STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of:	)	
PROPOSED AMENDMENT TO 20.60.2 NMAC (Dairy Rule)	)	**No. WQCC 12-09(R)**

NOTICE OF INTENT TO PRESENT TECHNICAL TESTIMONY ON BEHALF OF THE DAIRY INDUSTRY GROUP FOR A CLEAN ENVIRONMENT

The Dairy Industry Group for a Clean Environment (hereinafter, "DIGCE") hereby submits this Notice of Intent to Present Technical Testimony on behalf DIGCE.

1. **Identify the person for whom the witness(es) will testify:**

   The witnesses will testify for DIGCE and its members.

2. **Identify each technical witness the person intends to present and state the qualifications of that witness including a description of their educational and work background:**

   a. Lonnie Ray Burke is a technical witness who will testify regarding backflow prevention devices specified by the dairy rules, particularly reduced pressure principle devices. His qualifications, education and work background are included in his written testimony attached;

   b. Loney Ashcraft is a technical witness who will testify regarding nutrient management requirements, backflow prevention requirements, and requirements for calibration of flow meters. His qualifications, education and work background are included in his written testimony attached;

   c. Walter Bradley is a non-technical witness who will testify regarding his relationship with and nature of DIGCE, introductory remarks, and to respond to any questions; and

   d. Eric Palla is a non-technical witness who will testify regarding his relationship with and nature of DIGCE, introductory remarks, and to respond to any questions.

3. **Summarize, or include a copy of, the direct testimony each technical witness and state the anticipated duration of the testimony of that witness:**

Copies of each technical witness' direct testimony is attached. Each technical witness may provide additional testimony at the hearing in response to direct testimony presented by any other party or as rebuttal testimony. The anticipated duration of Mr. Burke's testimony is one-half hour and the anticipated duration of Mr. Ashcraft's testimony is one hour or longer depending upon the duration of cross-examination and any response or rebuttal testimony.

4. Include the text of any recommended modifications to the proposed regulatory change:

See *Exhibit Burke-1* and *Exhibit Ashcraft-1*.

5. Identify and attach all exhibits to be offered by the person:

EXHIBIT #	DESCRIPTION
EXHIBIT BURKE-1	Proposed Amendments to Subsection M of Section 20.6.6.21 NMAC
EXHIBIT BURKE-2	Breakdown of a reduced pressure principle backflow (RP) assembly
EXHIBIT BURKE-3	Chapter 6 of the Uniform Plumbing Code, 2003 version
EXHIBIT ASHCRAFT-1	Proposed Amendments to Sections 20.6.6.20, 20.6.6.21, and 20.6.6.24 NMAC
EXHIBIT ASHCRAFT-2	NRCS Code 590 for Nutrient Management, September 2012
EXHIBIT ASHCRAFT-3	NRCS Specification 590
EXHIBIT ASHCRAFT-4	NRCS summary page of the current Jobsheet
EXHIBIT ASHCRAFT-5	New Mexico NRCS office guidance and requirements re certification of nutrient management planners and training
EXHIBIT ASHCRAFT-6	Document entitled, "Flow Meter Calibration" prepared by Robert George
EXHIBIT ASHCRAFT-7	Colorado Department of Agriculture rules
EXHIBIT ASHCRAFT-8	Typical chemigation valve

WHEREFORE, DIGCE respectfully requests that the Water Quality Control Commission accept this Notice of Intent to Present Technical Testimony on behalf of Diary Industry Group for a Clean Environment.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that a copy of this pleading was served via hand-delivery or by U.S. mail to the following parties this Monday, November 19, 2012:

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STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of: **PROPOSED AMENDMENT** **TO 20.6.6 NMAC (Dairy Rule)**	**No. WQCC 12-09 (R)**

DIRECT TESTIMONY OF LONNIE BURKE

My name is Lonnie Ray Burke. My residence and business address is 2981 Beach Road NW, Albuquerque, New Mexico. I hold a B.A. degree in social science and drama from New Mexico Highlands University from which I graduated in 1971. I also hold a New Mexico Journeyman Plumbing and Gas Certificate.

I currently own and operate a business known as Resource Wise that is located at the same address. I started Resource Wise about ten years ago. Resource Wise does contract consulting for water and wastewater systems. For example, I hold a contract to help the City of Rio Rancho's water conservation program and have helped with their cross-connection program, including inspection of backflow prevention devices. I also work for several small water and wastewater utilities. For eight years, from approximately 1992 through 2000, I was employed by Presbyterian Health Services as a plumber. In that capacity, I was responsible for installing and testing backflow prevention devices. Before I took that job I sold a plumbing business I had operated for about eight years that had about eight employees.

I currently am an instructor at Santa Fe Community College for a course in water conservation auditing. I started teaching that course this semester. For three years before I started Resource Wise, or approximately 2000-2003, I was the Head of the Plumbing Department and instructed in plumbing at Albuquerque Technical Vocational Institute, or TVI,

now known as Central New Mexico Community College. Among other things, I taught courses in backflow prevention and cross connections.

I am experienced in landscape irrigation systems and hold a certification for teaching (QWEL) Qualified Water-Efficient Landscaper program. I also am familiar with the characteristics and operation of agricultural irrigation wells. I do not, however, have direct experience in the design, installation or operation of systems for land application of wastewater from dairies.

I have been asked by the Dairy Industry Group for a Clean Environment to provide this testimony regarding the backflow prevention devices specified in the dairy rules, particularly reduced pressure principle devices. Based on my experience and credentials in the plumbing field, my experience with and understanding of reduced pressure principle devices, and the specifications for the use of reduced pressure principle devices in the Uniform Plumbing Code, I do not believe that reduced pressure principle devices are suitable or appropriate for use as backflow prevention devices for irrigation wells connected to dairy wastewater systems used for land application of dairy effluent.

For purposes of this testimony, I have reviewed the proposed amendments to subsection M of section 20.6.6.21 NMAC, attached as *Exhibit Burke-1*. My understanding is that this subsection currently allows for only two types of backflow prevention devices for use at dairies that apply wastewater to fields, the air gap method and reduced pressure principle devices. I understand that another witness more familiar with agricultural irrigation systems will address the limitations on the use of air gaps within the dairy industry. I also understand that the amendments proposed by DIGCE would replace reduced pressure principle backflow prevention assembly devices with a device described as an "air/vacuum relief valve and a low pressure

drainage value located immediately upstream of a check valve." I understand that this type of device is referred to in the agricultural industry as a chemigation valve. I am not familiar with chemigation valves, but my testimony addresses why reduced pressure principle backflow assemblies should not be used in a dairy land application setting.

I have recommended, tested and installed reduced pressure principle backflow assemblies in my plumbing work and have given instruction on these devices. A reduced pressure principle backflow assembly (RP) consists of two internally loaded independently operating check valves and a mechanically independent, hydraulically dependent relief valve located between the check valves. This relief valve is designed to discharge if the pressure in the relief valve is equal to or greater than the upstream pressure entering the RP. The RP also contains tightly closing, resilient seated shut-off valves upstream and downstream of the check valves along with resilient seated test cocks. This assembly is used for the protection of the potable water supply from either pollutants or contaminants and may be used to protect against either backsiphonage or backpressure. At the live hearing in this case, I will demonstrate to the Commission how an RP device operates, using a cutaway exhibit of an RP assembly that I have used in my instructional work. A breakdown of a RP is attached to my testimony as *Exhibit Burke-2*. One can see the complexity (by the breakdown attached) of a RP, and see why the repair and testing requires a forty hour class.

Attached as *Exhibit Burke-3* to my testimony is a copy of Chapter 6 of the Uniform Plumbing Code, 2003 version, which I understand was introduced as an exhibit in a previous hearing on the dairy rules. Under the Uniform Plumbing Code, RP devices are used to protect potable water supplies, but they are not supposed to be used for sewer systems or wastewater lines, or for cross-connections between wastewater systems and potable water systems.

There are several reasons why RP devices are not specified for use in wastewater applications, and why I do not believe they are appropriate for use for dairy wastewater land application systems and for agricultural irrigation systems in general. First, RP devices are readily susceptible to fouling by sand, gravel and grit. Agricultural irrigation wells commonly pump sand and gravel that would flow through an RP device used at an irrigation well. As I will show using the cutaway, sand or gravel would lodge in the number 1 check valve of an RP device, the relief valve would dump until the RP was repaired, which would render the RP device inoperable which would require repairing and testing by a certified backflow technician. This likely would happen frequently if an RP device is attached to an irrigation well. An RP requires annual testing by a certified backflow technician, and must be retested any time it is repaired.

Second, RP devices become inoperable in freezing weather conditions and typically require active heating to prevent freeze-up. Consequently, they would not be suitable for use outdoors on agricultural irrigation systems in freezing conditions.

Also, a condition known as a "water hammer" may occur in irrigation systems, particularly those employing center pivot sprinklers. Water Hammer could damage the number 2 check valve of an RP device, rendering it inoperable once again requiring repair and testing.

RP devices are designed for use in systems that are under consistent and continuous water pressure. Irrigation wells do not operate under consistent pressure, but typically have intermittent or variable pressure. Inconsistent or intermittent water pressure will cause an RP device to constantly cycle, resulting in more frequent failure of an RP device used under those conditions.

Finally, RP devices are relatively complex, can be difficult to drain, and require specialized training to repair and test. In my experience, particularly in auditing water systems, I often encounter RP devices that have not been properly inspected and maintained. I have doubts about whether RP devices used in an agricultural setting would receive the necessary testing and maintenance to remain operable. Given all of these factors, I recommend against the use of RP devices for agricultural irrigation systems in general or for irrigation systems used for land application of dairy wastewater.

Based on this testimony, I recommend that the dairy rule provision on backflow devices, 20.6.6.21.M, be amended such that RP devices are not specified for use at dairies conducting land application of wastewater. If certain irrigation systems need an alternative to an air gap as backflow prevention, then an alternative other than an RP device should be specified.

I will stand for questions on this testimony at the hearing scheduled for December 11, 2012.

Respectfully Submitted,

Lonnie R. Burke

Lonnie Ray Burke

EXHIBIT BURKE-1

20.6.6.21 ADDITIONAL OPERATIONAL REQUIREMENTS FOR DAIRY FACILITIES WITH A LAND APPLICATION AREA:

. . . . . .

M. Backflow prevention. A permittee shall protect all water wells used within the land application distribution system from contamination by wastewater or stormwater backflow by installing and maintaining backflow prevention methods or devices. Backflow prevention shall be achieved by a total disconnect (physical air gap separation of at least two times the pipe diameter or complete piping separation when wastewater is being pumped) or by the installation of, at a minimum, a ~~reduced pressure principal backflow prevention assembly (RP)~~ air/vacuum relief valve and a low pressure drain valve located immediately upstream of a check valve between the ~~fresh irrigation water supply~~ discharge head of the well pump and wastewater and stormwater delivery systems.

(1) A permittee for a new dairy facility shall install backflow prevention methods or devices and submit written confirmation of installation to the department before discharging at the dairy facility.

(2) A permittee for an existing dairy facility that lacks backflow protection as required by this subsection shall install backflow prevention methods or devices within 90 days of the effective date of the discharge permit. The permittee shall submit written confirmation of installation to the department within 180 days of the effective date of the discharge permit.

N. Backflow prevention by ~~reduced pressure principle~~ check valve backflow prevention ~~assembly~~device - inspection and maintenance. A permittee shall inspect each check valve device at least monthly when the well is operating. ~~have each reduced pressure principle backflow prevention assembly (RP) check valve device inspected and tested by a person qualified by the manufacturer at the time of installation, repair, or relocation, and at least on an annual schedule thereafter.~~ A malfunctioning ~~RP~~ check valve device shall be repaired or replaced within 30 days of discovery, and use of all wastewater supply lines associated with the ~~RP~~ check valve device shall cease until repair or replacement has been completed. Copies of the inspection and maintenance records ~~and test results~~ for each ~~RP~~ check valve device associated with the backflow prevention program for the previous year shall be submitted to the department annually in the monitoring reports due by May 1.

