSI. System to be equipped with a clutch and/or brake to prevent runaway and free wheeling should the hose break or become plugged. Brake release should allow for easy uncoiling of reel hose.

3. PUMP UNIT

Power source - a 6 cylinder water cooled diesel engine. The engine to be capable of producing rated gross power of 120 HP (89KW) at 2500 RPM with a continuous gross power of 107 hp (80KW) at 2500 RPM. The engine to have a 30 gallon fuel tank, safety shield for PTO shaft safety warning stickers, water and oil pressure gauges and safety switches to shut down system if unit over-speeds, overheats or oil pressure drops.

The pump unit must be capable of producing 300 GPM at 150 PSI. The pump will be equipped with chopper blades and sheer bar. The pump shall be equipped with a hand primer and spring loaded valve which opens when the pump is primed and has positive pressure. Unit will be equipped with 30 feet of flexible suction hose, and cam lock fittings for easy quick connection to the pump intake.

The pump and engine shall be trailer mounted with 15" wheels. The wheels and bearings will be new and painted. Tires to be new 15" automotive type and 4 ply or 6 ply rating in accordance to weight of the unit.

4. PIPING

Portable piping to fields should be through 6 inch aluminum irrigation line in 30 feet sections. Connection from the irrigation line to the irrigator shall be through ring lock type connectors. Connections shall also be provided from the pump to the irrigation line.

The pipe and accessories will have a wall thickness of .058 inch that will withstand up to 150 lbs. PSI of working pressure.

- 1320' of 6" x 30' pipe
- 44 6" ring lock couplers
- 30' of 6" x 30' suction pipe
- 1 ea. 6" x 90 degree suction elbow
- 1 ea. 6" x 90 degree field elbow
- 1 ea. 6" x 45 degree field elbow
- 10' of 6" discharge hose with fittings

5. PIPE TRAILER

The trailer shall have a capacity of 15,000 lbs. G.V.W. with 12" x 2" electric brakes on both axles, 28' x 8' open bed, 2" ball coupler, 2" x 6" side pockets or holes for stakes, fenders and a hide-a-way jack stand. To include wheels and tires. The wheels will be new, painted 15" automotive type. The tires will be new 4 ply or 6 ply, in accordance with unit.

3.1.2 Pumping System 2

LAGOON PUMPOUT SPECIFICATIONS

1. PTO PROPELLER AGITATOR

The agitator will be 30 feet (plus or minus 2 feet) in length, of the 2 wheel trailer type. Maximum PTO horsepower requirement should be not more than 90 HP at 540 RPM. The agitator shall have a propeller at least 23 inches in diameter with multi-pitch blades and an adjustable sheer plate. The prop to be protected from hitting the bottom of the lagoon, with. a minimum clearance of 3 feet. Agitator shall have a hydraulic control system to be operated from the tractor seat. The main body shall be constructed of 4 inch x 1/4 inch wall square steel tubing (or equivalent strength) for rigidity. The shaft shall be 1 15/16 inch diameter (or equivalent strength). The shaft bearings will be fitted with grease fitting. The shaft to have a safety shield and have a display warning sticker. The trailer to be equipped with 16 inch (new) wheels and (new) 4 ply or 6 ply rating tires. The tires to be automotive tires and not equipment tires.

2. IRRIGATOR:

The irrigator will consist of reel, traveling irrigation system and solid hose in one unit. The solid hose (1,100 ft.) pulls the traveling gun. The system will travel with an adjustable speed and be equipped with an electronic speed indicator. The drive system must be independent of water application rate, self contained hydraulic system using orbit motor to drive the reel, powered by a 5 HP OHV gasoline engine with electronic ignition. Equipped with a turntable to allow the hose to be pulled in several directions from one setting of the irrigator. Auxilliary equipment to include: stabilizers, anchors, turntable, sprinkler lift system and a water hose purge system. Hose should be high density polyethylene hose, at least 3.75 inch I.D. with a five year warranty. Sufficient hose to reach 1,100 feet. Application will be by a "Big Gun" type sprinkler with a minimum_volume of 300 GPM mounted on a wheeled sprinkler cart for stability. Area covered by the sprinkler to be 200 feet to 240 feet diameter at 70-90 PSI. System to be equipped with a clutch and/or brake to prevent runaway and free wheeling should the hose break or become plugged. Brake release should allow for easy uncoiling of reel hose.

3. PUMP UNIT

Power source - a 6 cylinder water cooled diesel engine. The engine to be capable of producing rated gross power of 120 HP (89KW) at 2500 RPM with a continuous gross power of 107 hp (80KW) at 2500 RPM. The engine to have a 30 gallon fuel tank, safety

shield for PTO shaft safety warning stickers, water and oil pressure guages and safety switches to shut down system if unit overspeeds, overheats or oil pressure drops.

The pump unit must be capable of producing 300 GPM at 150 PSI. The pump will be equipped with chopper blades and sheer bar. The pump shall be equipped with a hand primer and spring loaded valve which opens when the pump is primed and has positive pressure. Unit will be equipped with 30 feet of flexible suction hose, and cam lock fittings for easy quick connection to the pump intake.

The pump and engine shall be trailer mounted with 15" wheels. The wheels and bearings will be new and painted. Tires to be new 15" automotive type and 4 ply or 6 ply rating in accordance to weight of the unit.

4. PIPING

Portable piping to fields should be through 6 inch aluminum irrigation line in 30 feet sections. Connection from the irrigation line to the irrigator shall be through ring lock type connectors. Connections shall also be provided from the pump to the irrigation line.

The pipe and accessories will have a wall thickness of .058 inch that will withstand up to 150 lbs. PSI of working pressure.

5. PIPE TRAILER

The trailer shall have a capacity of 15,000 lbs. G.V.W. with 12" x 2" electric brakes on both axles, 28' x 8' open bed, 2" ball coupler, 2" x 6" side pockets or holes for stakes, fenders and a hide-a-way jack stand. To include wheels and tires. The wheels will be new, painted 15" automotive type. The tires will be new 4 ply or 6 ply, in accordance with unit.

6. LAGOON TRAILER PUMP

The unit will be a PTO driven pump/agitator with chopper blades, 36 feet (plus or minus 2 feet) in length on wheels with a hydraulic control system. The trailer will be constructed of 6"x 6"x 1/4" steel tubing beam and truss for added strength (or equivalent). The impeller will be 26 inch x 4 inch with a RPM rate of 540.

The wheels will be new, painted, 15" automotive type. The tires will be new 4 ply or 6 ply in accordance with weight of unit.

The PTO shaft will have a safety shield and safety sticker. The end of shaft/propeller will be protected from hitting the bottom of the lagoon with a minimum clearance of 3 feet.

7. VACUUM TANKER

The trailer tanker will have the capacity of 1500 gallons, made of 1/4" steel. The unit will include a secondary moisture trap, tank level indicator to show capacity, 20 feet of 4 inch I.D. suction hose, 6" valve with hydraulic control. Walking tandems with 12.5LX 15" new tires (wheels and tires included). The vacuum pump will be a 7 vane, 540 RPM, CFM 185.

Figures 9-14 are photographs with descriptions of the equipment purchased for the Wagoner County Conservation District.



Figure 9. Wagoner's Balzer agitator.

Task 53, Dairy Waste Management May 6, 2003 Revision 0



Figure 10. Wagoner's Ag-Rain Engine Drive Slurry-Reel (solid hose reel) by Balzer.



Figure 11. Wagoner's Ford diesel 6-cyl. motor and Doda irrigation pump by Lister



Figure 12. Wagoner's 6-cyl. Doda/Balzer chopper (slurry) pump.



Figure 13. Wagoner's 1997 1-ton Ford truck; 30-ft pipe and pipe trailer.



Figure 14. Wagoner County's 1500-gallon Balzer MaCum vacuum tanker.

3.2 Establishing cooperative effort to make equipment available to dairies

Lack of local support nixed the planned establishment of Dairy Cooperatives that would be completely self-sustaining operations. The districts continue to utilize the equipment for the benefit of operators within their demonstration areas (or, in the case of Grady County, across the entire state) for a reasonable fee (detailed in table 3 below). Fees for the service were modeled after those used in conservation districts in Missouri and Arkansas. Additional funding sources may be needed, in which case the priority and importance of the continued availability of pumpout services may need to be evaluated.

1. Set up / take down fee		\$250.00
	Mileage to and from location:	\$.40 / mile (Grady), \$.325 /
	(per trip including each piece	mile (Wagoner)
	equipment moved)	
2. Agitator:		\$20.00 / hr
3. Pump and reel:	(First 8 hours)	\$75.00 / hr
	(After 8 hours)	\$65.00 / hr
4. Down time*:	(First 30 minutes)	\$75.00 / hr
	(After 30 minutes)	\$65.00 / hr
5. To move equipment to		\$20.00 / hr
another field		
6. Sampling Procedure		\$15.00

Table 3.	Fees f	or the	Grady	County	and	Wagoner	County	CD's	numpout	services
I abic o.	1 005 1	or the	Grauy	County	ana	vi agonei	County	CD 5	pumpout	Ser vices

*Down time = a delay caused by foreign matter (trash/debris) interfering with pumping. Excessive down time may result in discontinuance of service. Both districts require producers to assist as needed and provide a tractor with at least an 80 hp engine. The districts reserve the right to refuse service based upon their judgment of a site survey. Additionally, the producer is required to pay upon receipt of invoice the prices as listed and sign the agreement. A cost-share program is also available, and is detailed later in this section. Figure 15-16 give an example of this agreement.

WAGONER COUNTY CONSERVATION DISTRICT #22 1312 S. W. 3RD - WAGONER, OK 74467-5518 TELEPHONE: (918) 485-4010 SHERROD HORNBUCKLE, DAIRY LAGOON PUMPOUT COORDINATOR PUMP OUT FEES 1. Setup and Take Down Fee \$ 250.00 Mileage to and from location: \$ 32.5/mile (Per trip including each piece equipment moved). 2. Agitator ŝ 20.00/hr 3. Pump and Reel (First 8 hours) S 75.00/hr (After 8 hours) 65.00/hr 4. Down Time (First 30 minutes) \$ 75.00/hr (After 30 minutes) 65.00/hr (Down Time is foreign matter (trash/debris) causing delay with pump. Excessive down time may result in discontinuance of service.) 5. To move equipment to another field \$ 20.00/hr 6. Sampling Procedure \$ 15.00 Producer will assist the District as needed and provide tractor. Producer will agree to the prices as listed above and will pay upon receipt of invoice. /s/ Froducer Date: We reserve the right to refuse service based upon our judgement of site survey. THERE IS A COST-SHARE PROGRAM AVAILABLE --- 25% DISCOUNT PER JOB WITH MAXIMUM OF \$500.00 WITH A MINIMUM TOTAL PUMPOUT FEE \$1000.00. WE ALSO OFFER A 10% DISCOUNT ON ANY PUMPOUT COST THAT EXCEEDS \$3,000.00.

Figure 15. Pumpout fee agreement.

DAIRY LAGOON PUMPOUT PAYMENT PLAN

DAIRY LAGOON PUMPOUT PROGRAM WAGONER COUNTY CONSERVATION DISTIRCT 1312 S. W. 3RD WAGONER, OK 74467-5518 SHERROD HORNBUCKLE, DAIRY LAGOON PUMPOUT COORDINATOR
The Wagoner County Conservation District offers a payment plan for dairy lagoon pumpout services. The payment plan was adopted to make the District's services more feasible to the customer's financial needs.
 50% down or \$1,000.00 of the total pumpout fee, whichever is less.
Example: Total Cost \$ 1200.00 Down Payment \$ 600.00
 The remaining balance will be a fixed payment based on a six month payment plan, with no interest.
Example: Remaining Cost \$ 600.00 : 6 months = \$ 100.00 Per Month
PLEASE SIGN THIS AGREEMENT THAT YOU UNDERSTAND THAT THE REMAINING BALANCE, AFTER DOWN PAYMENT, IS TO BE PAID IN (6) MONTHLY INSTALLMENTS, PAYABLE TO THE WAGONER COUNTY CONSERVATION DISTRICT BEGINNING THE MONTH FOLLOWING THE COMPLETED PUMPOUT.
Cooperator Date

Figure 16. Pumpout payment agreement.

The local Conservation District for each producer provided NRCS personnel to assist with Waste Management Plans. For the Wagoner County Conservation District, the original agreement was for a cooperative effort with the Oklahoma Conservation Commission, Cherokee County C.D., Mayes County C.D., Muskogee County C.D., Rogers County C.D., OSU Extension Service, the Oklahoma Department of Pollution Control and Ecology (now the Oklahoma Department of Environmental Quality), the Natural Resources Conservation Service of the USDA, the Farm Services Agency, and the U.S. Environmental Protection Agency. Grady County CD's original agreement included the above except for the different surrounding conservation districts, which were McClain, Caddo and Canadian County CDs.

A cost-share program allowed for some financial assistance to producers. The program allowed a 25% discount per job to a maximum of \$500.00 and a minimum total pumpout fee of \$1000.00. The Wagoner County C.D. also offered a 10% discount on any pumpout cost that exceeded \$3000.00.

To participate in the cost-share program, the producers had to meet the following requirements:

1. Operate a dairy in one of the counties in the targeted areas.
- 2. Be a cooperator with the conservation district in their respective county.
- 3. Have a conservation plan, to include an animal waste plan, prepared by NRCS in their respective county.
- 4. Obtain a soil test on the fields where application would be made. Also obtain an effluent test after the storage facility (lagoon) has been properly agitated. This information was given to the conservation district for future pumpouts and for making determinations on amount of nutrient use.
- 5. Be approved for cost-share prior to beginning any pumpout work:
 - a. Make application for assistance in the county where the dairy is located.
 - b. All above requirements met.
 - c. Contingent upon availability of funds.
- 6. Only use cost-share assistance on the following items:
 - a. Agitation of the storage facility (lagoon) to put the solids in suspension in the available water.
 - b. Pumping of the agitated effluent to the designated fields (as stated in the AWP).
 - c. Applying the effluent properly by means of an irrigation system at the recommended rates as stated in the AWP and no more than what will meet the soil/plant needs as stated in the soil test recommendations.

3.3 Lagoon cleaning and testing

Figure 17-21 are photographs of pumpout activities on April 4th and 5th, 1995 in the Grady County CD demonstration area.



Figure 17. Agitation in the lagoon, Grady County Conservation District Pumpout Demonstration of April 4-5, 1995.



Figure 18. Pumping out feedlot lagoon while agitating, Grady County Conservation District Pumpout Demonstration of April 4-5, 1995.



Figure 19. Irrigation line from lagoon to field, Grady County Conservation District Pumpout Demonstration of April 4-5, 1995.



Figure 20. Attaching line from irrigation pipe to "big gun," Grady County Conservation District Pumpout Demonstration of April 4-5, 1995.



Figure 21. Application of waste effluent to fields, Grady County Conservation District Pumpout Demonstration of April 4-5, 1995

Personnel performed 31 pumpouts, applying 9,882,000 gallons of agitated waste to 1358 acres in the Grady County demonstration area. Personnel performed 16 pumpouts in the Wagoner County demonstration area, applying 4,419,000 gallons on 270 acres. Guidelines from the *NRCS Agricultural Waste Management Field Handbook, Chapter 4, Waste Characteristics* (Barth et al. 1992) and the NRCS Conservation Practice Standard/Waste Utilization/ Code 633 were the initial levels used to calculate appropriate effluent concentrations and field applications. Subsequent samples and soil tests were used to adjust the application concentrations appropriately. The Oklahoma Cooperative Extension Service at OSU provided standard operating procedures for tasks such as using a hydrometer to adjust manure application rates based on actual P_2O_5 content of the waste instead of NRCS estimates. Tables 4 and 5 describe the effluent tests, soil tests, enormity of pumpout, etc., in detail for Grady County C.D. and

Wagoner County C.D., respectively. Figure 22 is an example from the Grady County Conservation District of the soil test reports obtained by producers.

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
David Richardson, Minco	Hog	3-May-95	305,324	12-May-95	Total N = 2216 mg/L (18.5 lbs/1000 gal. effluent)	pH = 7.4	38					Berm.	5/3/95 NRCS
					Total P = 1172 mg/L (22.4 lbs P_2O_5 /1000 gal. effluent)	Cond. = 8360 umhos							
					Total K = 772 mg/L (7.7 lbs $K_2O/1000$ gal. effluent)	% Solids = 3.43							
					Total Ca = 1563 mg/L (13.0 lbs/1000 gal. effluent)								
Paul Brown, Chickasha	Cow (150)	17-May-95	348,480	29-May-95	Total N = 2930 mg/L (24.4 lbs/1000 gal. effluent)	pH = 7.7	10					Berm.	5/17/95 (NRCS)
					Total P = 1258 mg/L (24.0 lbs P_2O_5 /1000 gal. effluent)	Cond. = 6140 umhos							
					Total K = 2923 mg/L (29.2 lbs $K_2O/1000$ gal. effluent)	% Solids = 11.85							
					Total Ca = 3265 mg/L (27.2 lbs/1000 gal. effluent)								
Paul Brown, Chickasha	100 (Cow)	7-May-98		6-May-98	Total N = 1669 mg/L (13.9 lbs/1000 gal. effluent)	pH = 7.0	40					Berm	5/7/98
					Total P = 546 mg/L (10.4 lbs P_2O_5 /1000 gal. effluent)	Cond. = 6400 umhos							
					Total K = 1190 mg/L (11.9 lbs $K_2O/1000$ gal. effluent)	%Solids = 1.63							
					Total Ca = 1339 mg/L (11.2 lbs/1000 gal. effluent)								
Ernest Billins, Newcastle	Cow (200)	17-Jul-95	940,000	9-Aug-95	Total N = 2351 mg/L (19.6 lbs/1000 gal. effluent)	pH = 7.3	100					Wheat	7/17/95 (NRCS)
					Total P = 829 mg/L (15.8 lbs P_2O_5 /1000 gal. effluent)	Cond. = 5810 umhos							
					Total K = 1281 mg/L (12.8 lbs $K_2O/1000$ gal. effluent)	% Solids = 9.42							
					Total Ca = 2758 mg/L (23.0 lbs/1000 gal. effluent)								
City of Ninnekah	WWTP	1-Oct-95	2' top water	28-Nov-95	Total N = 16 mg/L (0.13 lbs/1000 gal. effluent)	pH = 8.5	20					Wheat	Private Eng.
					Total P = 5 mg/L (0.09 lbs P ₂ O ₅ /1000 gal. effluent)	Cond. = 1740 umhos							

Table 4. Pumpout data, waste analyses, and soil analyses for operators in the Grady County Conservation District's demonstration area.

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
					Total K = 22 mg/L (0.22 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.16							
					Total Ca = 45 mg/L (0.37 lbs/1000 gal. effluent)								
Andy Jackson, Tuttle	Cow (100)	15-Nov-95		28-Nov-95	Total N = 239 mg/L (2.0 lbs/1000 gal. effluent)	pH = 7.4	30					Wheat	
					Total P = 91 mg/L (1.8 lbs P_2O_5 /1000 gal. effluent)	Cond. = 3300 umhos							
					Total K = 409 mg/L (4.1 lbs $K_2O/1000$ gal. effluent)	%Solids = 2.23							
					Total Ca = 328 mg/L (2.7 Ibs/1000 gal. effluent)								
Ralph Morgan, Chickasha	CAFO	29-Nov-95		24-Jan-96	Total N = 47 mg/L (0.4 lbs/1000 gal. effluent)	pH = 7.6	80					Berm & Wheat	11/29/95 NRCS
					Total P = 10 mg/L (0.02 lbs P_2O_5 /1000 gal. effluent)	Cond. = 708 umhos							
					Total K = 77 mg/L (0.7 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.09							
					Total Ca = 33 mg/L (0.3 lbs/1000 gal. effluent)								
Ralph Morgan, Chickasha	DEMO			15-Apr-97	Total N = 9 mg/L (0.1 lbs/1000 gal. effluent)	pH = 7.7							
					Total P = 8 mg/L (0.2 lbs P_2O_5 /1000 gal. effluent)	Cond. = 802 umhos							
					Total K = 141 mg/L (1.4 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.22							
					Total Ca = 36 mg/L (0.3 lbs/1000 gal. effluent)								
George McNeff, Ninnekah	800 (cow)	15-Dec-95		24-Jan-96	Total N = 203 mg/L (1.7 lbs/1000 gal. effluent)	pH = 7.1	100					Wheat	12/15/95
					Total P = 43 mg/L (0.9 lbs P_2O_5 /1000 gal. effluent)	Cond. = 2780 umhos							
					Total K = 202 mg/L (2.0 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.31							
					Total Ca = 145 mg/L (1.2 lbs/1000 gal. effluent)								

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
Council Holt, Stonewall	Chicken	7-Feb-96		16-Feb-96	Total N = 2925 mg/L (24.4 lbs/1000 gal. effluent)	pH = 7.5	40					Wheat	2/7/96 NRCS
					Total P = 216 mg/L (4.1 lbs P_2O_5 /1000 gal. effluent)	Cond. = 21,400 umhos							
					Total K = 2777 mg/L (27.7 lbs $K_2O/1000$ gal. effluent)	%Solids = 2.01							
					Total Ca = 855 mg/L (7.1 lbs/1000 gal. effluent)								
Steve Pope, Loya	100 (Cow)	20-Feb-96		6-Mar-96	Total N = 2756 mg/L (23.0 lbs/1000 gal. effluent)	pH = 7.0	100					Wheat	2/20/96 NRCS
					Total P = 1037 mg/L (19.7 lbs P_2O_5 /1000 gal. effluent)	Cond. = 2250 umhos							
					Total K = 1236 mg/L (12.4 lbs $K_2O/1000$ gal. effluent)	%Solids = 11.96							
					Total Ca = 2906 mg/L (24.2 lbs/1000 gal. effluent)								
Steve Pope Loyal	100 (Cow)	20-Jul-99		27-Jul-99	Total N = 1626 mg/L (13.5 lbs/1000 gal. effluent)	pH = 7.1	60					Berm./wheat	7/20/99
					Total P = 405 mg/L (7.7 lbs P_2O_5 /1000 gal. effluent)	Cond. = 3980 umhos							
					Total K = 662 mg/L (6.6 lbs $K_2O/1000$ gal. effluent)	% Solids = 6.33							
					Total Ca = 1321 mg/L (11.0 lbs/1000 gal. effluent)								
Butch Lorenz, Hitchcock	100 (Cow)	27-Feb-96		13-Mar-96	Total N = 288 mg/L (2.4 lbs/1000 gal. effluent)	pH = 7.2	50					Grain Sorg.	2/27/96
					Total P = 72 mg/L (1.4 lbs P_2O_5 /1000 gal. effluent)	Cond. = 7020 umhos							
					Total K = 401 mg/L (4.0 lbs K ₂ O/1000 gal. effluent)	%Solids = 1.34							
					Total Ca = 385 mg/L (3.2 lbs/1000 gal. effluent)								
Stanley Kadavy, Loyal	100 (Cow)	11-Mar-96		27-Mar-96	Total N = 2109 mg/L (1706 lbs/1000 gal. effluent)	pH = 7.2	50					Wheat	3/11/96 NRCS
					Total P = 952 mg/L (18.1 lbs P_2O_5 /1000 gal. effluent)	Cond. = 3770 umhos							

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
					Total K = 800 mg/L (8.0 lbs $K_2O/1000$ gal. effluent)	%Solids = 9.57							
					Total Ca = 3466 mg/L (28.9 lbs/1000 gal. effluent)								
Phil Wehremberg, Loyal	7 150 (Cow)	15-Mar-96		27-Mar-96	Total N = 259 mg/L (2.2 lbs/1000 gal. effluent)	pH = 7.3		9-Feb-00	*			Wheat	3/15/96
					Total P = 59 mg/L (1.1 lbs P_2O_5 /1000 gal. effluent)	Cond. = 4350 umhos							
					Total K = 316 mg/L (3.1 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.44							
					Total Ca = 253 mg/L (2.1 lbs/1000 gal. effluent)								
Reherman Dairy, Kingfisher	1500 (cow)	28-Mar-96		28-Mar-96	Total N = 2248 mg/L (18.7 lbs/1000 gal. effluent)	pH = 7.3	100					Berm.	3/28/96
					Total P = 699 mg/L (13.3 lbs P_2O_5 /1000 gal. effluent)	Cond. = 5200 umhos							
					Total K = 935 mg/L (9.4 lbs K ₂ O/1000 gal. effluent)	%Solids = 7.61							
					Total Ca = 2453 mg/L (20.4 lbs/1000 gal. effluent)								
Rodney Wegener, Minco	150 (Cow)	8-Apr-96		23-Apr-96	Total N = 2587 mg/L (21.5 lbs/1000 gal. effluent)	pH = 7.1	60	7/7/1994 Location: West 13A	yield goal = 40 bushels wheat/acre	lime req. = 1.2 tons ECCE*/acre to pH 6.8	pH = 5.1, lime required to 6.8	Berm./wheat	4/8/96
					Total P = 930 mg/L (17.6 lbs P_2O_5 /1000 gal. effluent)	Cond. = 6280 umhos			NO-3-N (lbs/acre) Surface = 63; Subsoil = 40	N req. = none actual N adequate for 52 bushels/acre			
					Total K = 1085 mg/L (10.8 lbs $K_2O/1000$ gal. effluent)	%Solids = 8.43			P soil test index = 55	P req. = 8 lbs/acre P ₂ O ₅			
					Total Ca = 2074 mg/L (17.3 lbs/1000 gal. effluent)				K soil test index = 271	K req. = none			
								7/7/1994 Location: South 67AC	yield goal = 40 bushels wheat/acre	lime req. = 1.9 tons ECCE/acre to pH 6.8	pH = 4.9, Buffer index = 6.6lime needed to pH 6.8	Berm./wheat	4/8/96
									NO ₃ -N (lbs/acre) Surface = 80; Subsoil = 72	N req. = none Actual N adequate for 76 bushels/acre			
									P soil test index = 91	P req. = none, $P_2O_5 1.4X$ adequate amt			