EXHIBIT BURKE-2

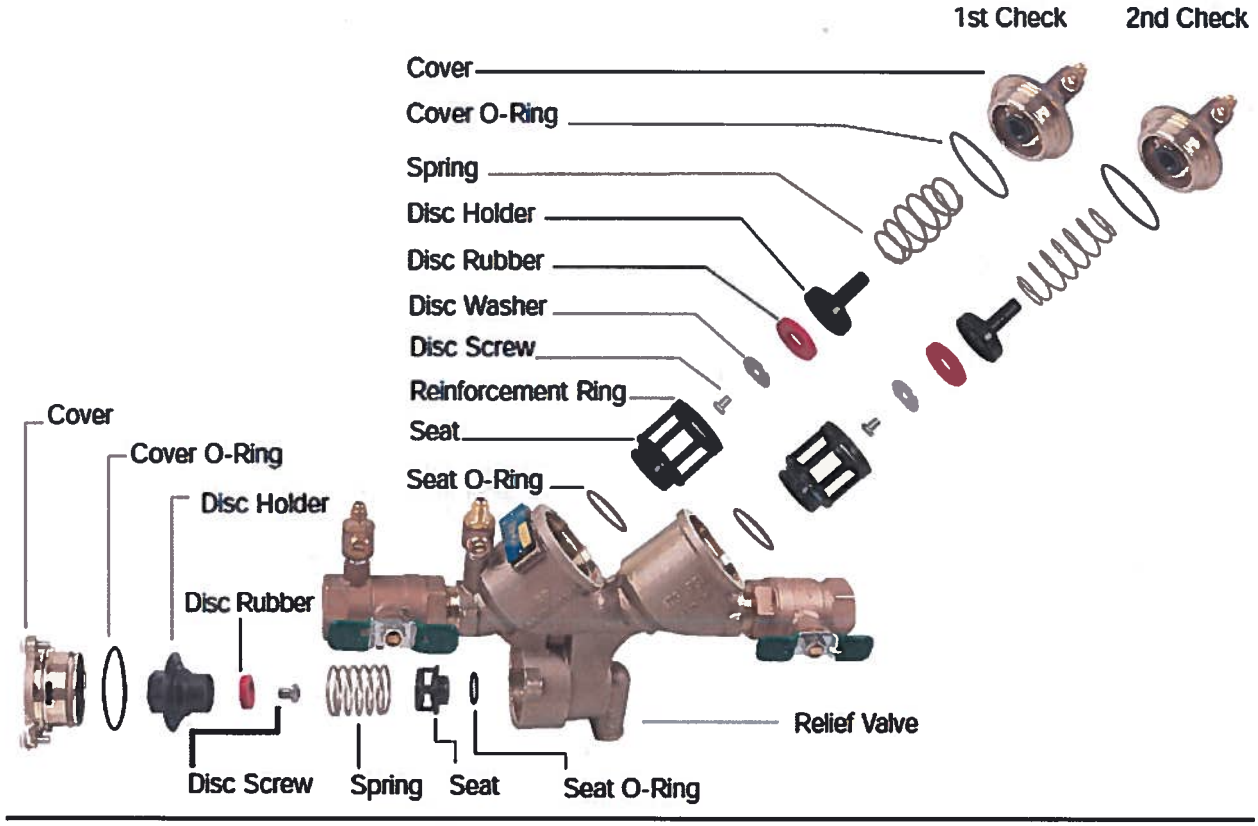

EXHIBIT BURKE-3

AN AMERICAN NATIONAL STANDARD

IAPMO/ANSI UPC 1-2003

UNIFORM PLUMBING CODE™

INTERNATIONAL ASSOCIATION OF PLUMBING & MECHANICAL OFFICIALS
IAPMO
FOUNDED 1926

ANSI C3

EXHIBIT
S221-20

PHCC
MCAA

CHAPTER 6

WATER SUPPLY AND DISTRIBUTION

601.0 Running Water Required.

601.1 Except where not deemed necessary for safety or sanitation by the Authority Having Jurisdiction, each plumbing fixture shall be provided with an adequate supply of potable running water piped thereto in an approved manner, so arranged as to flush and keep it in a clean and sanitary condition without danger of backflow or cross-connection. Water closets and urinals shall be flushed by means of an approved flush tank or flushometer valve. In jurisdictions which adopt Appendix J, water closets, urinals, and trap primers in designated non-residential buildings may be provided with reclaimed water as defined and regulated by Appendix J of this code.

601.2 Identification of a Potable and Nonpotable Water System. In all buildings where potable water and nonpotable water systems are installed, each system shall be clearly identified. Each system shall be color coded as follows:

601.2.1 Potable Water – Green background with white lettering.

601.2.2 Nonpotable Water – Yellow background with black lettering, with the words "Caution: Nonpotable water, do not drink."

Each system shall be identified with a colored band to designate the liquid being conveyed, and the direction of normal flow shall be clearly shown. The minimum size of the letters and length of the color field shall conform to Table 6-1.

A colored identification band shall be indicated every twenty (20) feet (6096 mm) but at least once per room, and shall be visible from the floor level.

Where vacuum breakers or backflow preventers are installed with fixtures listed in Table 14-1, identification of the discharge side may be omitted. Each outlet on the nonpotable water line which could be used for special purposes shall be posted as follows:

"Caution: Nonpotable water, do not drink."

601.2.3 Reclaimed Water – Purple (Pantone color #512) background and shall be imprinted in nominal 1/2 in. (12.7 mm) high, black upper case letters, with the words "Caution: Reclaimed water, do not drink."

601.3 Faucets and diverters shall be connected to the water distribution system so that hot water corresponds to the left side of the fittings.

TABLE 6-1

Minimum Length of Color Field and Size of Letters

Outside Diameter of Pipe or Covering		Minimum Length of Color Field		Minimum Size of Letters	
Inches	(mm)	Inches	(mm)	Inches	(mm)
1/2 to 1-1/4	(15 to 32)	8	(203)	1/2	(12.7)
1-1/2 to 2	(40 to 50)	8	(203)	3/4	(19.1)
2-1/2 to 6	(65 to 150)	12	(305)	1-1/4	(32)
8 to 10	(200 to 250)	24	(619)	2-1/2	(64)
Over 10	(Over 250)	32	(813)	3-1/2	(89)

602.0 Unlawful Connections

602.1 No installation of potable water supply piping or part thereof shall be made in such a manner that it will be possible for used, unclean, polluted, or contaminated water, mixtures, or substances to enter any portion of such piping from any tank, receptor, equipment, or plumbing fixture by reason of back-siphonage, suction, or any other cause, either during normal use and operation thereof or when any such tank, receptor, equipment, or plumbing fixture is flooded or subject to pressure in excess of the operating pressure in the hot or cold water piping.

602.2 No person shall make a connection or allow one to exist between pipes or conduits carrying domestic water supplied by any public or private water service system, and any pipes, conduits, or fixtures containing or carrying water from any other source or containing or carrying water which has been used for any purpose whatsoever, or any piping carrying chemicals, liquids, gases, or any substances whatsoever, unless there is provided a backflow prevention device approved for the potential hazard and maintained in accordance with this code.

602.3 No plumbing fixture, device, or construction shall be installed or maintained or shall be connected to any domestic water supply when such installation or connection may provide a possibility of polluting such water supply or may provide a cross-connection between a distributing system of water for drinking and domestic purposes and water which may become contaminated by such plumbing fixture, device, or construction unless there is provided a backflow prevention device approved for the potential hazard.

602.4 No water piping supplied by any private water supply system shall be connected to any other

source of supply without the approval of the Authority Having Jurisdiction, Health Department, or other Department Having Jurisdiction.

603.0 Cross-Connection Control.

Cross-connection control shall be provided in accordance with the provisions of this chapter.

No person shall install any water operated equipment or mechanism, or use any water-treating chemical or substance, if it is found that such equipment, mechanism, chemical, or substance may cause pollution or contamination of the domestic water supply. Such equipment or mechanism may be permitted only when equipped with an approved backflow prevention device or assembly.

603.1 Approval of Devices or Assemblies. Before any device or assembly is installed for the prevention of backflow, it shall have first been approved by the Authority Having Jurisdiction. Devices or assemblies shall be tested for conformity with recognized standards or other standards acceptable to the Authority Having Jurisdiction which are consistent with the intent of this code.

All devices or assemblies installed in a potable water supply system for protection against backflow shall be maintained in good working condition by the person or persons having control of such devices or assemblies. The Authority Having Jurisdiction or other department having jurisdiction may inspect such devices or assemblies and, if found to be

TABLE 6-2
Backflow Prevention Devices, Assemblies, and Methods

Device, Assembly, or Method[1]	Degree of Hazard				Installation[2,3]
	Pollution (Low Hazard)		Contamination (High Hazard)		
	Back-Siphonage	Back-Pressure	Back-Siphonage	Back-Pressure	
Airgap	x		x		See Table 6-3 in this chapter
Atmospheric Vacuum Breaker	x		x		Upright position. No valve downstream. Minimum of six (6) inches (152 mm) or listed distance above all downstream piping and flood-level rim of receptor.[4,5]
Spill-Proof Pressure-Type Vacuum Breaker	x		x		Upright position. Minimum of six (6) inches (152 mm) or listed distance above all downstream piping and flood-level rim of receptor.[5]
Double Check Valve Backflow Preventer	x	x			Horizontal, unless otherwise listed. Requires one (1) foot (305 mm) minimum clearance at bottom for maintenance. May need platform/ladder for test and repair. Does not discharge water.
Pressure Vacuum Breaker	x		x		Upright position. May have valves downstream. Minimum of twelve (12) inches (305 mm) above all downstream, piping and flood-level rim of receptor. May discharge water.
Reduced Pressure Principle Backflow Preventer	x	x	x	x	Horizontal unless otherwise listed. Requires one (1) foot (305 mm) minimum clearance at bottom for maintenance. May need platform ladder for test and repair. May discharge water.

[1] See description of devices and assemblies in this chapter.
[2] Installation in pit or vault requires previous approval by the Authority Having Jurisdiction.
[3] Refer to general and specific requirement for installation.
[4] Not to be subjected to operating pressure for more than 12 hours in any 24 hour period.
[5] For deck-mounted and equipment-mounted vacuum breaker, see Section 603.4.16.

tive or inoperative, shall require the repair or acement thereof. No device or assembly shall be ved from use or relocated or other device or ably substituted, without the approval of the ority Having Jurisdiction.

2 Backflow Prevention Devices, Assemblies, Methods.

603.2.1 Airgap. The minimum airgap to afford backflow protection shall be in accordance with Table 6-3.

603.2.2 Atmospheric Vacuum Breaker (AVB). An atmospheric vacuum breaker consists of a body, a checking member, and an atmospheric opening.

603.2.3 Hose Connection Backflow Preventer. A hose connection backflow preventer consists of two independent check valves with an independent atmospheric vent between and a means of field testing and draining.

603.2.4 Double Check Valve Backflow Prevention Assembly (DC). A double check valve backflow prevention assembly consists of two independently acting internally loaded check valves, four properly located test cocks, and two isolation valves.

603.2.5 Pressure Vacuum Breaker Backflow Prevention Assembly (PVB). A pressure vacuum breaker backflow prevention assembly consists of a loaded air inlet valve, an internally loaded check valve, two (2) properly located test cocks, and two (2) isolation valves. This device shall be installed outdoors only if provisions for spillage are provided.

603.2.6 Pressure Vacuum Breaker Spill-Proof Type Backflow Prevention Assembly (SVB). A pressure type vacuum breaker backflow prevention assembly consisting of one (1) check valve force-loaded closed and an air inlet vent valve force-loaded open to atmosphere,

TABLE 6-3
Minimum Airgaps for Water Distribution[4]

ures	When not affected by side walls[1]		When affected by side wall[2]	
	Inches	(mm)	Inches	(mm)
ective openings[3] not greater n one-half (1/2) inch (12.7 mm) diameter	1	(25.4)	1-1/2	(38)
ective openings[3] not greater an three-quarters (3/4) inch mm) in diameter	1-1/2	(38)	2-1/4	(57)
ective openings[3] not greater n one (1) inch (25 mm) in meter	2	(51)	3	(76)
ective openings[3] greater than e (1) inch (25 mm) in diameter	Two (2) times diameter of effective opening		Three (3) times diameter of effective opening	

de walls, ribs, or similar obstructions do not affect airgaps when spaced from the inside edge of the spout opening a distance ater than three times the diameter of the effective opening for a single wall, or a distance greater than four times the effective ening for two intersecting walls.

ertical walls, ribs, or similar obstructions extending from the water surface to or above the horizontal plane of the spout opening her than specified in Note 1 above. The effect of three or more such vertical walls or ribs has not been determined. In such cases, e airgap shall be measured from the top of the wall.

The effective opening shall be the minimum cross-sectional area at the seat of the control valve or the supply pipe or tubing which ds the device or outlet. If two or more lines supply one outlet, the effective opening shall be the sum of the cross-sectional areas f the individual supply lines or the area of the single outlet, whichever is smaller.

Airgaps less than one (1) inch (25.4 mm) shall be approved only as a permanent part of a listed assembly that has been tested nder actual backflow conditions with vacuums of 0 to 25 inches (635 mm) of mercury.

positioned downstream of the check valve, and located between and including two (2) tightly closing shutoff valves and test cocks.

603.2.7 Reduced Pressure Principle Backflow Prevention Assembly (RP). A reduced pressure principle backflow prevention assembly consists of two independently acting internally loaded check valves, a differential pressure relief valve, four properly located test cocks, and two isolation valves.

603.3 General Requirements.

603.3.1 All assemblies shall conform to listed standards and be acceptable to the Authority Having Jurisdiction with jurisdiction over the selection and installation of backflow prevention assemblies.

603.3.2 Where more than one (1) backflow prevention valve is installed on a single premise, and the valves are installed in one location, each separate valve shall be permanently identified by the permittee in a manner satisfactory to the Authority Having Jurisdiction.

603.3.3 The premise owner or responsible person shall have the backflow prevention assembly tested by a certified backflow assembly tester at the time of installation, repair, or relocation and at least on an annual schedule thereafter or more often when required by the Authority Having Jurisdiction. The periodic testing shall be performed in accordance with the procedures referenced in Table 14-1 by a tester qualified in accordance with those standards.