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
				-					K soil test index = 330	K req. = none, K ₂ O is 1.32X over adequate amt			
Kirk Meacham, Clinton	CAFO	25-Mar-97		15-Apr-97	Total N = 77 mg/L (0.6 lbs/1000 gal. effluent)	pH = 7.3						Berm./wheat	3/25/97
					Total P = 58 mg/L (1.1 lbs P_2O_5 /1000 gal. effluent)	Cond. = 2170 umhos			*				
					Total K = 406 mg/L (4.1 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.14							
					Total Ca = 42 mg/L (0.4 lbs/1000 gal. effluent)								
Ray McGee, Maysville	70 (Cow)	22-Apr-97		14-May-97	Total N = 1893 mg/L (15.8 lbs/1000 gal. effluent)	pH = 7.0						Berm	4/22/97
					Total P = 634 mg/L (12.1 lbs P_2O_5 /1000 gal. effluent)	Cond. = 3310 umhos							
					Total K = 844 mg/L (8.4 lbs $K_2O/1000$ gal. effluent)	%Solids = 8.48							
					Total Ca = 1890 mg/L (15.7 lbs/1000 gal. effluent)								
Billy Pierce, Sterling	100 (Cow)	14-May-97		30-May-97	Total N = 2500 mg/L (20.8 lbs/1000 gal. effluent)	pH = 7.2						Plains	5/14/97
					Total P = 913 mg/L (17.4 lbs P_2O_5 /1000 gal. effluent)	Cond. = 6090 umhos							
					Total K = 1127 mg/L (11.3 lbs $K_2O/1000$ gal. effluent)	%Solids = 9.45							
					Total Ca = 2766 mg/L (23.0 lbs/1000 gal. effluent)								
		15-May-98		1-Jun-98	Total N = 1796 mg/L (15.0 lbs/1000 gal. effluent)	pH = 7.0							
					Total P = 561 mg/L (10.7 Ibs P_2O_5 /1000 gal. effluent)	Cond. = 5310 umhos							
					Total K = 834 mg/L (8.3 lbs $K_2O/1000$ gal. effluent)	%Solids = 9.58							
					Total Ca = 1984 mg/L (16.5 lbs/1000 gal. effluent)								
Billy Pierce, Marlow	100 (Cow)	16-Jul-99		27-Jul-99	Total N = 1276 mg/L (10.6 lbs/1000 gal. effluent)	pH = 7.3	40					Wheat	7/16/99 NRCS

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
					Total P = 445 mg/L (8.5 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 6090 umhos							
					Total K = 885 mg/L (8.8 lbs $K_2O/1000$ gal. effluent)	% Solids = 4.30							
					Total Ca = 1596 mg/L (13.3 lbs/1000 gal. effluent)								
Ft. Reno, El Reno	CAFO	2-Dec-97		23-Dec-97	Total N = 1308 mg/L (10.9 lbs/1000 gal. effluent)	pH = 7.1	20					Berm.	12/8/97
					Total P = 228 mg/L (4.4 lbs P_2O_5 /1000 gal. effluent)	Cond. = 2420 umhos							
					Total K = 154 mg/L (1.5 lbs $K_2O/1000$ gal. effluent)	%Solids = 2.03							
					Total Ca = 845 mg/L (7.0 lbs/1000 gal. effluent)								
Gerald Brakhage, Lahoma	500 (Cow)	29-Jun-98		7-Aug-98	Total N = 1028 mg/L (8.6 lbs/1000 gal. effluent)	pH = 7.5	100					Wheat	6/29/98
					Total P = 240 mg/L (4.6 lbs P_2O_5 /1000 gal. effluent)	Cond. = 7400 umhos							
					Total K = 1152 mg/L (11.5 lbs $K_2O/1000$ gal. effluent)	%Solids = 1.40							
					Total Ca = 718 mg/L (6.0 lbs/1000 gal. effluent)								
Gerald Brakhage Lahoma	500 (Cow)	22-Jul-99		10-Aug-99	Total N = 2535 mg/L (21.1 lbs/1000 gal. effluent)	pH = 7.3	100					Wheat	7/22/99
					Total P = 981 mg/L (18.7 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 5480 umhos							
					Total K = 1348 mg/L (13.5 lbs $K_2O/1000$ gal. effluent)	% Solids = 9.60							
					Total Ca = 2563 mg/L (21.4 lbs/1000 gal. effluent)								
Leonard Wyatt, Purcell	CAFO	24-Apr-95		3-May-95	Total N = 12 mg/L (0.1 lbs/1000 gal. effluent)	pH = 7.8	50					Wheat	4/24/95
					Total P = 10 mg/L (0.2 lbs P_2O_5 /1000 gal. effluent)	Cond. = 683 umhos							
					Total K = 102 mg/L (1.0 lbs $K_2O/1000$ gal. effluent)	%Solids = 0.05							
					Total Ca = 37 mg/L (0.3 lbs/1000 gal. effluent)								

Lagoon name and location	Size & type of operation	Date of pump-out	Volume pumped out (gal.)	Date of effluent analysis	Effluent nutrient content	Other parameters	# of acres getting application	Date/location of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required (planned)	Other soil test parameters	Crop type	Date of most recent AWP & drafter
Richard Thomas, Lexington	150 (Cow)	4-Aug-99		10-Aug-99	Total N = 386 mg/L (3.2 lbs/1000 gal. effluent)	pH = 7.6							
					Total P = 94 mg/L (1.8 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 4940 umhos							
					Total K = 576 mg/L (5.8 lbs $K_2O/1000$ gal. effluent)	% Solids = 0.79							
					Total Ca = 244 mg/L (2.0 lbs/1000 gal. effluent)								
Richard Thomas, Lexington				24-Aug-99	Total N = 1092 mg/L (9.1lbs/1000 gal. effluent)	pH = 7.3	40					Berm	8/4/99
					Total P = 265 mg/L (5.1 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 5960 umhos							
					Total K = 775 mg/L (7.8 lbs $K_2O/1000$ gal. effluent)	% Solids = 2.61							
					Total Ca = 742 mg/L (6.2 lbs/1000 gal. effluent)								
Southgate	Close Out	30-Aug-99		3-Jun-99	Ammonia-N = 0.070 mg/L	Suspended Solids = 160.000 mg/L	40					Wheat	8/30/99
					BOD _{5 day} = 27.600 mg/L								
Vernon Whitnah Okarche	Hog	16-Sep-99		21-Sep-99	Total N = 2340 mg/L (19.5 lbs/1000 gal. effluent)	pH = 7.1	40					Berm	9/14/99 NRCS
					Total P = 2483 mg/L (47.4 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 3820 umhos							
					Total K = 944 mg/L (9.4 lbs $K_2O/1000$ gal. effluent)	% Solids = 6.25							
					Total Ca = 2497 mg/L (20.8 lbs/1000 gal. effluent)								
Todd Berry Ninnekah	Hog	23-Sep-99		1-Oct-99	Total N = 80 mg/L (0.7 Ibs/1000 gal. effluent)	pH = 8.5	50					Berm	9/23/99
					Total P = 26 mg/L (0.5 lbs $P_2O_5/1000$ gal. effluent)	Cond. = 4400 umhos							
					Total K = 297 mg/L (3.0 lbs $K_2O/1000$ gal. effluent)	% Solids = 0.35							
					Total Ca = 70 mg/L (0.6 Ibs/1000 gal. effluent)								
					For all Grady pumpouts,	total # of acres getting appl.=	1358						

Lagoon name and location	Estimated total volume of lagoon	Size of dairy or other operation	Date of pump-out	Volume pumped out	Date of effluent analysis	Effluent nutrient content (mg/L)	Other parameters	Location of application	# of acres getting application	Date of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required	Other soil test parameters	Crop type
Greg Bedford of Fairland	500,000 gal	110 Head	3/12/97	480,000 gal	03/26/97	Total N = 2795 mg/L (23.3 lbs/1000 gal.)	pH = 6.9	Sec.15 T26N R23E	32	NONE				Hay- grazer
						Total P = 821 mg/L (P ₂ O ₅ = 15.7 lbs/1000 gal.)	Cond. = 4160							
						Total K = 718 mg/L (K ₂ O = 7.2 lbs/1000 gal.)	%Solids = 9.81							
						Total Ca = 1835 mg/L (15.3 lbs/1000 gal.)								
David Boyer of Webbers Falls	297,000 gal	200 Head	4/13/98	285,000 gal	04/15/98	Total N = 225 mg/L (1.9 lbs/1000 gal.)	pH = 7.1	Sec. 27-34 T12N R20E	19	5/4/98	NO-3-N (lbs/acre) 17			Milo Field
						Total P = 75 mg/L (P_2O_5 = 1.4 lbs/1000 gal.)	Cond. = 2510				P (Ibs/acre) 80			
						Total K = 204 mg/L (K ₂ O = 2.0 lbs/1000 gal.)	%Solids = 9.81				K (lbs/acre) 680			
						Total Ca = 136 mg/L (1.1 lbs/1000 gal.)				5/3/99		Sorghum Sudan: no yield goal provided	pH = 5.8 Buffer index = 7.0 no lime required	Sorghum Sudan
						NO ₃ -N = 136 mg/L (1.1 lbs./1000 gal.)					NO-3-N (lbs/acre) 17	N req.= determined from yield goal		
											P (lbs/acre) 80	P req. = none		
											K (lbs/acre) 680	K req. = none		
Kindle & Bradford of Westville	567,000	100 Head	7/7/97	510,000 gal	08/13/97	Total N = 2049 mg/L (17.1 lbs/1000gal.)	pH = 7.3	NW 31 T18N R26E	34	None				Bermuda - grass
						Total P = 611 mg/L (11.7 lbs $P_2O_5/1000$ gal.)	Cond. = 4940 umhos							
						Total K = 1203 mg/L (12.0 lbs K ₂ O/1000 gal.)	%Solids = 6.12							
						Total Ca = 1135 mg/L (9.5 lbs/1000gal.)								
Rick Clovis of Muskogee	275,000 gal	100 head	8/16/95	205,000 gal.	08/18/95	Total N = 1738 mg/L (14.5 lbs./1000gal.)	pH = 7.5	Sec.18 T13N R17E	14	None				Bermuda - grass
						Total P = 846 mg/L (16.0 lbs $P_2O_5/1000$ gal.)	Cond. = 4180 umhos							
						Total K = 1070 mg/L (10.7 lbs K ₂ O/1000gal.)	% Solids = 7.32							
						Total Ca = 1740 mg/L (14.5 lbs/1000gal.)								

Table 5. Pumpout data, waste analyses and soil tests for the participating producers in the Wagoner County Conservation District demonstration area.

Lagoon name and location	Estimated total volume of lagoon	Size of dairy or other operation	Date of pump-out	Volume pumped out	Date of effluent analysis	Effluent nutrient content (mg/L)	Other parameters	Location of application	# of acres getting application	Date of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required	Other soil test parameters	Crop type
Dick Hardin Farm of Wagoner	281,358 gal	70 Head	6/10/96	225,000 gal	06/12/96	Total N = 459 mg/L (3.8 lbs/1000 gal.)	pH = 7.3	Sec.20 T18N R18E	15	6/4/96		Interpretations and req. for wheat yield goal = no yield goal provided	pH = 5.2, Buffer index = 6.7 ("lime" needed to pH 6.8)	Wheat pasture
						Total P = 142 mg/L (2.7 lbs $P_2O_5/1000$ gal.)	Cond. = 6260 umhos				Surface NO ₃ -N = 6 lbs/acre N	Surface NO ₃ -N requirement "determined from yield goal"		
						Total K = 1005 mg/L (10.0 lbs K₂O/1000gal.)	% Solids = 1.20				Availability Index P = 27 Ibs/acre (84% sufficient [rating and fertility])	P req. = 33 lbs/acre P ₂ O ₅ annually		
						Total Ca = 324 mg/L (2.7 lbs/1000gal.)					Availability Index K = 138 lbs/acre (83% sufficient)	K req. = 37 lbs/acre K ₂ O annually		
Dick Hardin Farm of Wagoner	281,358 gal	70 Head	7/28/99	225,000 gal	08/19/99	Total N = 1852 mg/L (15.4 lbs/1000 gal.)	pH = 7.1	Sec.20 T18N R18E	15			lime req. = 1.4 tons ECCE*/acre to pH 6.8 or 0.5 tons ECCE*/acre continuous wheat		Wheat
						Total P = 572 mg/L (10.9 lbs P₂O₅/1000 gal.)	Cond. = 4940 umhos							
						Total K = 789 mg/L (7.9 lbs K ₂ O/1000 gal.)	% Solids = 6.59							
						Total Ca = 1800 mg/L (15.0 lbs/1000 gal.)								
Mike Langley #1 of Westville	274,926 gal	90 Head	11/5/96	6,000 gal	11/09/96	Total N = 1236 mg/L (10.3 lbs/1000 gal.)	pH = 6.9	Sec.17 T18N R25E	4	None				Bermuda -grass
						Total P = 478 mg/L (9.1 lbs P ₂ O ₅ /1000 gal.)	Cond. = 4750 umhos							
						Total K = 709 mg/L (7.1 lbs K ₂ O/1000 gal.)	% Solids = 3.82							
						Total Ca = 598 mg/L (5.0 lbs/1000 gal.)								
1(Blake Littlejohn) of Westville	350,000 gal	100 Head	12/5/96	330,000 gal	6 Dec. 1996	Total N = 206 mg/L (1.7 lbs/1000 gal.)	pH = 7.7	Sec.33 T18N R25E	22	None				Fescue Meadow
						Total P = 72 mg/L (1.4 lbs $P_2O_5/1000$ gal.)	Cond. = 2370 umhos							
						Total K = 258 mg/L (2.6 lbs K ₂ O/1000 gal.)	% Solids = 0.18							
						Total Ca = 60 mg/L (0.5 lbs/1000 gal.)								
Jr. New (1) of Twin Oaks	300,000 gal	100 Head	6/29/98	285,000 gal	06/11/98	Total N = 630 mg/L (5.3 lbs/1000 gal.)	pH = 7.3	SE1/4 OF SEC 16 T20N R23E	19	4/16/99	P (lbs/acre) 310 (excessive)	Grass/legume overseed: yield goal = 3 tons/acre or 175 cowdays	pH = 4.79: lime required	Bermuda -grass
						Total P = 182 mg/L (3.5 lbs P₂O₅/1000 gal.)	Cond. = 4900 umhos				Ca (lbs/acre) 1200 (low)	N req.= 40 lbs/acre annually	Soil texture = sandy loam	