603.3.4 Access and clearance shall be provided for the required testing, maintenance, and repair. Access and clearance shall require a minimum of one (1) foot (305 mm) between the lowest portion of the assembly and grade, floor, or platform. Installations elevated more than five (5) feet (1524 mm) above the floor or grade shall be provided with a permanent platform capable of supporting a tester or maintenance person.

603.3.5 Direct connections between potable water piping and sewer connected wastes shall not exist under any condition with or without backflow protection. Where potable water is discharged to the drainage system it shall be by means of an approved airgap of two (2) pipe diameters of the supply inlet, but in no case shall the gap be less than one (1) inch (25 mm). Connection may be made to the inlet side of a trap provided that an approved vacuum breaker is installed not less than six (6) inches (152 mm) or the distance according to the device's listing, above the flood-level rim of such trapped fixture, so that at no time will any such device be subjected to any back-pressure.

603.3.6 Backflow preventers for hot water over 110°F (43.3°C) shall be a type designed to operate at temperatures of 110°F (43.3°C) or more without rendering any portion of the assembly inoperative.

603.3.7 Fixtures, appliances, or appurtenances with integral backflow preventers or integral airgaps manufactured as a unit shall be installed in accordance with their listing requirements and the manufacturers' instructions.

603.3.8 In cold climate areas, backflow assemblies and devices shall be protected from freezing by a method acceptable to the Authority Having Jurisdiction.

603.4 Specific Requirements.

603.4.1 Water closet and urinal flushometer valves shall be equipped with an atmospheric vacuum breaker. The vacuum breaker shall be installed on the discharge side of the flushometer valve with the critical level at least six (6) inches (152 mm) or the distance according to its listing above the overflow rim of a water closet bowl or the highest part of a urinal.

603.4.2 Water closet and urinal tanks shall be equipped with a ballcock. The ballcock shall be installed with the critical level at least one inch (25.4 mm) above the full opening of the overflow pipe. In cases where the ballcock has a hush tube, the bottom of the water supply inlet shall be installed one (1) inch (25.4 mm) above the full opening of the overflow pipe.

603.4.3 Water closet flushometer tanks shall be protected against backflow by an approved backflow prevention assembly, device, or method.

603.4.4 Heat Exchangers.

603.4.4.1 Heat exchangers used for heat transfer, heat recovery, or solar heating shall protect the potable water system from being contaminated by the heat transfer medium. Double-wall heat exchangers shall separate the potable water from the heat transfer medium by providing a space between the two walls which is vented to the atmosphere.

603.4.5 Water supply inlets to tanks, sumps, swimming pools, and other receptacles shall be protected by one of the following means:

(1) An approved airgap;

(2) A listed vacuum breaker installed on the discharge side of the last valve with the critical level not less than six (6) inches (152 mm) or in accordance with its listing;

(3) A backflow preventer suitable for contamination or pollution, installed

accordance with the requirements for that type of device or assembly as set forth in this chapter.

603.4.6 Protection from Lawn Sprinklers and Irrigation Systems.

603.4.6.1 Potable water supplies to systems having no pumps or connections for pumping equipment, and no chemical injection or provisions for chemical injection, shall be protected from backflow by one of the following devices:

(1) Atmospheric vacuum breaker

(2) Pressure vacuum breaker

(3) Reduced pressure backflow preventer

603.4.6.2 Where sprinkler and irrigation systems have pumps, connections for pumping equipment, or auxiliary air tanks or are otherwise capable of creating back-pressure, the potable water supply shall be protected by the following type of device if the backflow device is located upstream from the source of back-pressure:

(1) Reduced pressure backflow preventer

603.4.6.3 Where systems have a backflow device installed downstream from a potable water supply pump or a potable water supply pump connection, the device shall be one of the following:

(1) Atmospheric vacuum breaker

(2) Pressure vacuum breaker

(3) Reduced pressure backflow preventer

603.4.6.4 Where systems include a chemical injector or any provisions for chemical injection, the potable water supply shall be protected by the following:

(1) Reduced pressure backflow preventer

603.4.7 Potable water outlets with hose attachments, other than water heater drains, boiler drains, and clothes washer connections, shall be protected by a non-removable hose bibb type backflow preventer, a non-removable hose bibb type vacuum breaker, or by an atmospheric vacuum breaker installed at least six (6) inches (152 mm) above the highest point of usage located on the discharge side of the last valve. In climates where freezing temperatures occur, a listed self-draining frost-proof hose bibb with an integral backflow preventer or vacuum breaker shall be used.

603.4.8 *DELETED.*

603.4.9 Water cooled compressors, de-greasers or any other water cooled equipment shall be protected by a backflow preventer installed in accordance with the requirements of this chapter. ←

Note:

Water cooled equipment which produces back-pressure shall be equipped with the appropriate protection.

603.4.10 Water inlets to water supplied aspirators shall be equipped with a vacuum breaker installed in accordance with its listing requirements and this chapter. The discharge shall drain through an air gap. When the tailpiece of a fixture to receive the discharge of an aspirator is used, the air gap shall be located above the flood-level rim of the fixture. ←

603.4.11 Potable water make up connections to steam or hot water boilers shall be provided with a listed backflow protection assembly.

603.4.12 Nonpotable Water Piping. In cases where it is impractical to correct individual cross-connections on the domestic water line, the line supplying such outlets shall be considered a non-potable water line. No drinking or domestic water outlets shall be connected to the non-potable water line. Whenever possible, all portions of the non-potable water line shall be exposed, and all exposed portions shall be properly identified in a manner satisfactory to the Authority Having Jurisdiction. Each outlet on the non-potable water line which may be used for drinking or domestic purposes shall be posted: "Caution: Non-potable water, do not drink."

603.4.13 Potable water supply to carbonators shall be protected by either an airgap or a vented backflow preventer for carbonated beverage dispensers installed within the carbonated beverage dispenser. The carbonated beverage dispenser shall bear the label of an approved testing agency, certifying and attesting that such equipment has been tested and inspected and meets the requirements of the approved applicable standard. Carbonated beverage dispensers without an approved internal airgap or vented backflow preventer for carbonated beverage dispensers and carbonated beverage dispensing systems shall have the water supply protected with a vented backflow preventer for carbonated beverage dispensers.

603.4.14 Water Treatment Units. Reverse osmosis drinking water treatment units shall meet the requirements of the appropriate standards referenced in Table 14-1. Waste or discharge from reverse osmosis or other types of water treatment units shall enter the drainage system through an airgap.

603.4.15 Backflow preventers shall not be located in any area containing fumes that are toxic, poisonous, or corrosive.

603.4.16 Deck-mounted or equipment-mounted vacuum breakers shall be installed in accordance with their listing and the manufacturers' instructions, with the critical level not less than one (1) inch (25.4 mm) above the flood-level rim.

603.4.17 *DELETED.*

603.4.18 Protection from Fire Systems.

603.4.18.1 Except as provided under Sections 603.4.18.2 and 603.4.18.3, potable water supplies to fire protection systems that are normally under pressure, including but not limited to standpipes and automatic sprinkler systems, except in one- or two-family residential sprinkler systems, piped in materials approved for potable water distribution systems shall be protected from back-pressure and back-siphonage by one of the following testable devices:

(1) Double check valve assembly

(2) Double check detector assembly

(3) Reduced pressure backflow preventer

(4) Reduced pressure detector assembly

Potable water supplies to fire protection systems that are not normally under pressure shall be protected from backflow and shall meet the requirements of the appropriate standards referenced in Table 14-1.

603.4.18.2 Where fire protection systems supplied from a potable water system include a fire department (siamese) connection which is located less than seventeen hundred (1700) feet (518.2 m) from a non-potable water source that could be used by the fire department as a secondary water supply, the potable water supply shall be protected by one of the following:

(1) Reduced pressure backflow preventor

(2) Reduced pressure detector assembly

Note:

Non-potable water sources include fire department vehicles carrying water of questionable quality or water that is treated with antifreeze, corrosion inhibitors, or extinguishing agents.

603.4.18.3 Where antifreeze, corrosion inhibitors, or other chemicals are added to a fire protection system supplied from a potable water supply, the potable water system shall be protected by one of t following:

(1) Reduced pressure backflow preventer

(2) Reduced pressure detector assembly

603.4.18.4 Whenever a backflow device installed in the potable water supply t fire protection system, the hydraulic desi of the system shall account for the pressu drop through the backflow device. If su devices are retrofitted for an existing fi protection system, the hydraulics of t sprinkler system design shall be checked verify that there will be sufficient wa pressure available for satisfactory operati of the fire sprinklers.

603.4.18.5 Residential Sprinkler System When residential sprinkler systems a installed using the potable water syste they shall be installed in accordance wi the standards listed in Table 14-1.

603.4.19 Special Equipment, Water Supp Protection. Vacuum breakers for washer-ho bedpans shall be located not less than five (5 feet (1524 mm) above the floor. Hos connections in health care or laboratory-area shall not be less than six (6) feet (1829 mm above the floor.

603.4.20 Portable cleaning equipment, dental vacuum pumps, and chemical dispensers sha be protected from backflow by an airgap, a atmospheric vacuum breaker, a spill-proo vacuum breaker, or a reduced pressure principl backflow preventer.

603.4.21 Water Heater Connectors. Flexible metallic water heater connectors or reinforced flexible water heater connectors connecting water heaters to the piping system shall be in compliance with the appropriate standards listed in Table 14-1.

603.4.22 Combination stop-and-waste valves or cocks shall not be installed underground.

604.0 Materials.

604.1 Water distribution pipe, building supply water pipe, and fittings shall be of brass, copper, cast iron, CPVC, galvanized malleable iron, galvanized wrought iron, galvanized steel, PEX, or other approved materials. Asbestos-cement, PE, PVC, PEX-AL-PEX, or PE-AL-PE water pipe manufactured to recognized standards may be used for cold water building supply distribution systems outside a building. PEX-AL-PEX water pipe, tubing, and fittings manufactured to recognized standards may

STATE OF NEW MEXICO
BEFORE THE WATER QUALITY CONTROL COMMISSION

In the Matter of:	)	
PROPOSED AMENDMENT	)	**No. WQCC 12-09 (R)**
TO 20.6.6 NMAC (Dairy Rule)	)	

DIRECT TESTIMONY OF LONEY ASHCRAFT

My name is Loney Ashcraft. My residence address is 6423 Iroquios, Dexter, New Mexico. I hold a B.S. degree in Agricultural Economics/Agriculture Business from New Mexico State University from which I graduated in 1969.

I currently own and operate a business known as Ashcraft Consulting that is located at the same address as my residence. Through that business I provide dairy consulting services, which I have done for nine years. Before starting Ashcraft Consulting I was employed for 36 years with the U.S. Department of Agriculture Soil Conservation Service, now known as the Natural Resource Conservation Service (NRCS), with 30 years as District Conservationist.

I hold the following certifications relating to my work as a dairy consultant: New Mexico Comprehensive Nutrient Management Plan ("CNMP") and MMP Certification, completed on April 5, 2012. I also have completed the following courses of training provided by the NRCS: Water Quality (November 1, 1998); Agricultural Waste Systems II (April 27, 2001); Nutrient/Pest Management in Conservation Planning (April 24, 2002); Nutrient and Pest Management Online (December 3, 2001); and CNMP Planning (September 21, 2001).

In my positions as a dairy consultant and with the NRCS, I have worked with dairy operations for over 35 years in planning and designing wastewater storage systems and manure management. During this time I also have designed and constructed several types of irrigation

systems, including center pivot, side roll and linear sprinkler systems, gravity or surface flow systems, and drip systems. Several of these systems are used for land application of dairy wastewater. I have prepared numerous farm and ranch resource conservation plans, ranch plans for ranches of sizes up to approximately 60,000 acres, and farm plans for various size farms up to approximately 3,500 acres. I am experienced with both range management and cropland management. I have prepared numerous applications for dairy discharge permits.

I have been asked by the Dairy Industry Group for a Clean Environment (DIGCE) to provide this testimony in support of DIGCE's proposed amendments to the Water Quality Control Commission's dairy rules regarding nutrient management plan requirements, backflow prevention requirements, and requirements for calibration of flow meters. I have reviewed, am in support of and recommend that the Commission adopt the amendments to the dairy rules as contained in the Petition to Amend 20.6.6 NMAC (Dairy Rule) as filed with the Commission. A copy of the proposed amendments is attached to my testimony as Ashcraft Exhibit 1. I note one typographical error to be corrected in the proposed amendments to section subsection I of section 20.6.6.21 NMAC. In the third line from the bottom of that section, delete the capital T in the word "the."

TESTIMONY ON PROPOSED AMENDMENTS TO NUTRIENT MANAGEMENT PLAN REQUIREMENTS, SUBSECTION I OF SECTION 20.6.6.21 NMAC

As discussed above, I am certified to prepare Comprehensive Nutrient Management Plans by the New Mexico Office of the Natural Resource Conservation Service. I have prepared numerous CNMPs submitted to the NRCS. I also have experience preparing applications for discharge permits for dairies that conduct land application of wastewater.

The amendments attached as Exhibit Ashcraft-1 are intended to accomplish the following: (1) clarify that a nutrient management plan (NMP) under the dairy rules is not required to contain all of the information specified in a comprehensive nutrient management plan as specified by the NRCS, while ensuring that a dairy rule NMP will contain the information relating to ground water protection; and (2) require that a NMP under the dairy rules be certified by a person with any one of three types of credentials—NRCS certification as a nutrient management planner, a certified professional agronomist (CCAg) or a certified crop advisor (CCA).

The nutrient management plan requirements under the dairy rule are contained in subsection I of section 20.6.6.21 NMAC. Specific information requirements relating to the NMP requirement are specified in subsections A through L of section 20.6.6.25 NMAC.

The first change to subsection I of 20.6.6.21 NMAC is the addition of the words "required to be monitored under section 20.6.6.25.C." This wording is added for clarification and consistency with other parts of the dairy rule that identify specific constituents to be addressed, rather than wording that allows for open-ended agency discretion. Subsection C of section 20.6.6.25 NMAC specifies the constituents to be monitored in dairy wastewater to be land-applied, particularly nitrate as nitrogen, total Kjeldahl nitrogen, chloride, total sulfur and total dissolved solids. Nutrient management plans under the dairy rules in particular focus on nitrogen.

The next set of language changes in Exhibit Ashcraft-1, shown by underlined new language to be added and existing language to be deleted as shown by strikeout, replaces specific references to NRCS national comprehensive nutrient management plan templates and related NRCS code with new language that focuses on the NMP requirements relating to ground water

protection. The source of the new language is NRCS Code 590 for Nutrient Management, a copy of which, current as of September 2012, is attached as Exhibit Ashcraft-2.

As background, I should explain the purpose of a comprehensive nutrient management plan. The U.S. Department of Agriculture, through the NRCS, supplies funding for certain agricultural practices. In order to qualify for that funding, various NRCS requirements must be met which, in some instances, includes submission of a CNMP to NRCS. A dairy operator or farmer who chooses not to seek this funding is not required to prepare a CNMP. A CNMP addresses a number of matters, as shown in Exhibit Ashcraft-2. Some of these are related to ground water protection, but several elements of a CNMP are not related to ground water protection. My understanding is that the dairy rules are intended to require an NMP containing only those elements relating to ground water protection, and that required elements of a CNMP that are not related to ground water protection are not necessary elements of a dairy rule NMP.

The current dairy rule states that a dairy rule NMP "shall be developed through utilization of the U.S. department of agriculture natural resource conservation service (USDA-NRCS) national comprehensive nutrient management plan development templates as adopted by the New Mexico office of the USDA-NRCA and in accordance with the USDA-NRCS *conservation practice standard for New Mexico, nutrient management – code 590.*" This language could be interpreted as requiring preparation and submission of the full set of development templates in accordance with all of NRCS standard 590, including elements not related to ground water protection. My understanding is that the amendment proposed by DIGCE is intended to clarify that the only required elements of a dairy rule NMP are those elements relating to ground water protection, and that the elements not relating to ground water protection are not required to be included with and submitted to NMED.

NRCS prepares standards and related documents tailored specifically to New Mexico. NRCS also modifies its standards and requirements from time to time. For example, the current standard was modified and issued only this past September. Removing specific references to NRCS documents helps to clarify that the dairy rule is not tied to the version of the NRCS code that was in place at the time the dairy rules were adopted. In addition to standards, NRCS has issued a Specification 590, which provides additional details to implement the standard (attached as Exhibit Ashcraft-3) and a Jobsheet, which is a series of spreadsheets that a nutrient management planner can use to develop a nutrient management plan. A copy of the summary page of the current Jobsheet is attached as Exhibit Ashcraft-4, and the full can be found at the following link: jobsheethttp://efotg.nrcs.usda.gov/references/public/NM/590-js2012.xlsm. Under DIGCE's proposed amendment, the Jobsheet can be used to develop a part of the nutrient management plan, but alternative spreadsheets could be developed and used as long as they comply with the more specific requirements of the proposed amendments to the dairy rule.

As discussed above, the specific language proposed to be included in subsection I, including the modified second sentence, the new third through sixth sentences, and the modified seventh sentence, is taken in part from language in Exhibit Ashcraft-2 and is related to the specific land application monitoring requirements in section 20.6.6.25 NMAC. For example, on page 3 of Exhibit Aschcraft-2, the standard refers to development of nutrient application rates based on realistic yield goals and other factors. The proposed language considers the data to be collected under section 20.6.6.25 NMAC, including the volumes of wastewater and stormwater applied, manure nitrogen content and manure application rates, nitrogen in irrigation water, fertilizer applications, crop yield documentation and nitrogen in harvested crops. The dairy rules

require annual preparation and updates of an NMP, so the nitrogen budget is to be developed on an annual basis.

The new language also is tied to the soil tests required under subsections K and L of section 20.6.6.25 NMAC and the NRCS guidance for application of nitrogen based upon normal, high and excessive nitrogen soils. That NRCS guidance also is shown on the third page of Exhibit Ashcraft-2. The proposed new language states that maximum application rates for wastewater applied through irrigation is not to exceed the soil intake/infiltration rate, consistent with language also shown on page 3 of Exhibit Ashcraft-2. The modified sentence before the stricken language requires that nitrogen application should be consistent with the NMP, with departures from the NMP due to growing conditions or other factors to be addressed in the NMP update for the following year. Weather and other conditions can change during the year and affect crop selection, require replacement of crops damaged by hail or pests, or allow for increased nutrient application in exceptionally favorable growing conditions to optimize crop production. When these conditions change, some flexibility is needed to adjust actual practices compared with those planned in an NMP submitted on May 1. The required soil testing between the growing season and preparation of the following years' NMP allows changes made during the growing year to be reflected in the updated NMP. The language "and implemented pursuant to the dairy rule" is proposed to be stricken in favor of the more specific references to the monitoring requirements of section 20.6.6.25 and the other more specific requirements in the new language.

As discussed above, DIGCE's proposed amendments replace language requiring a dairy rule NMP to be developed, signed and dated annually by one or more persons who holds an NRCS certification as a nutrient management planner and also is credentialed as a certified crop

advisor (CCA) or a certified professional agronomist (CPAg). As noted above, I have my NRCS certification as a nutrient management planner.

Attached as Exhibit Ashcraft-5 is a copy of New Mexico NRCS office guidance and requirements regarding its certification of nutrient management planners and the required training. This document is a portion of a publication found at: http://www.nm.nrcs.usda.gov/technical/handbooks/npph/npph-amend11-cnmp-tg.pdf. Note that the general requirements, as shown on page 13 of Exhibit Ashcraft-5, include "knowledge of criteria associated with the various elements on a CNMP as contained in the 'Comprehensive Nutrient Management Policy and Guidance Document, New Mexico,'" and to "meet applicable local, state and federal regulations that impact the elements of the CNMP." The knowledge and training requirements for certification by the NRCS obviously are very specific to the requirements of both the NRCS CNMP standard and other laws, including the dairy rule.

The requirements for certification or a CPAg or a CCA were provided in the original dairy rule hearing, particularly NMED's Exhibit 3221-11. The CPAg and CCA requirements, both established by the American Society of Agronomy, include specific post-secondary education requirements, continuing education, and certain additional experience. A person with such certifications should, in my opinion, have sufficient knowledge to develop and certify a NMP as required under the dairy rule. They would not, however, necessarily have the specific New Mexico training required of a person certified by NRCS to prepare nutrient management plans, including the requisite water quality training.

In my experience, there are few individuals who consult for New Mexico dairies and who prepare their nutrient management plans who hold both an NRCS certification and credentials as a CPAg or a CCA. This means that a New Mexico dairy may have to change consultants to one

of the few individuals who hold both credentials, understanding there is limited available capacity, or the dairy would have to hire two consultants, one holding each of the required credentials. Because the rule requires that the plan be developed by persons who hold two credentials, the hiring of a second consultant would require substantial work by that consultant at substantial additional cost. In my opinion, the limited capacity of persons with two credentials to prepare NMPS, and the substantial additional cost to hire two consultants, is not justified, particularly since an individual holding any one of the three credentials should have sufficient training to develop and sign a NMP that complies with the dairy rule.

The proposed rule amendment contains new language, for clarification and convenience, that would allow a dairy permittee to submit an NMP contained within a broader plan, such as a CNMP or a nutrient management plan prepared for an EPA permit, as long as it meets all of the requirements for a dairy rule NMP. In such, the amended rule would require the Environment Department to consider only those parts of the plan that relate to the dairy rule NMP requirement. This provision avoids the need to prepare entirely separate plans to meet the requirements of various state and federal agencies.

Finally, the last sentence is modified to clarify the due date for an initial NMP following renewal of a dairy discharge permit, particularly for permits issued based on application submitted before the dairy rules were adopted. Because crop planning typically takes place in the spring, and most crop planting decisions are made around May, and soil tests are not available until the spring, the initial NMP would be submitted by the next May 1 after the permit is issued.

For these reasons I support DIGCE's proposed amendments to the dairy rule requirements for nutrient management plans as shown in Exhibit Ashcraft-1.

TESTIMONY IN SUPPORT OF AMENDMENTS TO FLOW METER CALIBRATION REQUIREMENTS, SUBSECTIONS J, M AND O OF SECTION 20.6.6.20 NMAC AND SUBSECTION E OF SECTION 20.6.6.24 NMAC.

I also have been asked by DIGCE to testify regarding the proposed amendments to the dairy rules relating to calibration of flow meters. During the original dairy rule hearings, DIGCE objected to the requirements to install and use flow meters at particular locations. DIGCE's proposed amendments do not change when and where a flow meter is required to be installed and used, but addresses only the field calibration requirements.

I have advised numerous dairies regarding the installation of flow meters to measure water use, wastewater discharge volumes and wastewater sent to land application areas. In my experience, flow meters used in dairy operations are not designed for field calibration or for adjustment in the field. Instead, they are calibrated by the manufacturer prior to sale and, if they are not working properly after installation, they must be returned to the manufacturer for repair and/or calibration. In my experience with many flow meters over several years, I have never conducted or witnessed field calibration of a flow meter.

I have reviewed the document entitled Flow Meter Calibration prepared by Mr. Robert George and introduced as Department Exhibit 3224-5 in the previous dairy rule hearing. A copy is attached as Exhibit Ashcraft-6. This exhibit indicates that the Department's purpose in requiring field calibration is not so much to determine whether a meter is meeting its specified level of accuracy but to determine gross inaccuracies in measuring flow volume. In my experience checking flow meter readings, there are many sources of information other than field calibration of testing to check whether a meter is functioning properly or providing reliable measurements. In most instances, failure of a flow meter is easily detectible because it no longer provides flow readings or gives readings that vary considerably from prior readings. In that

event, the typical response is to contact a factory representative to inspect and replace the meter or send it back to the factory for repair.

If a flow meter is functioning, inaccurate flow readings can be identified by comparison with previous flow data to compare for consistency. Wastewater flow meter readings also can be compared to measured water usage volumes. Also, published data is available to estimate the anticipated wastewater volumes associated with the number of cows being milked and the type of wastewater management practices utilized. In my experience, inaccurate flow meter readings are readily detectible using this type of information.

The Department's paper (Exhibit Ashcraft-6) recognizes the difficulty to accomplish field calibration of flow meters. It identifies three possible examples of flow meter calibration. However, in my experience, none of these "calibration" methods have been implemented, and the paper gives no literature citations or actual examples that such calibrations have been performed. All of these methods would require installation of additional equipment, such as sumps with known volumes or separate measuring devices. This would add substantial expense and would interfere with dairy operations by interrupting wastewater discharges while the "calibration" measurements are undertaken. One example is the installation of a weir or flume for comparison. If installation of a weir or flume is feasible, then a dairy would most likely use that as the primary measuring device, as that is allowed by the dairy rule.

DIGCE's proposed rule amendments would replace the field calibration requirement for flow meters with requirements to maintain documentation of manufacturer documentation regarding calibration and maintenance requirements as shown in the underlined new language and stricken old language in subsections J, M and O of section 20.6.6.20 NMAC. DIGCE's change also would eliminate subsection E of section 20.6.6.24 NMAC. Elimination of that

subsection would require renumbering of the rule and a check for necessary changes to any cross-references to that subsection and the following subsections.

DIGCE also proposes to change the language regarding the allowed timeframe to repair or replace a malfunctioning flow meter. Rather than the 30-day repair time specified in the existing rule language, DIGCE proposes to require initiation of repair or replacement within seven days of discovery. This ensures that repairs are started promptly, but does not expose the dairy operator from liability due to delays by a vendor or manufacturer.

For these reasons, I support DIGCE's proposed amendments to the dairy rule flow meter field calibration requirements as shown in Exhibit Ashcraft-1.

TESTIMONY ON PROPOSED AMENDMENTS TO BACKFLOW PREVENTION REQUIREMENTS, SUBSECTIONS M AND N OF SECTION 20.6.6.21 NMAC

My final topic of testimony is to support DIGCE's proposed amendment to the requirements for backflow prevention. Subsection M of section 20.6.6.21 NMAC currently allows the use of two types of backflow prevention devices, a "total disconnect" or "air gap" or a "reduced pressure principal [sic] backflow prevention assembly (RP)." My testimony describes why a total disconnect or air gap approach is not appropriate for land application of water using a pressurized sprinkler system. My testimony, and the separate testimony of Mr. Lonnie Burke, describes why RP devices are not suitable for use in dairy wastewater and agricultural irrigation systems. My testimony will describe the alternative identified in DIGCE's proposed rule amendment, which is an "air/vaccum relief valve and a low pressure drain valve located immediately upstream of a check valve." This device is commonly referred to as a chemigation valve.