Lagoon name and location	Estimated total volume of lagoon	Size of dairy or other operation	Date of pump-out	Volume pumped out	Date of effluent analysis	Effluent nutrient content (mg/L)	Other parameters	Location of application	# of acres getting application	Date of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required	Other soil test parameters	Crop type
						Total K = 469 mg/L (4.7 lbs K ₂ O/1000 gal.)	% Solids = 0.75				Mg (lbs/acre) 270 (low/medium)	P, K req. = none	Organic matter = 4.20%	
						Total Ca = 258 mg/L (2.2 lbs/1000gal.)					K (lbs/acre) 680 (excessive)	lime req. = 1150 lbs/acre E.N.M.**	Neutralizable acidity (N.A.) = 3.4 meq/100g	
Jr. New (2) of Twin Oaks	300,000 gal	100 head	6/18/99	255,000 gal	06/29/99			Sec 16 T20N R23E		4/16/99 cont.		Bermuda-grass hay: yield goal = 3 tons/acre	Cation exchange capacity (C.E.C.) = 8.4 meq/100g	Bermuda -grass
												N req.= 150 lbs/acre annually	Ca base saturation = 35.7%	
												P, K req. = none	Mg base saturation = 13.4%	
												lime req. = 895 lbs/acre E.N.M.**	K base saturation = 10.4%	
John Paris of Checotah	165,000 gal	70 Head	2/27/99	105,000 gal	03/01/99	Total N = 2626 mg/L (21.9 lbs/1000gal.)	pH = 6.7		7	3/17/99		Bermuda-grass yield goal: 2.00 tons/acre	pH = 5.0, Buffer index = 6.7 lime needed to pH 6.8	Bermuda -grass
						Total P = 777 mg/L (14.8 Ibs P₂O₅/1000 gal.)	Cond. = 2620 umhos				NO-3-N (lbs/acre) 15	N req. = 85 lbs/acre		
						Total K = 1162 mg/L (11.6 Ibs K₂O/1000 gal.)	% Solids = 11.44				P (lbs/acre) 37 (93% sufficient)	P req. = 23 lbs/acre P₂0₅ annually		
						Total Ca = 874 mg/L (7.3 lbs/1000 gal.					K (lbs/arce) 132 (81% sufficient)	K req. = 48 lbs/acre K ₂ O annually		
												lime req. = 1.4 tons ECCE*/acre		
Jack Roach of Keefton	450,000 gal	100 Head	11/1/98	300,000 gal	2 Nov. 1998	Total N = 2078 mg/L (17.3 lbs/1000 gal.)	Ph = 7.3	Sec 35 T13N R18E	20	7/24/98		Interpretations and req. for native hay yield goal = no yield goal provided	pH = 5.0, Buffer index = 6.7 no lime required.	Wheat pasture
						Total P = 674 mg/L (12.8 lbs $P_2O_5/1000$ gal.)	Cond. = 4200 umhos				Surface NO3-N = 26 Ibs/acre	N requirement "determined from yield goal"		
						Total K = 1274 mg/L (12.7 lbs K ₂ O/1000 gal.)	% Solids = 8.54				Test Index P = 84 lbs/acre	P req. = none		
						Total Ca = 710 mg/L (5.9 lbs/1000 gal.)					Test Index K = 127 Ibs/acre (85% sufficient)	K req. = 19 lbs/acre K2O annually		
Jack Roach of Keefton	450,000 gal	100 head	6/25/95	389,000 gal.	06/28/95	Total N = 1749 mg/L (14.6 lbs/1000 gal.)	pH = 7.1	Sec 35 T13N R18E	26	None				Soybea
						Total P = 506 mg/L (9.6 lbs P ₂ O ₅ /1000 gal.)	Cond. = 3570 umhos							
						Total K = 1215 mg/L (12.1 lbs K ₂ O/1000 gal.)	% Solids = 8.80							
						Total Ca = 505 mg/L (4.2 lbs/1000 gal.)								
Randy Vaughn of Westville	130,000 gal	75 head	9/1/99	75,000 gal	09/17/99	Total N = 2391 mg/L (19.9 lbs/1000 gal.)	pH = 7.4	Sec 17 T18N R25E	5	None				Bermud -grass

		-												
Lagoon name and location	Estimated total volume of lagoon	Size of dairy or other operation	Date of pump-out	Volume pumped out	Date of effluent analysis	Effluent nutrient content (mg/L)	Other parameters	Location of application	# of acres getting application	Date of soil test	Soil Nutrient Content	Interpretations: Soil Nutrients Required	Other soil test parameters	Crop type
						Total P = 680 mg/L (13.0 lbs $P_2O_5/1000$ gal.)	Cond. = 4470 umhos							
						Total K = 1244 mg/L (12.4 lbs K ₂ O/1000 gal.)	% Solids = 6.38							
						Total Ca = 1279 mg/L (10.7 lbs/1000 gal.)								
N.E.O A&M College	475,000 gal	150 Head of hogs	10/2/99	405,000 gal	10/08/99	Total N = 15 mg/L (0.1 lbs/1000 gal.)	pH = 7.5	Sec 17 T28N R23E	27	None				
						Total P = 6 mg/L (0.1 lbs $P_2O_5/1000$ gal.)	Cond. = 5280 umhos							
						Total K = 58 mg/L (0.6 lbs $K_2O/1000$ gal.)	% Solids = 0.14							
						Total Ca = 29 mg/L (0.2 lbs/1000 gal.)								
Bob King of Pryor	200,000 gal	70 Head	11/6/99	165,000 gal	11/09/99	Total N = 4069 mg/L (33.9 lbs/1000 gal.)	pH = 7.0	Sec 24 T21N R19E	11	10/4/99		Bermuda-grass: yield goal = 3.00 tons/acre	pH = 6.8 no lime required.	Bermuda -grass
						Total P = 1273 mg/L (24.3 lbs P2O5/1000 gal.)	Cond. = 2190 umhos				NO-3-N (lbs/acre) 45	N req. = 105 lbs/acre		
						Total K = 1429 mg/L (14.3 lbs K2O/1000 gal.)	% Solids = 12.37				P (lbs/acre) 68	P req. = none		
						Total Ca = 5138 mg/L (42.8 lbs/1000 gal.)					K (lbs/arce) 278	K req. = none		
Bob King of Pryor										10/18/99		Bermuda-grass: yield goal = 3.00 tons/acre	pH = 5.4, Buffer capacity = 6.9lime needed to pH 6.8	Bermuda -grass
											NO-3-N (lbs/acre) 5	N req. = 145 lbs/acre		
											P (lbs/acre) 37 (93% sufficient)	P req. = 23 lbs/acre P_2O_5 annually		
											K (lbs/acre) 129 (81% sufficient	K req. = 49 lbs/acre K ₂ O annually		
												lime req. = 1.0 tons ECCE*/acre to pH 6.8		
							For all Wagoner Pumpouts:	total # of acres getting appl.=	270					

*ECCE = Effective Calcium Carbonate Equivalence ** ENM = Effective Neutralizing Material

26		SOT	TES	T RF	PORT		
Soil, Wate Analytical	r, and For Laborator	ages y	- 1			Invoice OSU Agr	No. 1296 onomy Dept.
Name:	COUNT	Y EXTENSI	ON DIRECT	OR Rt	. 1 Box 197		
Address:	GRADY	COUNTY		——— Mi	nco, OK 73	059	
Date tes	ted: 7/0	07/94	Comment:	So	uth 67,	9 E	
State	Sender	Soil R	eaction	NO3-N	(lbs/A)	Soil Tes	st Index
No.	No.	рН	B.I.	Surface	Subsoil	P	K
44527	4063	4.9	6.6	80	72	91	330
SO4-S	(lbs/A)	Ca	Mg	Fe	Zn	B	
Surface	Subsoil	lbs/A	lbs/A	ppm	ppm	ppm	Cost
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	Foll	95 - 8	on 70 Ban	70 EE IN #	C Fine	Signature	

Figure 22. Example Soil Test Report, Grady County Conservation District.

3.4 Waste Utilization Plan development

Waste Utilization Plans were developed for every operation using the equipment. Examples of the most complete plans are enclosed as Appendices C, D, and E. All the plans outlined the projected or actual soil

test results, projected or actual waste analysis results, and the recommendations for utilization of the waste.

As can be seen in Appendices C-E, application rates were initially designed from average analysis provided by the OSU Extension Service. This analysis showed an average number of pounds of the given nutrient per 1000 gallons of effluent. The data gathered from the first clean-out were to be used for any subsequent clean-out and soil application.

The application rate for the waste is determined based on the estimated or actual nutrient content of the waste, the expected crop uptake (determined from the target yield), and the estimated or actual soil nutrient content. Estimated nutrient contents of waste effluent, nutrient uptake of crop plants, and nutrient contents of soil were assumed from regional data available to NRCS or from other averages such as those found in the NRCS *Agricultural Waste Management Field Handbook, Ch. 4,* Waste Characteristics (Barth et al. 1992). Actual nutrient values were determined from the laboratory analysis of waste effluent and soil samples.

3.5 Financial Reports

Both districts have provided a brief cost analysis of the program, showing a substantial overall profit. Grady County showed a gross income of \$81,489.92 and total expenses of \$38,180.22 for a net profit of \$43,309.70 for the period April 13, 1995 through December 12, 1999. Wagoner County C.D. showed a gross income of \$38,566.25 and total expenses of \$15,865.41 for the period July 1, 1995 through June 30, 1999. The net profit was \$22,700.84. The net profits could be used for future replacement and maintenance of equipment or to help pay salaries of any additional personnel needed for the program. The expenses are outlined more completely in tables 6 and 7.

Table 0. 1 unipout infancial report for Grady County C.D.					
Categories	Amounts: 4/13/95-6/30/2000				
Income: Pumpout Service	\$81,489.92				
Expenses:					
Truck & Equipment maintenance/minor repairs/fuel	\$13,698.50				
Parts/labor (major repairs)	\$10,128.51				
Travel, etc.	\$4,129.13				
Insurance	\$8,728.00				
Other (office/lab fees/postage/public relations)	\$1,496.08				
Total Est. Expenses	\$38,180.22				
Net Profit:	\$43,309.70				

In-kind services, or salaries of district employees that were reimbursed through OCC and so were not included in the above expenses, were estimated at \$17,310.

Categories	Amounts:7/1/95-6/30/2000
Income: Pumpout Service	\$38,566.25
Expenses:	
Truck & Equipment maintenance/minor repairs/fuel	\$ 8,684.06
Parts/labor (major repairs)	\$ 534.26
Travel/demonstrations, etc.	\$ 776.80
Insurance	\$ 4,537.00
Other (office/lab fees/postage/public relations)	\$ 1,333.29
Total Est. Expenses	\$15,865.41
Net Profit:	\$22,700.84

Table 7. Pumpout financial report for Wagoner County C.D. Control of the second seco

Attachments F and G are examples of more detailed records kept by the districts.

4.0 **DISCUSSION**

Unforeseen economic forces reduced the price of dairy products and created a strain on producers during the years since 1995. According to Dan Waldner, Dairy Specialist with the OSU Cooperative Extension Service, Oklahoma has lost dairies at a rate of 5% or 6% per year since about 1995. Because of the economic situation for dairies and the difficulty hiring and funding full-time pumpout personnel, the conservation districts were not able to reach the workplan's measures of success regarding total number of lagoons serviced and the percent increase in number serviced per year. Although the goal of 109 lagoon clean outs in 3 years was not reached due to economic and logistical problems, we believe that significant progress was made toward successful implementation of the project objectives. Awareness among producers about the need for testing of waste and soils as well as the need for timely pump-outs and clean-outs has clearly improved through cooperative efforts guided by NRCS and district personnel.

In the future a better measure of success might be (1) a measure of the pounds of nitrate and phosphorus that were utilized and applied responsibly rather than being dumped into a creek or just dumped onto one small area, (2) the number in attendance at demonstrations and informational meetings, (3) the number of sign ups for participation in the pumpout program (weather and economics can often slow good intentions), (4) the number of land owners or businesses actually purchasing their own equipment for similar pumpouts, and/or (5) a measure of the success in the technology transfer to other agencies and organizations. The current measure of success (pumpout numbers) was not very practical because of its susceptibility to economic constraints, weather conditions, and equipment down time.