During my tenure with the NRCS, I designed dozens of irrigation systems each year. I have designed irrigation systems for dairy land application of wastewater for over 20 years involving dozens of dairies and using several different types of irrigation systems, including surface/gravity flow, and side roll, center pivot and linear sprinkler systems. Backflow prevention is necessary for all of these systems.

Surface irrigation systems typically have air gaps, often in more than one place. In my experience, however, air gaps are not feasible for use with pressurized sprinkler systems. Many pressurized sprinkler systems utilizes the pressure supplied by the well or wells that supply the irrigation water. Creation of an air gap, however, eliminates this pressure. If an air gap is used, a separate booster pump would have to be installed downstream of the air gap to repressurize the sprinkler system. This would impose additional capital costs for booster pumps and additional equipment, such as tanks or sumps. I would estimate the typical costs for the basic necessary equipment, booster pumps and a sump or standpipe, at $10,000 to $15,000, plus the additional power costs to run the booster pump and associated additional maintenance costs. These costs could be much higher for more complex systems that use multiple wells.

Use of a booster pump also creates serious operational problems. Irrigation wells often pump at variable rates over the course of a day. There is no system of which I am aware to synchronize the pumping rate of a booster pump with the irrigation well or wells. If a booster pump is set at a flow rate that is exceeded by pumping rate of the irrigation well or wells (and in some instances, the pumps supplying the dairy wastewater), then the system is likely to overflow. If the booster pump is set at a rate higher than actual rate of the irrigation wells, then the booster pump may pump air and fail. This situation could be remedied by the addition of larger tanks and sumps to store water ahead of the booster pump, but this would only add to the

cost, resulting in a function system with capital costs that could be much greater than the $10,000 to $15,000 estimated above, along with increased operating and maintenance costs.

For these reasons, in my opinion, air gaps are not feasible for many irrigation systems used for land application of dairy wastewater. The only alternative to an air gap under the dairy rule is an RP device. I have never designed an agricultural irrigation system with an RP device for backflow prevention because these devices are not reliable in an agricultural irrigation setting. This topic is discussed in more detail in Mr. Burke's testimony.

In my experience and opinion, chemigation valves provide a proven and effective alternative for backflow prevention. I have designed numerous irrigation systems, particularly systems for land application of dairy wastes, using chemigation valves for backflow prevention. I have never experienced a failure of a chemigation valve and I am not aware of any evidence of chemigation valves that failed as an effective backflow prevention device. In my opinion, chemigation valves, which were specifically designed to operate in an agricultural irrigation setting, are the best means of backflow prevention under the dairy rule.

A chemigation valve, as described in the dairy rule, consists of several components: one or more check valves, a low pressure drain valve, and an air/vacuum relief valve. Such a system is described in various documents and other rules. An example is the Colorado Department of Agriculture rules under the Colorado Chemigation Act, the relevant sections of which are attached as Exhibit Ashcraft-7. Section 6 of these rules describe the requirements and purposes of the check valve (6.02), the vacuum relief valve (6.06), and the low-pressure drain (6.08). Exhibit Ashcraft-8 shows a typical chemigation valve. If I can obtain a cutaway of a chemigation valve, I will be able to better show how it operates at the hearing.

Chemigation valves function well in an agricultural irrigation setting and remain functional when irrigation water contains sand or gravel. When used on irrigation systems that apply dairy wastewater, the wastewater itself does not come into contact with the chemigation valve. Typically there are hundreds of feet of pipeline that carry fresh water between the well and chemigation valve and the location where dairy wastewater is introduced into the system. When a well is shut off, the chemigation valve stops the flow of fresh water down the well. Fresh water then remains in the pipeline between the chemigation valve and the location where dairy wastewater is introduced, providing an added safety buffer.

The proposed changes to subsection N of section 20.6.6.21 NMAC as shown in Exhibit Ashcraft-1 replace the annual RP device inspection and testing requirements with a monthly inspection requirement for chemigation valves. A monthly visual inspection for any physical damage or leaks can be conducted by the farm operator. If a visual inspection detects damage or a problem, the operator can contact a repairman to further inspect and repair or replace the device.

For these reasons, I support DIGCE's proposed amendments to the dairy rule backflow prevention requirements as shown in Exhibit Ashcraft-1.

Respectfully Submitted,

Loney Ashcraft

EXHIBIT ASHCRAFT-1

TITLE 20 ENVIRONMENTAL PROTECTION
CHAPTER 6 WATER QUALITY
PART 6 GROUND WATER PROTECTION – SUPPLEMENTAL PERMITTING REQUIREMENTS FOR DAIRY FACILITIES

. . . . . .

20.6.6.20 OPERATIONAL REQUIREMENTS FOR ALL DAIRY FACILITIES:

. . . . . .

J. Flow meter installation. A permittee shall employ a flow metering system that uses flow measurement devices (flow meters) to measure the volume of wastewater discharged at the dairy facility. Flow meters shall be installed in accordance with the plans submitted with the application for a new, renewed or modified discharge permit, or those submitted after issuance of a discharge permit to achieve compliance with the dairy rule, pursuant to this section, Subsection C of 20.6.6.17 NMAC, and Subsections G and H of 20.6.6.21 NMAC. Flow meters shall be physically and permanently labeled with the discharge permit number, meter identification nomenclature as specified in a discharge permit, and the month and year of meter installation. All flow meters shall be calibrated in accordance with the manufacturer's requirements prior to installation or reinstallation following repair. The permittee shall maintain copies of the manufacturer's certificate of calibration and the manufacturer's recommended maintenance schedule. Confirmation of installation shall include a description of the device type, manufacturer, meter identification, location, record drawings, and ~~the results of the initial field~~ a copy of the manufacturer's certificate of calibration and a copy of the manufacturer's recommended maintenance schedule~~completed pursuant to Subsection E of 20.6.6.24 NMAC~~.

(1) An applicant or permittee for a new dairy facility shall install flow meters and submit confirmation of flow meter installation to the department before discharging at the dairy facility.

(2) An applicant or permittee for an existing dairy facility shall install flow meters within 150 days of the effective date of the discharge permit and submit confirmation of flow meter installation to the department within 180 days of the effective date of the discharge permit.

. . . . . .

M. Authorized use of existing flow meters. An applicant or permittee proposing to use an existing flow meter(s) shall submit documentation demonstrating that the existing flow meter(s) is installed consistent with this section, and Subsections G and H of 20.6.6.21 NMAC, as appropriate. The proposal shall be submitted with an application for a new, renewed and modified discharge permit and shall include the following documentation.

(1) The location of each existing flow meter indicated on the scaled map required by Subsection U of this section and the identification of the wastewater discharge, or wastewater or stormwater application it is intended to measure.

(2) A copy of the record drawings or manufacturer plans and technical specifications specific to each existing flow meter, if available.

~~(3) A field calibration report for each existing flow meter, completed pursuant to Subsection E of 20.6.6.24 NMAC.~~

O. Flow meter inspection and maintenance. A permittee shall visually inspect flow meters on a weekly basis for evidence of malfunction. If a visual inspection indicates a flow meter is not functioning to measure flow, the permittee shall initiate repair or replacement of the meter within ~~30~~ seven days of discovery. The repaired or replaced flow meter shall be installed and calibrated pursuant to ~~the dairy rule~~subsection J of this section.

(1) For repaired meters, the permittee shall submit a report to the department with the next quarterly monitoring report following the repair that includes a description of the malfunction; a statement verifying the repair, and a copy of the manufacturer's or repairer's certificate of calibration~~; and a flow meter field calibration report completed pursuant to Subsection E of 20.6.6.24 NMAC~~.

(2) For replacement meters, the permittee shall submit a report to the department with the next quarterly monitoring report following the replacement that includes plans for the device pursuant to Subsection C of 20.6.6.17 NMAC, a copy of the manufacturer's certificate of calibration, and a copy of the manufacturer's recommended maintenance schedule~~, and a flow meter field calibration report completed pursuant to Subsection E of 20.6.6.24 NMAC~~.

. . . . . .

[20.6.6.20 NMAC - N, 01/31/2011; A, 12/31/2011]

20.6.6.21 ADDITIONAL OPERATIONAL REQUIREMENTS FOR DAIRY FACILITIES WITH A LAND APPLICATION AREA:

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I. Nutrient management plan. Nutrients and other constituents required to be monitored under section 20.6.6.25.C and present in wastewater and stormwater shall be applied to irrigated cropland under cultivation in accordance with the requirements of a nutrient management plan (NMP) submitted to the department with the application for a new, renewed, or modified discharge permit. The NMP shall provide for development of a nutrient budget for nitrogen on an annual basis that accounts for the amount of nitrogen from all combined nitrogen sources, including but not limited to wastewater, stormwater, manure solids, composted material, irrigation water and other additional fertilizer(s), along with residual soil nitrogen and nitrogen credits from leguminous crops and that considers estimated and measured nitrogen removal by harvested crops and other losses, considering the monitoring data required to be collected under section 20.6.6.25 NMAC. The NMP shall describe how planned total nitrogen application rates shall be determined each year based upon realistic yield goals for the planned crops. The information used to set the crop yield goals shall be identified in the NMP. The NMP shall

address how nitrogen application rates will be adjusted based upon the results of soil tests required by section 20.6.6.25, subsections K and L, consistent with applicable Natural Resource Conservation Service guidance for normal, high and excessive soil nitrogen levels. The NMP shall specify the maximum application rates for wastewater applied through irrigation so as not to exceed the soil intake/infiltration rate. ~~shall be applied to~~The application of nitrogen to each field within the land application area shall be in accordance with the NMP, and any departures from the NMP due to growing conditions or other factors shall be addressed in the update to the NMP for the following year. ~~The NMP shall be developed through utilization of the U.S. department of agriculture natural resources conservation service (USDA-NRCS) national comprehensive nutrient management plan development templates as adopted by the New Mexico office of the USDA-NRCS and in accordance with the USDA-NRCS *conservation practice standard for New Mexico, nutrient management - code 590.* The NMP shall be developed, signed and dated annually by an individual certified by the American society of agronomy as a certified crop advisor (CCA) or certified professional agronomist (CPAg) and by an individual certified by the New Mexico office of the USDA-NRCS as a nutrient management planner.~~ Plant material and soil sampling protocols in the NMP shall be, at a minimum, equivalent to the requirements of Subsections I, K and L of 20.6.6.25 NMAC. The NMP shall identify the method(s)of crop removal to be employed. The NMP shall be developed for the term of the discharge permit~~,~~ and updated annually~~, and implemented pursuant to the dairy rule~~. The NMP shall be developed, signed and dated annually by an individual certified by the American society of agronomy as a certified crop advisor (CCA) or certified professional agronomist (CPAg) or by an individual certified by the New Mexico office of the USDA-NRCS as a nutrient management planner. The permittee may elect to submit an NMP meeting the requirements of this subsection that is incorporated into a broader plan, such as a comprehensive nutrient management plan or a nutrient management plan prepared to meet the requirements of a permit issued by EPA, in which case only the portions of such plan required by this subsection and section 20.6.6.25 NMAC shall be considered for purposes of the dairy rule. For a renewed permit where the NMP was not submitted in an application, Tthe permittee shall submit the initial NMP by May 1 of the first year the permit is in effect, and the permittee shall submit annual updates to the NMP to the department in the monitoring reports due by May 1 of each year.

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M. Backflow prevention. A permittee shall protect all water wells used within the land application distribution system from contamination by wastewater or stormwater backflow by installing and maintaining backflow prevention methods or devices. Backflow prevention shall be achieved by a total disconnect (physical air gap separation of at least two times the pipe diameter or complete piping separation when wastewater is being pumped) or by the installation of, at a minimum, a ~~reduced pressure principal backflow prevention assembly (RP)~~ air/vacuum relief valve and a low pressure drain valve located immediately upstream of a check valve between the ~~fresh irrigation water supply~~ discharge head of the well pump and wastewater and stormwater delivery systems.

(1) A permittee for a new dairy facility shall install backflow prevention methods or devices and submit written confirmation of installation to the department before discharging at the dairy facility.

(2) A permittee for an existing dairy facility that lacks backflow protection as required by this subsection shall install backflow prevention methods or devices within 90 days of the effective date of the discharge permit. The permittee shall submit written confirmation of installation to the department within 180 days of the effective date of the discharge permit.

N. Backflow prevention by ~~reduced pressure principle~~ check valve backflow prevention ~~assembly~~device - inspection and maintenance. A permittee shall inspect each check valve device at least monthly when the well is operating. ~~have each reduced pressure principle backflow prevention assembly (RP) check valve device inspected and tested by a person qualified by the manufacturer at the time of installation, repair, or relocation, and at least on an annual schedule thereafter.~~ A malfunctioning ~~RP~~ check valve device shall be repaired or replaced within 30 days of discovery, and use of all wastewater supply lines associated with the ~~RP~~ check valve device shall cease until repair or replacement has been completed. Copies of the inspection and maintenance records ~~and test results~~ for each ~~RP~~ check valve device associated with the backflow prevention program for the previous year shall be submitted to the department annually in the monitoring reports due by May 1.

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[20.6.6.21 NMAC - N, 01/31/2011; A, 12/31/2011]

20.6.6.24 MONITORING REQUIREMENTS FOR ALL DAIRY FACILITIES:

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~~**E. Flow meter field calibration.** All flow meters shall be capable of having their accuracy ascertained under actual working (field) conditions. A field calibration method shall be developed for each flow meter and that method shall be used to check the accuracy of each respective meter. Field calibrations shall be performed upon installation and, at a minimum, annually thereafter. Flow meters shall be calibrated to within plus or minus 10 percent of actual flow, as measured under field conditions. Field calibrations shall be performed by an individual knowledgeable in flow measurement and in the installation/operation of the particular device in use. The permittee shall submit the results of annual field calibrations to the department annually in the monitoring reports due by May 1. The flow meter calibration report shall include the following.~~

~~(1) The location and meter identification nomenclature identified by the department through a discharge permit.~~

~~(2) The method of flow meter field calibration employed.~~

~~(3) The measured accuracy of each flow meter prior to adjustment indicating the positive or negative offset as a percentage of actual flow as determined by an in-field calibration check.~~

~~(4) The measured accuracy of each flow meter following adjustment, if necessary, indicating the positive or negative offset as a percentage of actual flow of the meter.~~

~~(5) Any flow meter repairs made during the previous year or during field calibration.~~

[20.6.6.24 NMAC - N, 01/31/2011]

EXHIBIT ASHCRAFT-2

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

NUTRIENT MANAGEMENT
(Ac.)

CODE 590

DEFINITION

Managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

PURPOSE

- To budget, supply, and conserve nutrients for plant production.
- To minimize agricultural nonpoint source pollution of surface and groundwater resources.
- To properly utilize manure or organic by-products as a plant nutrient source.
- To protect air quality by reducing odors, nitrogen emissions (ammonia, oxides of nitrogen), and the formation of atmospheric particulates.
- To maintain or improve the physical, chemical, and biological condition of soil.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where plant nutrients and soil amendments are applied. This standard does not apply to one-time nutrient applications to establish perennial crops.

CRITERIA

General Criteria Applicable to All Purposes

A nutrient budget for nitrogen, phosphorus, and potassium must be developed that considers all potential sources of nutrients including, but not limited to, green manures, legumes, crop residues, compost, animal manure, organic by-products, biosolids, waste water, organic matter, soil biological activity, commercial fertilizer, and irrigation water. Organic and inorganic fertilizer recommendation budgets will be developed using New Mexico State University's (NMSU) Soil Test Interpretation Software (Excel Spreadsheet), or other NRCS approved software.

Enhanced efficiency fertilizers, used in the State must be defined by the Association of American Plant Food Control Officials (AAPFCO) and be accepted for use by the State fertilizer control official, or similar authority, with responsibility for verification of product guarantees, ingredients (by AAPFCO definition) and label claims.

For nutrient risk assessment policy and procedures see Title 190, General Manual (GM), Part 402, Nutrient Management and Title 190, National Instruction (NI), Part 302, Nutrient Management Policy Implementation.
http://directives.sc.egov.usda.gov/Default.aspx

To avoid salt damage, the rate and placement of applied nitrogen and potassium in starter fertilizer must be consistent with New Mexico State University guidelines, or industry practice recognized by NMSU.

The NRCS-approved nutrient risk assessment for nitrogen must be completed on all sites unless the State NRCS, with the concurrence of New Mexico Environment Department (NMED), has determined specific conditions where nitrogen leaching is not a risk to water quality, including drinking water.

The NRCS-approved nutrient risk assessment for phosphorus must be completed when:

- phosphorus application rate exceeds NMSU fertility rate guidelines for the planned crop(s), or
- the planned area is within a phosphorus-impaired watershed (contributes to 303d-listed water bodies), or
- the NRCS and NMED have not determined specific conditions where the risk of phosphorus loss is low.

A phosphorus risk assessment will not be required when the State NRCS, with concurrence of the NMED, has determined specific conditions where the risk of phosphorus loss is low. These fields must have a documented agronomic need for phosphorus; based on Soil Test Phosphorus (STP) and NMSU nutrient recommendations.

On organic operations, the nutrient sources and management must be consistent with the USDA's National Organic Program.

Areas contained within minimum application setbacks (e.g., sinkholes, wellheads, gullies, ditches, or surface inlets) must receive nutrients consistent with the setback restrictions.

Applications of irrigation water must minimize the risk of nutrient loss to surface and groundwater.

Soil pH must be maintained in a range that enhances an adequate level for crop nutrient availability and utilization. Refer to NMSU documentation for guidance.

Soil, Manure, and Tissue Sampling and Laboratory Analysis (Testing)

Nutrient planning must be based on current soil, manure, and (where used as supplemental information) tissue test results developed in accordance NMSU guidance, or industry practice, if recognized by NMSU.

Current soil tests are those that are no older than 3 years, but may be taken on an interval recommended by NMSU. The area represented by a soil test must be that acreage recommended by NMSU. Request analysis specified in NMSU Extension Guide A-122 http://aces.nmsu.edu/pubs/_a/a-122.html .

Where a Conservation Management Unit (CMU) is used as the basis for a sampling unit, all acreage in the CMU must have similar soil type, cropping history, and management practice treatment.

The soil and tissue tests must include analysis pertinent to monitoring or amending the annual nutrient budget, e.g., pH, Electrical Conductivity (EC) and sodicity where salts are a concern, soil organic matter, phosphorus, potassium, or other nutrients and test for nitrogen where applicable. Follow NMSU guidelines regarding recommended analysis.

Many soils and crops in New Mexico also show a need for sulfur, zinc, manganese and other micronutrients.

NRCS NM
September, 2012

If the saturated paste pH_e is greater than 7 an Olsen, (Sodium Bicarbonate) P-test will be done. If the pH is < 7 the Bray P- test will be used. The K-test shall be done using the water extraction method or the ammonium acetate extraction method. Soil pH and Electrical Conductivity (EC) will be determined by saturation extract (salinity assessment). Exchangeable calcium, magnesium and sodium shall also be determined during salinity assessment to assess the sodium adsorption ratio and exchangeable sodium percentage.

Tissue sampling and testing, if used, shall be done in accordance with NMSU standards or recommendations. See NMSU Extension Guide A-123. http://aces.nmsu.edu/pubs/_a/a-123.html Additional nutrients above the budget amount may be added if interpretation of the tissue test indicates a need.

Soil test analysis must be performed by laboratories successfully meeting the requirements and performance standards of the North American Proficiency Testing Program-Performance Assessment Program (NAPT-PAP) under the auspices of the Soil Science Society of America (SSSA) and NRCS, or other NRCS-approved program that considers laboratory performance and proficiency to assure accuracy of soil test results. Alternate proficiency testing programs must have solid stakeholder (e.g., water quality control entity, NRCS State staff, growers, and others) support and be regional in scope.

Nutrient values of manure, organic by-products and bio-solids must be determined prior to land application.

Manure analysis must include, at minimum, total nitrogen (N), ammonium N, total phosphorus (P) or P_2O_5, total potassium (K) or K_2O, and percent solids, or follow NMSU guidance regarding required analysis.

Manure, organic by-products, and bio-solids samples must be collected and analyzed at least annually, or more frequently if needed to account for operational changes (feed management, animal type, manure handling strategy, etc.) impacting manure nutrient concentrations. If no operational changes occur, less frequent manure testing is allowable where operations can document a stable level of nutrient concentrations for the preceding three consecutive years, unless Federal, State, or Local regulations require more frequent testing.

Samples shall be collected, prepared, stored, and shipped, following NMSU Extension Guide A-114.

http://aces.nmsu.edu/pubs/_a/a-114.html . Fields must have 10-15 sub-samples taken to make up the composite samples to be analyzed.

When planning for new or modified livestock operations, acceptable "book values" recognized by the NRCS (e.g., NRCS Agricultural Waste Management Field Handbook http://directives.sc.egov.usda.gov/Default.aspx) and NMSU, or analysis from similar operations in the geographical area, may be used if they accurately estimate nutrient output from the proposed operation.

Manure testing analysis must be performed by laboratories successfully meeting the requirements and performance standards of the Manure Testing Laboratory Certification Program (MTLCP) under the auspices of the Minnesota Department of Agriculture, or other NRCS- approved program that considers laboratory performance and proficiency to assure accurate manure test results.

Nutrient Application Rates

Planned nutrient application rates for nitrogen, phosphorus, and potassium must not exceed NMSU guidelines or industry practice when recognized by the university.

At a minimum, determination of rate must be based on crop/cropping sequence, current soil test results, realistic yield goals, and NRCS- approved nutrient risk assessments.

Recommended nutrient application rates shall be based on NMSU recommendations, see NMSU Fertilizer Guide Extension A-128 http://140.254.84.215/cached.jsp?idx=0&id=150797 and/ or industry practice when recognized by NMSU that consider current test results realistic yield goals and management capabilities. NMSU Fertilizer Interpretation software, (Excel Spreadsheet), or other NRCS approved software may be used to generate a nutrient budget for a given crop.

Realistic yield goals must be established based on historical yield data, soil productivity information, climatic conditions, nutrient test results, level of management, and local research results considering comparable production conditions.

Estimates of yield response must consider factors such as poor soil quality, drainage, pH, salinity, etc., prior to assuming that nitrogen and/or phosphorus are deficient.

For new crops or varieties, industry- demonstrated yield, and nutrient utilization information may be used until land-grant university information is available. The NRCS State Agronomist and NMSU shall establish yield goals and nutrient requirements for new crops as soon as possible.

Lower-than-recommended nutrient application rates are permissible if the grower's objectives are met.

Applications of bio-solids, starter fertilizers, or pop-up fertilizers must be accounted for in the nutrient budget.

The application rate (in/hr) for material applied through irrigation should not exceed the soil intake/infiltration rate and must consider the water holding capacity of the soil root zone and the leaching fraction. See the Irrigation Guide in the NM Field Office Technical Guide (FOTG, Sec I) http://www.nm.nrcs.usda.gov/technical/fotg/section-1/irrigationguide.html for local soil water holding capacities and soil intake rates. Application rates must be adjusted to match the soil intake rate.

Nitrogen Application

Normal N test – When the application rate is based on N (P Index <27) and the preplant/preapplication soil nitrate reading is less than 30 ppm, the **normal agronomic rates of application will be used** (as explained under Nutrient Application Rates).
High N test – When the soil N test is between 30-200 ppm nitrate, **additional testing will be done** to determine when more manure can be added. Additional testing will be done 25% of the way into the growth period of the crop (120 day corn would be tested 30 days after planting). If the pre-application (crop growing) soil test is less than 80 ppm, a maximum rate of 30 lbs/ac of N can be applied.

Excessive N test – When the soil N test is greater than 200 ppm nitrate, **no additional organic nutrient sources containing N can be applied** until the level drops below 80 ppm. Additional testing will be done 25% of the way into the growth period of the crop (120 day corn would be tested 30 days after planting). If the pre-application (crop growing) soil test is less than 80 ppm, a maximum rate of 30 lbs/ac of N can be applied.

Nutrient Sources

Nutrient sources utilized must be compatible with the application timing, tillage and planting system,

soil properties, crop, crop rotation, soil organic content, and local climate to minimize risk to the environment.

Nutrient Application Timing and Placement

Timing and placement of all nutrients must correspond as closely as practical with plant nutrient uptake (utilization by crops), and consider nutrient source, cropping system limitations, soil properties, weather conditions, drainage system, soil biology, and nutrient risk assessment results.

Nutrients must not be surface-applied if nutrient losses offsite are likely. This precludes spreading on:

- frozen and/or snow-covered soils, and
- when the top 2 inches of soil are saturated from rainfall or snow melt.

Exceptions for the above criteria can be made for surface-applied manure when specified conditions are met and adequate conservation measures are installed to prevent the offsite delivery of nutrients. The adequate treatment level and specified conditions for winter applications of manure must be defined by NRCS in concurrence with the water quality control authority in the State. At a minimum, the following site and management factors must be considered:

- slope,
- organic residue and living covers,
- amount and form of nutrients to be applied, and
- adequate setback distances to protect local water quality.

Additional Criteria to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater

Planners must use the current NRCS-approved nitrogen, phosphorus, and soil erosion risk assessment tools to assess the risk of nutrient and soil loss. Identified resource concerns must be addressed to meet current planning criteria (quality criteria). Technical criteria for risk assessments can be found in National Instruction, NI-190-302. http://directives.sc.egov.usda.gov/Default.aspx

When there is a high risk of transport of nutrients, conservation practices must be coordinated to avoid, control, or trap manure and nutrients before they can leave the field by surface or subsurface drainage (e.g., tile).

The number of applications and the application rates must also be considered to limit the transport of nutrients to tile.