In addition, coordination with other agencies that have jurisdictional authority can be a factor when considering education, technology transfer, and implementation. All parties, including inspectors with the state Department of Agriculture, should be brought to the table for development of a unified effort.

LITERATURE CITED

- Barth, C., T. Powers, and J. Rickman. 1992. Waste characteristics. Pages 4-1 to 4-23 <u>in</u> Krider, J. and J. Rickman (editors). Agricultural Waste Management Field Handbook. USDA Soil Conservation Service.
- Pelley, J. 2000. Personal communication regarding sampling methods and promotional activities. Watershed Technician, Oklahoma Conservation Commission, Chickasha, Oklahoma.
- Waldner, D. 2000. Personal communication regarding numbers and status of state dairies. Dairy Specialist, Oklahoma State University Cooperative Extension Service, Stillwater, Oklahoma.

Appendix A. Pumpout information packet distributed by Grady County.

New Assistance Available for Area Animal Waste Facilities

The Grady County Conservation District will be offering a Cost-Share Assistance Program for pump out of dairy waste storage facilities. This program is part of Task 300 Dairy Waste Management Implementation Project of the 319 Non Point Program.

The purpose of the cost-share program is the improvement of water quality to demonstrate the positive effects the program will have on water quality in the target areas including Grady, McClain, Caddo and Canadian Counties. This is a one year program and will end when appropriated funds are depleted.

To take part in the program, the dairy producer must meet the following requirements:

- Operate a dairy in one of the counties in the targeted areas
- Be a cooperator with the Conservation District in their county

• HAVE A CONSERVATION PLAN, INCLUDING WASTE MANAGEMENT PLAN AS PREPARED BY NRCS

- Obtain soil tests on the fields where application will be made
- Be approved for cost share prior to beginning of pump out
- Cost share will be based on:
 - 1. Agitation of the storage facility to put the solids in suspension in the available water
 - 2. Pumping of the agitated affluent to designated fields
 - 3. Applying affluent properly at the recommended rates

Cost share will be made when final approval has been made by a District representative. The cost share rate is 25% not to exceed \$500.00. This cost share rate only applies with pump fees of \$1,500 or more.

For more information, contact the District office: Phone 224-0523

Grady County Conservation District

828 Choctaw Avenue - Chickasha

(Working in Cooperation with the Natural Resource Conservation Service)

MARK YOUR CALENDAR

To See The Latest Technology In Land Application Equipment

GRADY COUNTY CONSERVATION DISTRICT Hosts

DAIRY/LAGOON DEMONSTRATION PUMP OUT

WHEN:	Thursday, July 13, 1995
	9:00 AM - 4:00 PM (Come &- Go)

- WHERE: Morgan Cattle Company Highway 81 South (2 miles south Intersection Hwy 81 &- Hwy 19) Chickasha, Oklahoma
- WHY: To provide education and information on the newest method of lagoon pump out and applying wastes for nutrient management.

For more info: Contact Grady Co. C.D. 405-224-0523

Lunch Provided by Knutson Irrigation Design 11:00 AM - 1:00 PM







Task 53, Dairy Waste Management May 6, 2003 Revision 0

MANURE MANAGEMENT



Waste Storage Pond

FUNCTIONS

- 1. Stores manure, rainwater, and flushwater for short periods (4 to 6 months).
- 2. Provides nutrient-rich slurry for fertilizing crops.

MAINTENANCE

- 1. Keep foreign material (dead animals, 2-by-4's, bottles, sewing machines) out of pond.
- 2. Keep embankments mowed and free of trees.
- 3. Spread slurry on crops to provide fertlizer.
- 4. Spread entire pond volume before the onset of winter.
- 5. Agitate and remove solids each time you spread slurry.
- 6. Enlarge pond when animal numbers increase.

FIFT FIFTFIFTFIFTFIFTFIFT

Irrigating Liquids Stored in a Feedlot Retention Basin

A feedlot retention basin is a collection pond that prevents stormwater from entering streams. Although feedlot runoff can pollute streams, it is more water than manure. Nutrient content of the liquid is very low.

Some recent samples show the following ranges...

TOTAL N:0.1 TO 0.2 LBS/1000 GAL

P_2O_5 :	0.2 to 0.3 lbs/1000 gal
K ₂ O :	0.8 to 1.0 lbs/1000 gal

<u>You still need to remove liquid to provide storage for the next storm.</u> With these low nutrient values it's best to provide irrigation water for a small area.

If you irrigate 6.0 inches of liquids, you will provide about:

25 lbs Total N, 40 lbs P₂O₅, and 150 lbs K₂O per acre.

but...

Most soils can only receive about 1/2 to 1 inch of liquid per irrigation without runoff.

so...

We need to break the 6-inch application up into *many irrigations over the growing season*. Actual irrigation depth will depend on soil conditions.

Applying Dairy Manure Slurries

<u>The fertilizer content of manure slurries is highly variable</u>. The greatest single factor is <u>solids content...</u>

Typical nument values for agriated Dany Storage Fonds.							
Solids Content	Total N	P_2O_5	K ₂ O				
%	lbs/1000 gal	lbs/1000 gal	lbs/1000 gal				
1	8	8	10				
2	12	10	10				
3	14	11	11				
4	16	12	11				
5	18	13	12				
6	20	14	12				

Typical nutrient values for agitated Dairy Storage Ponds.

Sample and test slurries with each application. Always agitate slurry storage <u>before</u> taking a sample!! Otherwise, you are only measuring the nutrient content of the liquid part of the slurry.

So, how much to apply?

Let's say the soil test tells us *P* is not excessive and the annual *N* requirement is 100 lbs/acre. Our slurry sample shows 3% solids, 14 lbs Total *N*, 11 lbs P_2O_5 , and 11 lbs K_2O per 1000 gallons:

 $\frac{100 \text{ lbs N} \times 1000 \text{ gallons} \times \text{Acre inch}}{\text{Acre year}} = \frac{0.3 \text{ inches}}{14 \text{ lbs N}} 27,000 \text{ gallons} \text{ year}$

If we apply 0.3 inches of slurry each year, we provide about:

100 lbs Total N, 90 lbs P₂O₅, and 90 lbs K₂O per acre

Most soils can accept a ¹/₂ inch application under most moisture conditions without runoff.

Irrigating Lagoon Liquids

<u>Results will come back from the lab in units of lbs per 1000 gallons.</u> Typically, lagoon liquids contain nutrients in the range:

Total N:	2.0	to 5.0 lbs/1000 gal
NH ₃ -N:	1.5	to 4.0 lbs/1000gal
P ₂ 0 ₅ :	0.5	to 3.0 lbs/1000 gal
K ₂ 0:	2.0	to 6.0 lbs/1000gal

About half of the Total-N is lost during application, so we sometimes talk of Plant Available Nitrogen or PA-N. For lagoon liquids, PA-N is in the range:

PA-N: 1.0 to 3.0 lbs/1000 gal

So, how much to apply?

Let's say the soil test tells us *P* is not excessive and the annual *N* requirement is 100 lbs/Acre. Our lagoon sample shows 4.0 lbs *N*, 2.0 lbs PA-N, 2.0 lbs P₂0₅, and 4.0 lbs K₂O per 1000 gallon.:

<u>100 lbs N</u>	х	<u>1000 gallons</u>	x	Acre inch	=	<u>1.9 inches</u>
Acre year		2.0 lbs N		27,000 gallons		year

if we apply 2.0 inches of lagoon liquids each year, we will provide about:

100 lbs PA-N, 100 lbs P₂0₅, and 200 lbs K₂0 per acre.

but....

Most soils can only receive about 1/2 to 1 inch of liquid per irrigation without runoff.

so...

We need to break the 2.0 inch application up into 2 or more irrigations over the growing season. Actual irrigation depth will depend on soil conditions.

Cleaning Sludge from Lagoons

You need to clean the sludge from a lagoon periodically to maintain the lagoon's treatment volume. The usual method is to agitate the sludge blanket and spread the mixed contents of the lagoon as a slurry.

Always agitate slurry before taking a sample!! Otherwise, you are only measuring the nutrient content of the liquid portion of the slurry.

The amount of solids stored in a lagoon increases as the lagoon gets older. Also, the sludge becomes richer in phosphorus as the lagoon matures.

So, how much to apply?

Let's say we are cleaning out a 20-year-old lagoon, A slurry sample shows these results:

Solids:	5 %
Total-N:	20 lbs/1000 gal
P ₂ 0 ₅ :	40 lbs/1000 gal
K ₂ 0:	8 lbs/1000 gal

Since the sample shows P₂0₅ greatly exceeds N, let's limit application to 200 lbs P₂0₅ per Acre.

<u>200 lbs P₂O5</u>	x	1000 gallons	x	Acre inch	=	0.18 inches		
Acre year		$40 \ lbs \ P_2O_5$		27,000 gallons		year		
-				-		-	27,000) gallons

If we apply 0.2 *inches of slurry*, we provide about:

110 lbs N, 220 lbs P₂0₅, and 43 lbs K₂0 per acre

Most soils can accept a ¹/₂ inch application under most moisture conditions without runoff.

Appendix B. Board of Director's special meeting.

Grady County conservation District

AGENDA

BOARD OF DIRECTOR'S SPECIAL MEETING

April 4, 1995

Place:	Grady County Agricultural Center
	828 Choctaw Ave - Chickasha Conference Room

Time 10:00 A.M.

ORDER OF BUSINESS

RE: Dairy Lagoon Pump-Out Program and Demonstration

1) Opening Remarks	Ralph Morgan Grady County C.D.
2) Introduction	Otis Bennett Cherokee Co. C.D.
3) Lagoon Nutrient Sampling	Dr. Mike Smolen Coop. Ext. Serv.
4) Record Keeping for Producers; Manure Value/Irrigation Distribution	Doug Hamilton Coop. Ext. Serv.
5) District Pumpout Operators Information Ledger	Otis Bennett
6) Fees for Services	Otis Bennett
7) Contract Labor/Liability Form	Otis Bennett
8) Adjourn to Demonstration Area	Ralph Morgan

Agenda posted on Thursday, March 30, 1995, at 10:00 AM at the front entrance of the District office. D. Surber, Program Coordinator.

MINUTES

BOARD OF DIRECTORS SPECIAL MEETING GRADY COUNTY CONSERVATION DISTRICT 828 Choctaw Avenue Chickasha, OK 73018

DATE: April 4, 1995	TIME: 10:00 A.M.
MEMBERS PRESENT:	Melvin Heath, Chairman Ralph Morgan, Vice-Chairman John Paxton, Sec-Treas. Rick Vickrey, Member Park Anderson, Member
OTHERS PRESENT:	Dee Surber, District Program coordinator Johnny Pelley, District Aide Eddie Rathbun, DC, NRCS Darrell Cheshier, CED, CFSA Mason Mungle, Exe. Director, OCC John Hassell, OCC Water Quality Otis Bennett, Cherokee Co. C.D. Jon Knutson, Knutson Irrigation Design George Stunkard, Wagoner Co. C.D. Mike Smolen, OSU - Coop. Ext. Serv. Doug Hamilton, OSU - Coop. Ext. Serv. Ron Justice, OSU - Coop. Ext. Serv. Mark Van Hyfte, Balzer Mfg. Mike Box, Grady County CD Kevin Shotts, NRCS Greg Kindell, NRCS
	Floyd Young, Wagoner Co. C.D.

The special meeting of the Grady County Conservation District Board of Directors was called to order by the Chairman, Melvin Heath, in compliance with the Oklahoma Open Meeting Act, Title 25 of the Oklahoma Statutes, Sections 301 and following, as amended. Notice of this meeting is on file with the County clerk. The agenda for this meeting was posted on March 30, 1995, at 10:00 AM at the front entrance of the District Office.

Opening remarks were made by Ralph Morgan, Vice-Chairman, Grady County C.D.

Mike Smolen, Water Quality Specialist, OSU, discussed the Record keeping book for producers, the rules and regulations.

Doug Hamilton, Waste Management Specialist, OSU, discussed lagoon nutrient sampling; ways to take samples, and distribution of waste with pressure using the gun. Grady County CD Minutes, Page 2 04/04/95

Otis Bennett, Cherokee County CD discussed the following:

forms for sampling/processing liquid manure; demonstrated sampling techniques; reviewed the ledger book; reviewed liability forms and contract labor; suggested fees and other charges for services provided by the Districts; and provided sampling bottles/boxes to the two Districts. Record books will be shipped to the Districts.

MR. MORGAN GAVE DIRECTIONS TO THE LAGOON DEMONSTRATION AREA AT MORGAN CATTLE COMPANY. MEETING ADJOURNED TO THE AREA.

Appendix C: Ernest Billen's Waste Utilization Plan

K₂0

ERNEST BILLEN ANIMAL WASTE MANAGEMENT PLAN JUNE 25, 1995

This waste plan was developed by Ernest Billen with technical assistance of the USDA, Natural Resources Conservation Service through the McClain County Conservation District. The dairy operation is located in the South half of Southeast Quarter of Section 3, Township 9 North, Range 4 West, McClain County, Oklahoma. This dairy operation milks 225 head of cows, average weight of 1200# in confinement for 91 days per year.