Nutrients must be applied with the right placement, in the right amount, at the right time, and from the right source to minimize nutrient losses to surface and groundwater. The following nutrient use efficiency strategies or technologies must be considered:

- slow and controlled release fertilizers
- nitrification and urease inhibitors
- enhanced efficiency fertilizers
- incorporation or injection
- timing and number of applications
- soil nitrate and organic N testing
- coordinate nutrient applications with optimum crop nutrient uptake
- Corn Stalk Nitrate Test (CSNT), Pre-Sidedress Nitrate Test (PSNT), and Pre-Plant Soil Nitrate Test (PPSN)
- tissue testing, chlorophyll meters, and spectral analysis technologies
- other land-grant university recommended technologies that improve nutrient use efficiency and minimize surface or groundwater resource concerns.

Additional Criteria Applicable to Properly Utilize Manure or Organic By-Products as a Plant Nutrient Source

When manures are applied, and soil salinity is a concern, salt concentrations must be monitored to prevent potential crop damage and/or reduced soil quality.

The total single application of liquid manure:

- must not exceed the soil's infiltration or water holding capacity
- be based on crop rooting depth
- must be adjusted to avoid runoff or loss to subsurface tile drains.

Crop production activities and nutrient use efficiency technologies must be coordinated to take advantage of mineralized plant-available nitrogen to minimize the potential for nitrogen losses due to de-nitrification or ammonia volatilization.

Nitrogen, and phosphorus application rates must be planned based on risk assessment results as determined by NRCS-approved nitrogen,

(http://www.nm.nrcs.usda.gov/technical/tech-notes/agro/ag61.doc) and phosphorus, (Phosphorus Assessment Tool) risk assessment tools.

For fields receiving manure, where phosphorus risk assessment results equate to:

- **LOW** risk, additional phosphorus and potassium can be applied at rates greater than crop removal not to exceed the nitrogen requirement for the succeeding crop.
- **MODERATE** risk, additional phosphorus and potassium may be applied at a phosphorus crop removal rate for the planned crops in the rotation.
- **HIGH** risk, additional phosphorus and potassium may be applied at phosphorus crop removal rates if the following requirements are met:
  - a soil phosphorus drawdown strategy has been implemented, and
  - a site assessment for nutrients and soil loss has been conducted to determine if mitigation practices are required to protect water quality,
  - any deviation from these high risk requirements must have the approval of the Chief of the NRCS.

The Phosphorous Index, (PI) for NM is described Agronomy Technical Note 57. Download "Worksheet" under Agronomy Tech note 57. http://www.nm.nrcs.usda.gov/technical/tech-notes/agro.html

Manure or organic by-products may be applied on legumes at rates equal to the estimated removal of nitrogen in harvested plant biomass, not to exceed NMSU recommendations.

Manure may be applied at a rate equal to the recommended phosphorus application, or estimated phosphorus removal in harvested plant biomass for the crop rotation, or multiple years in the crop sequence at one time. When such applications are made, the application rate must not exceed the acceptable phosphorus risk assessment criteria, must not exceed the recommended nitrogen application rate during the year of application or harvest cycle, and no additional phosphorus must be applied in the current year and any additional years for which the single application of phosphorus is supplying nutrients.

Setbacks are required for application of manure, litter, and lagoon or pond waste water. No application can be made closer than 100-feet to any down gradient surface open tile line intake structure, sink holes, well heads, or other conduits to surface or ground water. A vegetated buffer (grass, no shrubs) 35- feet wide or more will allow organic application adjacent to the buffer.

Nutrient Values

Nutrient values of manure and other organic by-products shall be determined prior to land application based on laboratory analysis, acceptable "book values" recognized by the NRCS and/or NMSU, or historic records for the operation (two or three years of no operational change), if they accurately estimate the nutrient content of the materials. At a minimum, manure analysis shall identify nutrient and specific ion concentrations, percent moisture, and percent organic matter. Salt concentration shall be monitored so that manure applications do not cause plant damage or negatively impact soil quality.

Book values recognized by NRCS may be found in the Agricultural Waste Management Field Handbook (AWMFH), Chapter 4 – Agricultural Waste Characteristics.

http://directives.sc.egov.usda.gov/Default.aspx

Acceptable values for NM can be found in the NM Nutrient Management specification. Heavy metals in bio-solids have additional criteria.

Additional Criteria to Minimize Agricultural Non point Source Pollution of Surface and Ground Water Resources

An assessment shall be completed of the potential for nitrogen and/or phosphorus transport from the field if any waters of concern may be affected. Waters of concern include but are not limited to waters of the US, 303d listed steams, wells, other streams, high ground water, ponds, arroyos that flow part of the year, and lakes. The **Leaching** Index (LI) and/or Phosphorus Index (PI), or other recognized assessment tools, may be used to make these assessments. The results of these assessments and recommendations shall be discussed with the client and included in the practice planning.

Nutrient Management practices developed to minimize agricultural non-point source pollution of surface or ground water resources shall include practices and/or management activities that can reduce the risk of nitrogen or phosphorus movement from the field.

Additional Criteria to Protect Air Quality by Reducing Odors, Nitrogen Emissions and the Formation of Atmospheric Particulates

To address air quality concerns caused by odor, nitrogen, sulfur, and/or particulate emissions; the source, timing, amount, and placement of nutrients must be adjusted to minimize the negative impact of these emissions on the environment and human health. One or more of the following may be used:

- slow or controlled release fertilizers
- nitrification inhibitors
- urease inhibitors
- nutrient enhancement technologies
- incorporation
- injection
- stabilized nitrogen fertilizers
- residue and tillage management
- no-till or strip-till
- other technologies that minimize the impact of these emissions

Do not apply poultry litter, manure, or organic by-products of similar dryness/density when there is a high probability that wind will blow the material offsite.

Additional Criteria to Improve or Maintain the Physical, Chemical, and Biological Condition of the Soil to Enhance Soil Quality for Crop Production and Environmental Protection

Time the application of nutrients to avoid periods when field activities will result in soil compaction. In areas where salinity is a concern, select nutrient sources that minimize the buildup of soil salts.

Nutrients shall be applied and managed in a manner that maintains or improves the physical, chemical and biological condition of the soil. Use of nutrient sources with high salt content relative to the nutrient value will be minimized to prevent damage to plants. Salt levels will be monitored by soils testing to see that they do not exceed the permissible EC rate for the crop to be grown. See Table 4 in the NM Irrigation Guide in Sec. 1 of the FOTG for the maximum allowable salt levels by crop.

Nutrients shall not be applied to flooded or saturated soils by ground equipment when the potential for soil compaction and creation of ruts is high.

Additional Criteria for Subsurface Drip Irrigation

If nutrients are added to Subsurface Drip Irrigation (SDI) systems, a jar test must be done to determine if any of the material being added to the system will cause solids to precipitate out causing the system to plug and fail. The jar test is simply a mixture of the fertilizers (at the field concentration) applied to the water and left to stand to see if any of material settles out. See Agronomy Tech Note 71. http://www.nm.nrcs.usda.gov/technical/tech-notes/agro.html

CONSIDERATIONS

Consider induced deficiencies of nutrients due to excessive levels of other nutrients.

Elevated soil test phosphorus levels are detrimental to soil biota. Soil test phosphorus levels should not exceed State-approved soil test thresholds established to protect the environment.

Consider the potential for nitrogen leaching into shallow ground water and potential health impacts.

Volatilization losses can become significant, if manure is not immediately incorporated into the soil after application.

Soil test information no older than one year, particularly if organic nutrients are used.

Conduct annual reviews to determine if changes in the nutrient budget are needed especially if livestock numbers or land acreage changes up or down 20%.

To prevent leaf burn for some crops, apply liquids according to local climatic conditions or the NRCS irrigation guide. Application rate should vary according to the salt content (electrical conductivity for the liquid and the salt tolerance of the crop). See Table 4 in the Irrigation Water Quality section of the Irrigation Guide in Section I of the FOTG.

Use no-till/strip-till in combination with cover crops to sequester nutrients, increase soil organic matter, increase aggregate stability, reduce compaction, improve infiltration, and enhance soil biological

activity to improve nutrient use efficiency.

Use nutrient management strategies such as cover crops, crop rotations, and crop rotations with perennials to improve nutrient cycling and reduce energy inputs.

Use variable-rate nitrogen application based on expected crop yields, soil variability, soil nitrate or organic N supply levels, or chlorophyll concentration.

Use variable-rate nitrogen, phosphorus, and potassium application rates based on site-specific variability in crop yield, soil characteristics, soil test values, and other soil productivity factors.

Develop site-specific yield maps using a yield monitoring system. Use the data to further diagnose low- and high- yield areas, or zones, and make the necessary management changes. See Title 190, Agronomy Technical Note (TN) 190.AGR.3, Precision Nutrient Management Planning.
Use manure management conservation practices to manage manure nutrients to limit losses prior to nutrient utilization.

Apply manure at a rate that will result in an "improving" Soil Conditioning Index (SCI) without exceeding acceptable risk of nitrogen or phosphorus loss.

Avoid applying manure and organic byproducts upwind of occupied structures.

When applying manure with irrigation equipment, modify equipment to reduce the potential for volatilization of nitrogen from the time the manure leaves the application equipment until it reaches the surface of the soil (e.g. reduced pressure, drop down tubes for center pivots). N volatilization from manure in a surface irrigation system will be reduced when applied under a crop canopy.

Use legume crops and cover crops to provide nitrogen through biological fixation and nutrient recycling.

Modify animal feed diets to reduce the nutrient content of manure following guidance contained in Conservation Practice Standard (CPS) Code 592, Feed Management.

Soil test information should be no older than 1 year when developing new plans. Excessive levels of some nutrients can cause induced deficiencies of other nutrients, e.g., high soil test phosphorus levels can result in zinc deficiency in corn. Use soil tests, plant tissue analysis, and field observations to check for secondary plant nutrient deficiencies or toxicity that may impact plant growth or availability of the primary nutrients.

Use the adaptive nutrient management learning process to improve nutrient use efficiency on farms as outlined in the NRCS' National Nutrient Policy in GM 190, Part 402 Nutrient Management.

Potassium should not be applied in situations where an excess (greater than soil test potassium recommendation) causes nutrient imbalances in crops or forages.

Workers should be protected from and avoid unnecessary contact with plant nutrient sources. Extra caution must be taken when handling anhydrous ammonia or when dealing with organic wastes stored in unventilated enclosures.

Material generated from cleaning nutrient application equipment should be utilized in an environmentally safe manner. Excess material should be collected and stored or field applied in an appropriate manner. Nutrient containers should be recycled in compliance with State and local guidelines or regulations.

Considerations to Minimize Agricultural Nonpoint Source Pollution of Surface and Groundwater

Use conservation practices that slow runoff, reduce erosion, and increase infiltration, e.g., filter strip, contour farming, or contour buffer strips. These practices can also reduce the loss of nitrates or soluble phosphorus.

Use application methods and timing strategies that reduce the risk of nutrient transport by ground and surface waters, such as:

- split applications of nitrogen to deliver nutrients during periods of maximum crop utilization,
- banded applications of nitrogen and/or phosphorus to improve nutrient availability,
- drainage water management to reduce nutrient discharge through drainage systems, and
- incorporation of surface-applied manures or organic by-products if precipitation capable of producing runoff or erosion is forecast within the time of planned application,
- avoid winter nutrient application for spring seeded crops,
- avoid winter plow out of alfalfa to release

nitrate when plants can use it in the spring,

- use precision agricultural techniques to apply nutrient materials uniformly,
- incorporation of applied manure or organic by-products immediately,
- delay field application of animal manures or other organic by-products if precipitation capable of producing runoff and erosion is forecast within 24 hours of the time of the planned application,
- ammonia based N fertilizers should be incorporated the same day applied.

Use the agricultural chemical storage facility conservation practice to protect air, soil, and water quality.

Use bioreactors and multistage drainage strategies when approved by the land-grant university.

Considerations to Protect Air Quality by Reducing Nitrogen and/or Particulate Emissions to the Atmosphere

Avoid applying manure and other by-products upwind of inhabited areas.

Use high-efficiency irrigation technologies (e.g., reduced-pressure drop nozzles for center pivots) to reduce the potential for nutrient losses.

PLANS AND SPECIFICATIONS

The following components must be included in the nutrient management plan, (See NM Nutrient Management Specification 590):

- aerial site photograph(s)/imagery or site map(s), and a soil survey map of the site,
- soil information including: soil type surface texture, pH, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and/or ponding frequency,
- location of designated sensitive areas and the associated nutrient application restrictions and setbacks,
- for manure applications, location of nearby residences, or other locations where humans may be present on a regular basis, and any identified meteorological (e.g., prevailing winds at different times of the year), or topographical influences that may affect the transport of odors to those locations,
- results of approved risk assessment tools for nitrogen, phosphorus, and erosion losses,
- documentation establishing that the application site presents low risk for phosphorus transport to local water when phosphorus is applied in excess of crop removal,
- current and/or planned plant production sequence or crop rotation,
- soil, water, compost, manure, organic by-product, and plant tissue sample analyses applicable to the plan,
- soil test phosphorus and/or risk assessment levels at which the plan would require that no phosphorus in any form be applied,
- when soil phosphorus levels are increasing, include a discussion of the risk associated with phosphorus accumulation and a proposed phosphorus draw-down strategy,
- realistic yield goals for the crops,
- complete nutrient budget for nitrogen, phosphorus, and potassium for the plant production sequence or crop rotation,
- listing and quantification of all nutrient sources and form,
- all enhanced efficiency fertilizer products that are planned for use,
- in accordance with the nitrogen and phosphorus risk assessment tool(s), specify the recommended nutrient application source, timing, amount (except for precision/variable rate applications specify method used to determine rate), and placement of plant nutrients for each field or management unit, and
- guidance for implementation, operation and maintenance, and recordkeeping.