The present waste storage facility will be investigated by NRCS engineers and recommendations to redesign the structure to meet current standards will be developed. Upon completion of the appropriate measures the structure will meet the criteria in USDA, Natural Resources Conservation Service Technical Note 716.

A filter strip 50 feet wide, consisting of Bermudagrass will be installed along the water course running Northwest to Southeast through the operation to control animal waste. Filter strip will be fenced and managed to maintain no less than 3 inches of standing growth at all times.

Waste application will be made on cropland field adjacent to Mr. Billen's operation. The field is located in the Southwest quarter of section 3, T 9 N, R 4 W McClain County. Attached map indicates the soils rated for waste application. A written agreement to apply animal waste will be executed prior to pump out and a copy presented to the pump operator prior to application.

Application rates will initially be designed from average analysis gathered by Grady County Conservation District as they pumped out lagoons and storage ponds. The application schedule will be based on this analysis (1.

=	20.04/ 1000 G _E		
	P ₂ 0 ₅	=	20.0#/ 1000 Ge
	Nitrogen =		20.0#/1000 gallons of effluent (Ge)

ERNEST BILLEN WASTE MANAGEMENT PLAN PG 2 of 3

Waste facility will be agitated at the time of pumping. Samples will be taken at this time and actual data will be used for future applications. Soil tests will be taken in each field, where waste was applied, annually to monitor the Nitrogen and Phosphorus levels.

Using a maximum application rate of 300#/ac P₂0₅ will result in 300#/ac of Nitrogen being applied. To accomplish this an application rate of 15 thousands of gallons per acre is required. Applying .552 acre inches of the lagoon liquids to 47.2 acres is required to use the animal waste.

Care must be taken not to apply waste under any of the following situations:

- a. Soils with an apparent water table within 2 feet of the surface.
- b. Soils with less than 10 inches of depth to parent material.
- c. Areas within 50 feet of an intermittent stream (as designated in the NRCS Soil Survey).
- d. Areas within 100 feet of a perennial stream or a sensitive area such as a well or pond.
- e. Areas within 200 feet on an intermittent or perennial stream when applying to slopes that exceed 8%.
- f. When soil is frozen or snow covered (except where slope is less than 1 percent.
- g. The area is eroding at greater than the tolerance or "T" level of the soil from water erosion, or where there are active gullies.
- h. Soils that are frequently flooded.

i. Soils that are occasionally flooded. However, waste may be applied between June 20 and September 20 on soils classified as occasionally flooded. Manure may also be applied to soils classified as occasionally flooded between February 1 and April 20 if disposal area is established to cool season grasses that are at least 3 inches in height at the time of application.

ERNEST BILLEN WASTE MANAGEMENT PLAN PG 3 of 3

- j. Slopes greater than 15 %.
- k. Where there are rock fragments in the surface layer that are 3 to 10 inches in diameter and exceed 35% by volume, or > 10" diameter and exceed 15 % by volume.
- 1. Where there are stones and boulders (>10" diameter) which cover >3% of the surface, and the slope is >8%.

(1 Analysis is average of old lagoons and agreed upon with OSU Extension Agent Ron Justice.

ERNEST BILLEN DAIRY APPLICATION DOCUMENTATION

Completion July 26, 1995 Grady County Conservation District equipment Johnny Pelley operator

Waste applied to 15.8 acres at the rate of .56" /acre.

analysis of applied material:

19.6# N /1000 gal 15.8# P₂0₅ /1000 gal 12.8# K₂0 /1000 gal

.56"/ac (application rate) = 15.2053 /1000 gal/ac

Actual application as documented:

 $\begin{array}{ll} 15.2053 \ /1000 \ gal/ac(19.6 \# /1000 \ gal) = 298 \# & N/ac \\ 15.2053 \ /1000 \ gal/ac(15.8 \# /1000 \ gal) = 240.24 \# P_2 0_5 / ac \\ 15.2053 \ /1000 \ gal/ac(12.8 \# /1000 \ gal) = 194.63 \# K_2 0 / ac \\ \end{array}$

Maximum application rate for P_2O_5 incorporated is 400#/acre. Maximum application rate for P_2O_5 sprinkler is 300#/acre.

Since the applied P_20_5 did not exceed the maximum allowable this is considered a safe application of agricultural waste.

Ernest Billen Dairy Calculations

assume: 80 bushels of oats / acre 3000 # baled straw / acre

.2#N
.0#N

TOTAL /ACRE/YR = 97.2#N

P extracted /yr [grain] 2400#(.0034%P) = 8.2#P

Total /acre/yr = 13.0#P

 $13 \#P(2.288) = Total P_20_5/ac/yr = 29.74\#$

assume: analysis of Lagoon actual data of similar situation.

 $N = 20.0\# /100OG_e$ $P_20_5 = 20.0\# /100OG_e$ $K_20 = 20.0\# /100OG_e$

capacity of lagoon is 126092 cuft (943.1682 /1000G_e) application of 4.86 100OG_e will deliver 97.2# N per acre. This will require 194.1 acres to meet nutrient management requirements.

Application rate incorporated of $400\# P_20_5$ will require $20/1000G_e$ per acre which will require 47.2 acres to pump out the lagoon. Irrigation application rate of .737 acre inch/acre will deliver the $400\#P_20_5$ per acre.

Pump capacity of 1/2 acre inch/acre will result in 271.5 $\#P_2O_5$ being applied and will require 69.5 acres to completely empty the lagoon.

Appendix D: Richard Thomas' Waste Utilization Plan.

MORGAN CATTLE COMPANY

WASTE MANAGEMENT PLAN

SEPTEMBER 8, 1994

This waste management plan includes the production, handling and distribution of waste form a 1000 head of 500 pound beef steers in the feedlot located in the Northeast quarter of the Northeast quarter of section 29 T6N, R7W, Grady, Oklahoma.

It is assumed that 30 percent of the annual manure production reaches the lagoon, 50 percent as dry scrape and 20 percent utilized by the Bermudagrass produced in the confinement area. Total nutrients produced during the 121 day confinement period are:

 $\begin{array}{ll} N & = 18150 \text{ pounds} \\ P_2 0_5 & = 13843 \text{ pounds} \\ K_2 0 & = 14581 \text{ pounds} \end{array}$

The feeding unit consists of a rectangular feed lot of 18.5 acres. A waste treatment lagoon with 11.4 acre feet of working capacity. Dewatering of the lagoon is by irrigation system on Bermudagrass and rye used for forage production. Dry scraped manure is also spread on Bdrmudagrass which is overseeded to rye and cropland seeded to winter wheat.

Nutrient utilization in the confinement area is $2769\# P_20_5/yr$. This is estimated to be $150\# P_20_5/ac/yr$.

Solid wastes will be dry scraped, staked and spread yearly. The waste will be spread uniformly on cropland and Bermudagrass pasture. Waste spread on cropland will be incorporated into the soil within 7 days. Cropland will be used for wheat production. Bermudagrass will also be used for additional production. An estimated 253.4 tons will be generated each year. Each ton of dry scrape at application is estimated to contain 16.1# of N, 19.1# P₂0₅. All identified soils will accept 4000/acre/yr Of P₂0₅ when incorporated. When application is not incorporated 200#/ac/yr is the maximum application. An estimated rate of approximately 21 tons/ac/yr at 400# P₂0₅/ac or 10.5 tons/ac/yr at 200# P₂0₅/ac. Minimum of cropland with manure application incorporated is 12 acres/yr or 24 acres/yr of pasture.

Liquids from the lagoon will be used to irrigate Bermudagrass. It is estimated that the liquid waste generated during confinement contains, at application, 5445# of nitrogen, 1815# of phosphorus as 4153# P₂0₅. All designated soils will accept a maximum of 300# of P₂0₅ when applied by irrigation. Current nutrient tests of soil, manure And waste water will take precedence over estimates shown in this plan. 13.8 acres of Bermudagrass pasture is the minimum acres required for disposal of the annual production of phosphorus.

MORGAN CATTLE CO. WASTE MANAGEMENT PLAN PG 2 OF 2
The lagoon has a total capacity of 13.5 acre feet at the emergency spillway. The storage requirements for a 25 year 24 hour storm is 11.4 acre feet. A marker will be maintained at the elevation necessary to store a 25 year 24 hour storm which is an elevation 5.5 feet below the emergency spillway. The lagoon will be maintained at or below this elevation.

The lagoon is designed and constructed in accordance with the USDA, Soil Conservation service Technical Note 716.

All waste applications will be made when danger of runoff is at a minimum. No waste will be applied to:

Areas within 100 feet from a perennial stream

Areas within 50 feet from an intermittent stream or a sensitive area such as a pond or well.

Areas within 200 feet on an intermittent or perennial stream when applying to slopes that exceed

8%.

Morgan Cattle Co. Chickasha, OK

pg 1 of 2

1000 HD 500# Beef cattle Confined 5 Mo. (121 days)

Assume:

- 50% Annual Excreted Material to Dry stack (dry stack stored 365 days)
- 30% Annual Excreted Material to Lagoon
- 20% Annual Excreted Material consumed by Bermudagrass in confinement area

Table 4-8 AWMFH (450-750#)

1000# = 1 AU

N = .3#/day/1000# P = .1#/day/1000# K = .2#/day/1000#

Annual Excretion #/yr

N = 500/1000#.AUs	(.3#/d/AU)(121 days)	=	18150
P = 500/1000# AUs	(.l#/d/AU)(121 days)	=	6050
$P_2 0_5 = P (2.288)$		=	13843
K = 500/1000# AUs	(.2#/d/AU)(121 days)	=	12100
$K_20 = K (1.205)$		=	14581

Annual generation to lagoon:

N = 18150 total/yr (.3)	=	5445
$P_2 0_5 = 13843 \text{ total/yr}$ (.3)	=	4153

maximum application 300# P₂0₅/ac/yr requires 13.8 acs/yr when applied by irrigation system.

Annual consumption by Bermudagrass in lots:

N = 18150 total/yr (.2)	=	3630
$P_2 0_5 = 13843 \text{ total/yr} (.2)$	=	2769

(P limiting nutrient) 2769#/yr / 18.5 acs is approximately 150#/ac/yr. N is 3630#/yr / 18.5 acs is approximately 196#/yr.

Annual generation to dry stack:

Ν	= 18150 total/yr (.5)	=	9075
$P_2 0_5$	= 13843 total/yr (.5)	=	6922

Morgan Cattle Co.

pg 2 of 2

= 4085

Stored (spread once per year) Table - 1

 $\begin{array}{ll} N &= 9075 \ (.5) &= 4538 \\ P_2 0_5 &= 6922 \ (.7) &= 4846 \end{array}$

Application loss of 365 day stored dry stack: Table 3 (incorporated in 7 days)

N = 4538 (.9) $P_2 0_5 = 4846 (no loss) = 4846$

Annual tonnage of dry scrape material: (total solids vs + fs) Figure 1 % moisture annual (365 days) = 55%

Table 4-8 AWMFH

Total solid = 7.54#/day/AU % moisture = .55 % wb (figure 1) = .45

 $\frac{7.54}{.45}$ = 16.57#/d/AU

500 Aus (16.75#/d/AU)(121 days)(.5 to dry stack) =

 $\frac{506688\#/yr}{2000\#/ton} = 253.4 \text{ tons/yr}$

N = 4085#/YR = 16.1# N/TON

253.4 t/yr

 $P_2 0_5 = \frac{4846 \#/yr}{253.4 t/yr} = 19.1 \# P_2 0_5/ton$

Maximum incorporated application $400\#P_20_5/ac/yr$ required approximately 21 ton/ac/yr. Maximum surface (unincorporated) application is $200\#P_20_5/ac/yr$ requires 10.5 tons/ac/yr.

Ralph Morgan - Pump-out Demonstration

July 13, 1995

Quart cans were placed 10 feet apart perpendicular to the line of travel of the traveling "Big Gun" Sprinkler. Two can groups were placed. The first initiated 10 right of the line of travel and extended 140 feet. The second extended 50 feet either side of the line of travel. Contents of each can was measured after the sprinkler had passed the location of the line of cans. Line one measured:

Center line

		Can 1	- 9/16"
Can	2	- 9/16"	
Can	3	- 9/16"-	
Can	4	- 3/4"	
Can	5	- 9/16"	
Can	6	- 9/16"	
Can	7	- 3/4"	
Can	8	- 3/4"	
Can	9	- 11/16"	
Can	10	- 9/16"	
Can	11	- 1/2"	
Can	12	- 3/16"	
Can	13	- 1/4"	
		Can 14	- 1/8"

Line Two

Left of Center

Can 1	-	9/16"
Can 2	-	9/16"
Can 3	-	3/4"
Can 4	-	3/4"
Can 5	-	9/16"

Center line

Can 6	-	9/16"
Can 7	-	9/16"
Can 8	-	9/16"
Can 8 Can 9	-	9/16'' 3/4"

Effective application was 1100' X 200' = 22000 5.05 acres Average application rate = .63125 inches/ac With the analysis of .1 #N/1000gal = 17.14#N/ac

Appendix E. Richardson Farms Animal Waste Management Plan.

RICHARDSON FARMS ANIMAL WASTE MANAGEMENT PLAN

APRIL 14,1995

This waste plan was developed by David Richardson with technical assistance of the USDA, Natural Resources Conservation Service through the Grady County Conservation District. The operation is located in the Southeast Quarter of Section 4, Township 8 North, Range 8 West, Grady County, Oklahoma. This swine operation with confinement for 365 days per year.

The waste is confined in a Waste Storage Structure designed for 365 day storage. Waste will be applied to Bermudagrass by means of a hose reel irrigation system with traveling gun.

Application rates will initially be designed from average analysis provided by Ron Justice OSU Extension Service. The application schedule will be based on this analysis.

Nitrogen = 14.75 # / 1000 gallons of effluent (G_e) P₂0₅ = 10.85 # / 1000 G_e K₂0 = 10.50 # / 1000 G_e

Waste facility will be agitated at the time of pumping. Samples will be taken at this time and actual data will be used for future applications.

Target production will be 5 ton of Bermudagrass per acre per year. An application rate of 17.6 thousands of gallons per acre. Requiring 31.2 acres each pumpout. This will require 260 #/ac of Nitrogen and will result in 191 #/ac P₂0₅ and 185 #/ac K₂0 being applied.

RICHARDSON FARMS WASTE MANAGEMENT PLAN P 2

Care must be taken not to apply waste under any of the following situations:

- a. Soils with an apparent water table within 2 feet of the surface.
- b. Soils with less than 10 inches of depth to parent material.
- c. Areas within 50 feet of an intermittent stream (as designated in the NRCS Soil Survey).
- d. Areas within 100 feet of a perennial stream or a sensitive area such as a well or pond.
- e. Areas within 200 feet on an intermittent or perennial stream when applying to slopes that exceed 8%.
- f. when soil is frozen or snow covered (except where slope is less than 1 percent).
- g. The area is eroding at greater than the tolerance or 'IT" level of the soil from water erosion, or where there are active gullies.
- h. Soils that are frequently flooded.
- i. Soils that are occasionally flooded. However, waste may be applied between June 20 and September 20 on soils classified as occasionally flooded. Manure may also be applied to soils classified as occasionally flooded between February 1 and April 20 if disposal area is established to cool season grasses that are at least 3 inches in height at the time of application.
- **j.** Slopes greater than 15 %.
- k. Where there are rock fragments in the surface layer that are 3 to 10 inches in diameter and exceed 35% by volume, or > 10" diameter and exceed 15 % by volume.
- 1. Where there are stones and boulders (>10" diameter) which cover >3% of the surface, and the slope is >8%.

150 Sows Ave. 600lbs.(120 pregnant 30 lactating) 1500 pigs (300 > 40lbs. 1200 < 40lbs. 125# ave.)

Assume: Total confinement.

AWMFH Table 4-11 Swine waste characterization-as excreted

Sow - Gestation -	9.20 lb/d/1000#
Lactation -	10.00 lb/d/1000#
Nursing pig -	10.60 lb/d/1000#
Grower pig -	6.34 lb/d/1000#

Annual Excretion #/yr

Ν	18/1000#	LPs	(.47#/d/1000#)(365 days)	=	3087.9
	72/1000#	GPs	(.19#/d/1000#)(365 days)	=	4993.2
	6/1000#	NPs	(.60#/d/1000#)(365 days)	=	1314.0
	150/1000#	Ps	(.42#/d/1000#)(365 days)	=	22995.0
			TOTAL	=	32390.1
Р	18/1000#	LPs	(.15#/d/1000#)(365 days)	=	985.5
	72/1000#	GPs	(.063#/d/1000#)(365 days)	=	1655.7
	6/1000#	NPs	(.25#/d/1000#)(365 days)	=	547.5
	150/1000#	Ps	(.16#/d/1000#)(365 days)	=	8760.0
			TOTAL	=	11948.7

$$P_2 0_5 = P (2.288)$$

= 27338

Annual generation to lagoon: Table 1

N = **32390.1 Total/yr (.25)**= **8097.5** $P_2O_5 = 11948.7 \text{ Total/yr (.50)} = 5974.4$

maximum application 200# P₂0₅/ac/yr requires 29.9 acs/yr when applied by irrigation system.

Annual consumption by Bermuda grass (5 ton target yield)

N =260#/ac/yr (8097.5 #) = 31.2 acres

 P_2O_5 (31.2 acres) = 191.5#/ ac/ yr

RICHARDSON FARMS ANIMAL WASTE APPLICATION

APPLICATION COMPLETED MAY 5,1995

According to the pump log 22.5 hours was required to apply the waste to 38 acres of suitable land.

assume: 305,325 gallons were pumped

(NEED DOCUMENTATION OF ACTUAL APPLICATION, RECORD OF CAN CATCH, MAP OF AREA APPLIED, DATES AND MAYBE WEATHER CONDITIONS.)

therefore: $\frac{305325\text{gal}}{38} = 8035 \text{ gal/ac}$

liquid analysis = 18.5 Total N (#/1000 gallons) $22.4 P_2 0_5$ $7.7 K_2 0$

18.5 #N (8.035 1000GAL)	=	148.7 #	≠N/AC
$22.4 \# P_2 0_5 (8.035 \ 1000 \text{GAL})$	=	179.98	P_20_5/AC
7.7 #K ₂ 0 (8.035 1000GAL)	=	61.87	K ₂ 0

Attached map documents the area that the waste was applied.

Johnny Pelley June 20, 1995 Engineering Aid Grady County Conservation District



RICHARDSON FARMS ANIMAL WASTE APPLICA TION

APPLICATION COMPLETED MAY 5,1995

According to the pump log 22.5 hours were required to apply the waste to 38 acres of suitable land.

assume: 305,325 gallons were pumped

there for: $\frac{305325 \text{ gal}}{38 \text{ acres}} = 8035 \text{ gal/ac}$

liquid analysis = 18.5 Total N (#/1000 gallons) 22.4 P₂0₅ 7.7 K₂0

 $\begin{array}{ll} 18.5 \ \#\text{N} \ (8.035 \ 1000 \text{GAL}) &= 148.7 \ \# \ \text{N/AC} \\ 22.4 \ \#\text{P}_20_5 \ (8.035 \ 1000 \text{GAL}) &= 179.98 \ \# \ \text{P}_20_5/\text{AC} \\ 7.7 \ \#\text{K}_20 \ (8.035 \ 1000 \text{GAL}) &= 61.87 \ \# \ \text{K}_20 \end{array}$

COST <u>\$2607</u> = \$68.60/AC

38 ACRES

BULK = 595# 25-30-10 \$ 00.115/#APPLIED

COMMERCIAL = 700# 22-27-9 \$ 00.119/#APPLIED (APPLICATION COST \$00.0035/AC [materials] @ \$2.50/AC [applying])

Task 53, Dairy Waste Management
May 6, 2003
Revision 0

Gi 828 Choctaw Av	rady County Conservati venue — Chickasha, OK 73018 —	on District Phone 224-0523 or 224-2172	
STATE	MENT	May 15	19_95
Rt. 1 Box 40, Pocasset, OK 7	3079		
	TERMS: CASH		
1. Setup/Take down Fee			250.0
Mileage (per equipment) 8 tr	ips: @ 48 mi + 384 mi	. @ .25¢	96.0
2. Agitator: 32.5 hrs @ 20.00/)ır		650.0
3. Pump & Reel: 22.4 Hrs 8	hrs @ \$75.00/hr		600.0
14.4	Hrs @ \$65.00/hr		936.0
5. Move equipment to another lo	cation: 3 moves 0 \$20	0.00/move	60.0
. Sampling Procedure			15.0
		Te	2.607.0
		COMBNIMENT	
~ ~ ~	Ibs/1000 gal on "as	-is" basis	
Total N 18.5	Ibs/1000 gal on "as	-is" basis	
Total N 18.5	Ibs/1000 gal on *as	-is" basis	
Total N 18.5	Ibs/1000 gal on "as	-is" basis	
Total N <u>18.5</u> P2O5 <u>22.4</u> K20 <u>7.7</u> Total Ca <u>13.0</u>	Ibs/1000 gal on "as	-is" basis	

Appendix F. Example Register Report from the Grady County Conservation District.

Register Report

4/l/95 Through 5/28/96

5/28/96 Pump Out Fund

Date	Num	Description	Memo	Category	Clr	Amount
	BALANCE	3/31/95				0.00
2/15/96		Cash (Reimbursement		(CK # 1057)		256.87
3/5/96		Transfer to CD		(CK # 1057)		-10,000.00
5/15/95	1010	Stephens Oil Co.		Auto: Fuel		-97.63
6/21/95	1022	Stephens Oil Co.		Auto: Fuel		-181.22
8/22/95	1035	Stephens Oil Co.		Auto: Fuel		-136.04
9/22/95	1037	Stephens Oil Co.		Auto: Fuel		-15.00
11/22/	1047	Stephens Oil Co.		Auto: Fuel		-78.45
12/13/	1048	Stephens Oil Co.		Auto: Fuel		-229.72
1/18/96	1054	Stephens Oil Co.		Auto: Fuel		-153.17
2/15/96	1060	Stephens Oil Co.		Auto: Fuel		-202.75
3/14/96	1069	Stephens Oil Co.		Auto: Fuel		-463.31
4/10/96	1080	Stephens Off Co.		Auto: Fuel		-133./1
4/10/90	10/9	South 81 Fuel Stop		Auto: Fuel		-526.74
5/22/90	1092	Stanhans Oil Co		Auto: Fuel		-165.24
9/22/90	1039	Dolese Bros Co		Building		-1.074.38
5/15/95	1009	Craig P C		Computer		-1,620,00
12/15/	1009	Interest Accrued		December		-1,020.00
7/11/95	1028	Wonder Bread		Demo		-8.91
7/11/95	1020	Wal-Mart		Demo		-28 49
7/11/95	1026	Cables		Demo		-97.20
7/11/95	1029	Lightners		Demo		-30.24
7/12/95	1030	Dunns Food Center		Demo		-63.49
4/1 3/95	1003	Ag. Security Insurance		Insurance		-817.00
9/26/95	1040	DSC Risk Mgt.		Insurance		-60.00
10/26/	1043	Farm Bureau		Insurance		-915.00
4/15/96	1084	Ag. Security Insurance		Insurance		-747.00
1/22/96		Interest Accrued		January		21.03
4/25/95	1004	University of Arkansas		Lab fee		-10.00
5/4/95	1007	University of Arkansas		Lab fee		-10.00
8/17/95		Morgan Cattle Co.		Lab fee		-16.00
6/13/95	1021	University of Arkansas		Lab fees		-20.00
9/22/95	1038	University of Arkansas		Lab fees		-20.00
11/20/	1045	University of Arkansas		Lab fees		-20.00
1/16/96	1051	University of Arkansas		Lab fees		-20.00
2/9/96	1058	University of Arkansas		Lab fees		-10.00
2/28/96	1062	University of Arkansas		Lab fees		-10.00
3/ //96	1064	University of Arkansas		Lab fees		-10.00
3/19/90	1070	University of Arkansas		Lab fees		-20.00
5/20/90	1072	University of Arkansas		Lab fees		-10.00
4/12/90 5/10/06	1082	University of Arkansas		Lab fees		-10.00
5/24/95	1018	Chickasha Industrial		Lab fees		-10.00
3/1//96	1010	DADS Wholesale		lumber		-10.60
4/26/95	1005	Taking Care of Business		Mailing fee		-5.41
5/4/95	1005	Taking Care of Business		Mailing fee		-5.41
5/16/95	1012	Taking Care of Business		Mailing fee		-5.41
5/18/95	1012	Taking Care of Business		Mailing fee		-5.41
7/24/95	1032	Taking Care of Business		Mailing fee		-10.82
11/20/	1046	Taking Care of Business		Mailing fee		-10.82
1/16/96	1052	Taking Care of Business		Mailing fee		-10.82
2/9/96	1059	Taking Care of Business		Mailing fee		-5.41
2/28/96	1063	Taking Care of Business		Mailing fee		-5.51
3/7/96	1065	Taking Care of Business		Mailing fee		-5.51
3/19/96	1071	Taking Care of Business		Mailing fee		-11.02
3/21/96	1074	Taking Care of Business		Mailing fee		-5.51

Register Report 4/l/95 Through 5/28/96

Page 2

PumpOut Fund

5/28/96

Date	Num	Description	Memo	Category	Clr	Amount
5/10/96	1088	Taking Care of Business		Mailing fee		-5.51
5/17/96	1089	Jakes Rib		Meeting Exp.		-74.03
4/13/95	1001	Grady County CD		Misc.		44.10
5/24/95	1016	Taylor and Son Pipe		Misc.		-10.80
5/24/95	1014	Brandt's		Misc.		-29.48
6/26/95	1023	Brandt's		Misc.		-7.39
7/21/95	1031	Brandt's		Misc.		41.94
8/22/95	1034	Brandt's		Misc.		-32.15
10/26/	1044	Creative Image		Misc.		-19.44
1/2/96	1050	Taylor and Son Pipe		Misc		-7.20
5/1 5/95	1011	Chickasha Ford New		Misc: Equipment		-64.89
5/24/95	1020	Standridge Equip. Co.		Misc: Equipment		-28.94
5/24/95	1019	Lemans Mfg		Misc: Equipment		-205.00
5/24/95	1017	Knutson Irrigation		Misc: Equipment		-54.57
6/26/95	1024	Knutson Irrigation		Misc: Equipment		-239.92
9/11/95	1036	l,emans Mfg.		Misc: Equipment		-1,065.00
9/26/95		St. of Oklahoma		Misc: Equipment		1,000.00
10/25/	1041	Brandt's		Misc: Equipment		-261.93
1/2/96	1049	l,emans Mfg.		Misc: Equipment		-50.00
1/18/96	1055	Knutson Irrigation		Misc: Equipment		-37.56
1/18/96	1053	Brandt's		Misc: Equipment		48.73
2/22/96	1061	Brandt's		Misc: Equipment		-9.84
3/14/96	1066	Chickasha Ford New		Misc: Equipment		-9.77
4/10/96	1081	Brandt's		Misc: Equipment		-81.94
5/22/96	1090	Brandt's		Misc: Equipment		-6.68
4/10/96	1078	Chickasha Ford New		Misc: Filter/oil		-7.47
4/10/96	1077	Wal-Mart		Misc: Photo		-5.35
11/22/		Interest Accrued		November		19.90
10/26/		Interest Accrued		October		17.68
4/13/95	1002	Wal-Mart		Office		49.99
5/1/95	1006	Ann's Quick Print		Office		46.75
5/24/95	1015	Standley Corp		Office		-11.11
4/8/96	10/5	Grady County CD		Phone		-168.8/
6/30/95	1025	Postmaster		Postage		-64.00
5/16/95		D Dishandary		PumpOut Service		1,/4/.50
0/30/95		D. Kichardson		PumpOut Service		2,607.00
//11/95		P. Brown Dillong Doimy		PumpOut Service		1,529.00
9/20/95		Dillong Doing		PumpOut Service		1,520.95
11/22/		Ninnalsah Bural Watar		PumpOut Service		1 720 40
1/2/15/		D Jackson		PumpOut Service		500.00
1/2/90		D. Jackson P. Morgon		PumpOut Service		2 850 65
2/15/96		Frnest Billens		PumpOut Service		2,859.05
2/15/96		Council Holt		PumpOut Service		1 977 20
2/13/96		Frnest Billens		PumpOut Service		250.00
2/21/96		McNeff Dairy		PumpOut Service		3 046 10
2/29/96		Andy Jackon		PumpOut Service		500.00
3/21/96		Steve Pone		PumpOut Service		2 173 50
4/8/96		P Weherenberg		PumpOut Service		898 50
4/23/96		Reherman Dairy		PumpOut Service		5 002 00
4/30/96		Wegener		PumpOut Service		2,267,30
5/6/96		Kadavy		PumpOut Service		1 731 00
8/17/95	1033	J. Pelly		Reimbursement		-8.75
10/26/	1042	J. Pellev		Reimbursement		-6.94
3/20/96	1073	Johnny Pelley		Reimbursement		-80.00
1/22/96	1056	Novotniy's Auto Start		Repairs		42-95
9/22/95	-	Interest Accrued		September		20.67
5/6/96	1086	Southwestern Bell		Service		-59.00
7/21/95		Knutson Irrigation		Sponsorship		200.00
		C C		1 1		

Register Report

Task 53, Dairy Waste Management May 6, 2003 Revision 0

4/1/95 Through 5/28/96

Page 3

:]	5/28/96 PurnpOut	Fund		11190 1110ugi 0/20/90		Page 3
Date	Num	Description	Memo	Category	Clr	Amount
4/10/96 2/5/96 4/-30/96 4/13/95 5/24/95 5/24/95 5/24/95 6/13/95 7/11/95 7/11/95 7/24/95	1076 1057 1085	Livingston Machine Johnny Pellev Chickasha Ford Opening Balance Interest Accrued Check Charge Interest Accrued Interest Accrued		Transport Serv. 'I'ravel: Holt 'I'ruck Repair [PumpOut Fund]	R	-166-00 400.00 -53.96 7,063.57 3.87 -39.75 14.12 12.10 0.00 0.00 12.02
7/24/95 8/22/95 2/22/96 3/21/96 4/23/96 5/22/96		Interest Accrued Interest Accrued Interest Accrued Interest Accrued Interest Accrued Interest Accrued				13.92 18.32 29-12 29.87 19.05 30.29
		TOTAL 4/1/95 - 5/2	28/96			17,658.47
		BALANCE 5/28/9	6			17,658.47
		TOTAL TOTAL NET TO	INFLOWS OUTFLOWS TAL			39,968.81 -22,310.34 17,658,47
		CD (\$10,000.00) NET TOTAL:				27,658.47
		Accounts Reco	eivable:			
		Billen Jackson OSU Anim Lorenz Reherman Total Due:	nal Science	1,000. 581. 1,320. 2,838. 256. \$5,997.	00 80 70 00 80 30	

Appendix G. Financial Report from the Wagoner County Conservation District.

Wagoner County Directors George Stunkard **Conservation District** Coweta Kenneth Replogie Coweta Office of Directors J.W. Edwards 1312 S.W. 3rd Wagoner Wagoner, OK 74467-5518 Phone (918) 485-4010 Sherd Parker Porter Floyd Young Wagoner Pumpout Report 7/1/1995 through 6/30/1999 INCOME : \$ 28,417.73 Pumpout Services 12 12,569.50 * TOTAL ESTIMATED EXPENSES: *This figure includes: Truck and Equipment Maintenance, Parts and Labor, Insurance, Fuel, Sample Testing, Postage All salaries of the Equipment Manager are reimbursed by the Oklahoma Conservation Commission.

HOW MANY BY YEAR

1995-96 (3)	Rick Clovis and Jack Roach Demonstration and Dick Hardin
1996-97 (7)	Blake Littlejohn Greg Bedford Jim Eller Darryl Guffey John Hamilton Mike Johnson Bradford/Kindle
1997-98	
(4)	David Boyer Jr. New Jack Roach Dick Hardin
1998-99	
(9)	Dick Hardin John Parris Jack Roach Curt Stutzman Jr. New Dick Hardin Randy Vaughn Northeastern Oklahoma State University - Miami Bob King

DAIRY LAGOON INCOME AND EXPENSES

<u>1995-1996</u>

Income:	\$ 5,728.26
Expenses:	\$ 2,548.46
Labor: Reim	bursed by Oklahoma Conservation Commission

<u>1996-1997</u>

<u>1997-1998</u>

<u>1998-1999</u>

Income:	\$ 6,149.12
Expenses:	\$ 4,347.49
Labor: Rein	nbursed by Oklahoma Conservation Commission
Income:	\$ 8,677.61
Expenses:	\$ 2,828.22
Labor: Rein	nbursed by Oklahoma Conservation Commission
Income	\$ 7,862.74
Expenses	\$ 2,845.33

Labor: Reimbursed by Oklahoma Conservation Commission

Income 1995-96

Rick Clovis	\$ 1,715.00
Jack Roach	3,439.00
OCC	534.26
Steve Butler	40.00

\$ 5,728.26

Expenses 1995-96

Testing			\$10.00
Welding			12.50
Small Engi	ne Sho	p	6.10
Advertising	, Job V	acancy	31.20
"	"	"	49.00
"	"	"	79.80
"	"	"	28.00
Testing			10.00
Testing			10.00
Testing			10.00
Pump			534.26
Wheeler Metals			5.72
Water			4.00
Wagoner Lumber			6.49
Lee's Welding			10.00
Knutson Irrigation			92.53
Sid's			12.50
Roger's Plumbing			6.10
Wagoner Lumber			5.22
Lee's Welding			25.00
Insurance			855.00
Fuel			745.04
Total			\$ 2,548.46

Income 1996-97

OCC	\$353.29
Dick Hardin	570.00
Littlejohn	1,190.89
Langley	684.80
Roberts	55.00
Roberts	90.00
Jones	240.00
Bedford	1,000.34
Hamilton	405.60
Guffey	369.20
Hamilton	80.00
Butler	30.00
Eller	1,000.00
Hamilton	80.00
Total	\$6,149.12

Expenses 1996-97

Testing	\$10.00
Demonstration	325.80
Wal-Mart	27.49
Knutson Irrigation	33.65
Knutson Irrigation	78.97
Wal-Mart	14.46
Wal-Mart	15.40
'Testing	10.00
UPS	4.31
Testing	10.00
UPS	4.31
Auto Parts	7.67

Expenses 1996-97

Knutson Irrigation	\$22.12
Car Wash	10.00
Welding	10.00
Per Diem	175.00
Per Diem	22.50
Per Diem	22.50
Testing	10.00
Welding	10.00
Pike Pass	40.00
Per Diem	90.00
Bedford (Reimburse for Dairy Pumpout)	1,000.34
Auto Parts	13.32
Welding	20.00
Atwoods	189.00
Sid's	115.75
Testing	10.00
Knutson Irrigation	247.49
Insurance	855.00
Fuel	942.41

Total

\$ 4,347.49

Income 1997-98

Jr. New	\$ 1,259.70
David Boyer	870.40
Bradford/Kindle	1,000.00
Mike Johnson	1,397.75
Jim Eller	287.47
John Hamilton	80.00
Oklahoma Conservation Commission	123.50
Oklahoma Conservation Commission	189.00
Jim Eller	287.47
John Hamilton	80.00
Bradford/Kindle	246.73
Jim Eller	287.47
John Hamilton	80.00
Bradford/Kindle	246.73
Jim Eller	287.47
Bradford/Kindle	246.73
Jim Eller	287.47
Smith	38.00
Bradford/Kindle	246.73
John Hamilton	130.00
Bradford/Kindle	246.73
Larry Hall	24.00
Riley	40.00
Larry Hall	24.00
David Boyer	136.06
Bradford/Kindle	246.73
Total	\$ 8,677.61
Expenses 1997-98	
Allied Bearings	\$131.42
Testing	10.00
Knutson Irrigation	53.16
Welding	115.00
Wagoner Lumber	1.33

 William's
 4.00

 Sid's
 15.24

 Turnpike Fees
 21.00

 Wagoner Lumber
 10.49

 Express
 25.25

 Expenses 1997-98
 25.25

O'Reileys	8.19
Knutson Irrigation	350.25
Knutson Irrigation	10.16
Sid's	1.68
Knutson Irrigation	142.06
Pike Pass	40.00
Welding	85.00
Tire (Flat)	6.00
Wagoner Lumber	42.48
Testing	10.00
Insurance	855.00
Testing	10.00
Testing	10.00
Rogers Plumbing	1.47
O'Reileys	1.49
Fuel	867.55
Total	\$ 2,828.22

Income 1998-99

Boyer Dairy	\$272.12
Ronnie Smith	66.00
Ab Nicholas	540.00
David Boyer Dairy	136.06
David Conley	36.00
David Boyer Dairy	272.16
Jack Roach	1,358.50
Larry Hall	78.00
Dick Hardin	2,155.00
Ronnie Smith	60.00
Jack Roach	286.16
John Paris	1,003.80
Jack Roach	574.34
Willerton Dairy	48.00
Curt Stutztnan	976.60

\$7,862.74

Expenses 1998-99

Allied	\$28.93
OSU Extension	10.00
Boyd Welding	40.00
O'Reilly Auto Parts	2.99
Wal-Mart	2.07
Sid's Farm Supply	7.66
University of Arkansas - Testing	10.00
Boyd Welding	120.00
Knutson Irrigation	21.50
University of Arkansas - Testing	10.00
Postage	4.88
Wal-Mart	10.96
Sid's Farm Supply	100.00
O'Reilly's Auto Part	27.71
Boyd Welding	75.00
Knutson Irrigation	18.61
University of Arkansas - Testing	10.00
O'Reilly Auto Parts	.99
Boyd Welding	132.00
Roger's Hardware	9.84
Knutson Irrigation	74.25

William's	45.50
B&J Welding	35.00
University of Arkansas - Testing	84.87
Ag Security Insurance	855.00
Insurance	262.00
B&J Welding	40.00
University of Arkansas - Testing	10.00
Boyd Welding	20.00
Loftin Trailers	5.00
Wal-Mart	6.97
Fuel	763.60

\$2,845.33

Income 1999-2000

Jr. New	\$1,694.60
Ronnie Smith	30.00
Hardin Forms	2,000.00
Randy Vaughn	934.20
NEO (College) Miami	3,365.00
Larry Hall	292.00
Bob King	1,345.90
Detherage Dairy	306.92
Chris Piazza	180.00
	\$ 10,148.52

Expenses 1999-2000

Knutson Irrigation	\$28.48
Oklahoma Turnpike Authority - Pike Pass	40.00
University of Arkansas - Testing	60.00
O'Reilly Auto Parts	5.79
Small Engines	12.99
B. J. Welding	5.00
Wal-Mart - Gas Jug	6.36
O'Reilly Auto POU - Oil Filter	8.29
Boyd Welding	40.00
O'Reilly Auto Parts - Bearings	4.92
Sears	81.46
Knutson Irrigation	64.90
Sid's Farm Supply	117.20
Knutson Irrigation	33.96
Boyd Welding	60.00
Wheeler Metals	150.00
Insurance	855.00
Fuel	1,721.76

\$3,295.91