In addition, the following components must be included in a precision/variable rate nutrient management plan:

- Document the geo-referenced field boundary and data collected that was processed and analyzed as a GIS layer or layers to generate nutrient or soil amendment recommendations.
- Document the nutrient recommendation guidance and recommendation equations used to convert the GIS base data layer or layers to a nutrient source material recommendation GIS layer or layers.
- Document if a variable rate nutrient or soil

amendment application was made.

- Provide application records per management zone or as applied map within individual field boundaries (or electronic records) documenting source, timing, method, and rate of all applications that resulted from use of the precision agriculture process for nutrient or soil amendment applications.
- Maintain the electronic records of the GIS data layers and nutrient applications for at least 5 years.

If increases in soil phosphorus levels are expected (i.e., when N-based rates are used), the nutrient management plan must document:

- the soil phosphorus levels at which it is desirable to convert to phosphorus based planning and/or no further phosphorus application,
- the potential plan for soil test phosphorus drawdown from the production and harvesting of crops, and
- management activities or techniques used to reduce the potential for phosphorus transport and loss,
- for AFOs, a quantification of manure produced in excess of crop nutrient requirements, and
- a long-term strategy and proposed implementation timeline for reducing soil P to levels that protect water quality and allow for application of P at crop-removal rates,
- a rationale for P applications in excess of crop removal when the phosphorus risk assessment equates to a low risk for P transport to surface or groundwater.

OPERATION AND MAINTENANCE

Conduct periodic plan reviews to determine if adjustments or modifications to the plan are needed. At a minimum, plans must be reviewed and revised, as needed with each soil test cycle, changes in manure volume or analysis, crops, or crop management.

Fields receiving animal manures and/or bio-solids must be monitored for the accumulation of heavy metals and phosphorus in accordance with land-grant university guidance and State law.

Significant changes in animal numbers, management, and feed management will necessitate additional manure analyses to establish a revised average nutrient content.

Calibrate application equipment to ensure accurate distribution of material at planned rates. Document the nutrient application rate. When the applied rate differs from the planned rate, provide appropriate documentation for the change.

Records must be maintained for at least 5 years to document plan implementation and maintenance. As applicable, records include:

- soil, plant tissue, water, manure, and organic by-product analyses resulting in recommendations for nutrient application,
- quantities, analysis and sources of nutrients applied,
- dates, and method(s) of nutrient applications, source of nutrients, and rates of application,
- weather conditions and soil moisture at the time of application; lapsed time to manure incorporation; rainfall or irrigation event,
- crops planted, planting and harvest dates, yields, nutrient analyses of harvested biomass, and crop residues removed,
- dates of plan review, name of reviewer, and recommended changes resulting from the review, and
- all enhanced efficiency fertilizer products used.

Additional records for precision/variable rate sites must include:

- maps identifying the variable application source, timing, amount, and placement of all plant nutrients applied, and
- GPS-based yield maps for crops where yields can be digitally collected.

REFERENCES

Association of American Plant Food Control Officials (AAPFCO). 2011. AAPFCO Official Publication no. 64. AAPFCO Inc., Little Rock, AR.

Follett, R.F. 2001. Nitrogen transformation and transport processes. *In* Nitrogen in the environment; sources, problems, and solutions, (eds.) R.F. Follett and J. Hatfield, pp. 17-44. Elsevier Science Publishers. The Netherlands. 520 pp.

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Stevenson, F.J. (ed.) 1982. Nitrogen in agricultural soils. Agron. Series 22. ASA, CSSA, and SSSA, Madison, WI.
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U.S. Department of Agriculture, Natural Resources Conservation Service. 2011. Title 190, General Manual, (GM), Part 402, Nutrient Management. Washington, DC.
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NRCS NM
September, 2012

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE SPECIFICATON

NUTRIENT MANAGEMENT

(Acre)
CODE 590

The nutrient management component of a Resource Management System (RMS) is a record of the producer's decisions for managing the amount (rate), source, placement (method of application), and timing of plant nutrients and soil amendments.

The objective for applying nutrient management in accordance with the 590 Standard is to enhance the quantity and quality of commodities while minimizing negative impacts of excess nutrients on soil, water, air, plant and animal resources and on humans. A narrative can be developed that explains what is required to be done for the chosen alternative. The Planner should explain how the alternative fulfills RMS criteria.

The **NM 590 Jobsheet** will be used when planning and applying alternatives that include nutrient management. See Instructions starting on **page 3.**

The following components shall be included in the nutrient management practice specification:

- Field(s) identification (name or number) and acres,
- aerial photograph or map and a soil map of the site,
- current and/or planned plant production sequence or crop rotation,
- results of soil, plant, water, manure or other organic by-product sample analyses,
- realistic yield goals for the crops in the rotation,
- quantification of all nutrient sources,
- recommended nutrient rates, timing, form, and method of application and incorporation,
- location of designated sensitive areas or resources and the associated, nutrient management restriction,
- guidance for implementation, operation, maintenance, record keeping, and
- complete nutrient budget for nitrogen, phosphorus, and potassium for the rotation or crop sequence.

If increases in soil phosphorus levels are expected, the specification shall document:

- the Phosphorus Index Rating (NM PI) at which it may be desirable to convert from a nitrogen base to phosphorus based implementation, (see the NM PI),
- the relationship between soil phosphorus levels and potential for phosphorus transport from the field, (see the NM PI), and
- the potential for soil phosphorus draw-down from the production and harvesting of crops.

Nutrient Management should be considered inseparable from soil health. To move towards a Soil Health Management System (SHMS), a comprehensive evaluation of chemical, physical and biological indicators is

needed. This includes:

- ❑ Plant tissue tests for a more precise evaluation the fate of applied nutrients See NMSU Extension Guide A-123. http://aces.nmsu.edu/pubs/_a/a-123.html
- ❑ Water tests for salt and other nutrient levels See NMSU Extension guide W-102 http://aces.nmsu.edu/pubs/_water/Guide_W-102.pdf
- ❑ Slake test for aggregate stability. http://ocw.tufts.edu/data/32/383298.pdf
- ❑ Available water capacity determination to measure soils ability to store water. http://www.nm.nrcs.usda.gov/technical/tech-notes/agro/ag46.pdf
- ❑ Surface and subsurface hardness to measure soils resistance to infiltration http://soilhealth.cals.cornell.edu/extension/manual/2testing.pdf
- ❑ Active Carbon test to evaluate the level of microbial activity in the soil see: http://www.nm.nrcs.usda.gov/technical/handbooks/iwm/NM_IWM_Field_Manual/Section17/17a-Reactive_C_Field_Kit_Overview_power_point.pdf
- ❑ Potentially mineralize-able Nitrogen a biological activity indicator and N indicator
- ❑ Root health rating to measure root health and vigor
- ❑ Earthworm count, an additional biological indicator http://soilhealth.cals.cornell.edu/extension/manual/2testing.pdf

OPERATION AND MAINTENANCE

Operation and maintenance will address the following:

- Continuous evaluation of soil health indicators
- periodic specification review to determine if adjustments or modifications to the practice are needed. As a minimum, the specification will be reviewed and revised with each soil test cycle.
- protection of fertilizer and organic by-product storage facilities from weather and accidental leakage or spillage.
- calibration of application equipment to ensure uniform distribution of material at planned rates.
- documentation of the actual rate at which nutrients were applied. When the actual rates used differ from or exceed the recommended and planned rates, records will indicate the reasons for the differences.

Maintaining records to document practice implementation. As applicable, records include:

- soil test results and recommendations for nutrient application,
- quantities, analyses and sources of nutrients applied,
- dates and method of nutrient applications,
- crops planted, planting and harvest dates, yields, and crop residues removed,
- results of water, plant, and organic by-product analysis, and
- dates of review and person performing the review, and recommendations that resulted from the review.

Records should be maintained for five years; or for a period longer than five years if required by other Federal, state, or local ordinances, or program or contract requirements.

Workers should be protected from and avoid unnecessary contact with chemical fertilizers and organic by-products. Protection should include the use of protective clothing when working with plant nutrients. Extra caution must be taken when handling ammonia sources of nutrients, or when dealing with organic wastes stored in unventilated enclosures.

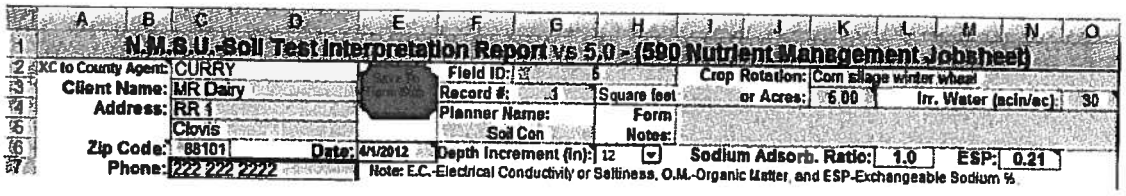
The disposal of material generated by the cleaning nutrient application equipment should be accomplished properly. Excess material should be collected and stored or field applied in an appropriate manner. Excess material should not be applied on areas of high potential risk for runoff and leaching.

The disposal or recycling of nutrient containers should be done according to state and local guidelines or regulations.

Instructions for 590 Jobsheet

Report sheet

Note: Many of the data entry boxes have a pop-up comment that describes how the data should be entered.



Enter **Client Name, Address** and **Phone.**

Enter **Zip Code** from pull down menu. County Name will auto-populate on first line, (XC to County Agent).

Enter **Field ID** and **Crop Rotation.**

Enter **Record#, Square Ft.** or **Acres.**

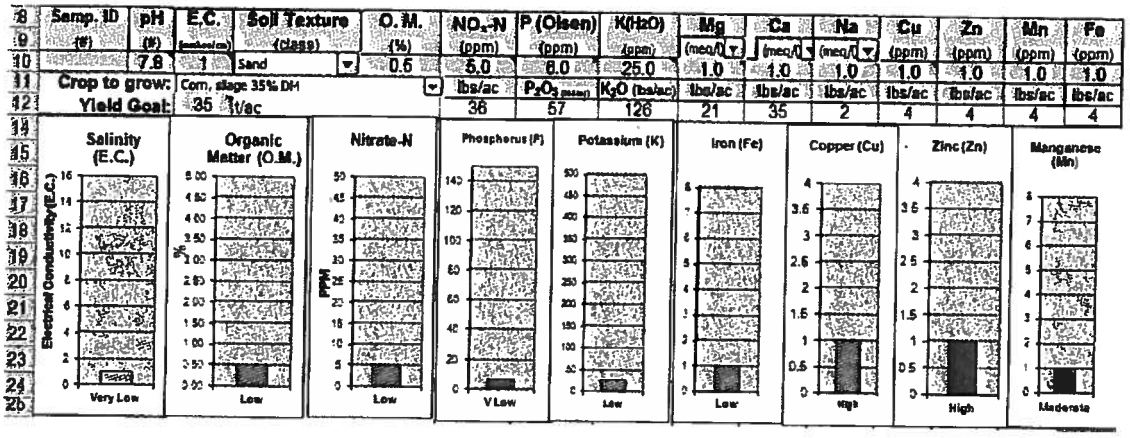
Enter **Irrigation Water (ac in/ac).** This is the total inches of water applied per irrigation season. It will be used to calculate the lbs of Nitrate-N, (NO_3-N), applied in seasonal irrigation water if tested.

Enter **Planner Name** and **Form Notes.**

Enter **Date** that the interpretation was completed.

Enter **Depth increment (in)** that sample was taken from.

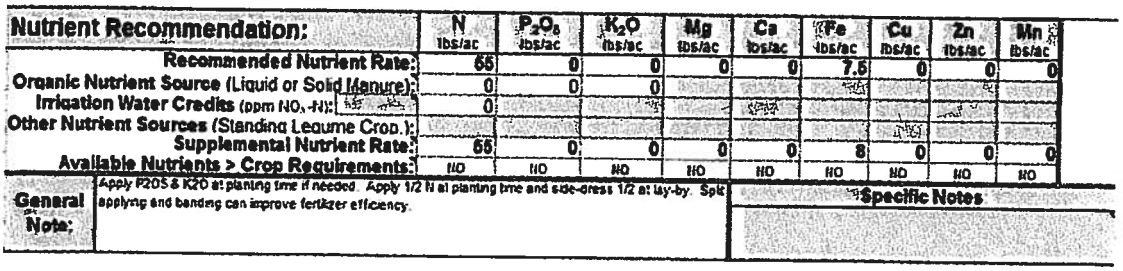
Sodium Adsorption Ratio, (SAR) and Exchangeable Sodium Percentage, (ESP) are calculated and will auto-populate based on level of Na, Mg and Ca entered.



Enter **Sample ID#**

Enter **pH, EC, Soil Texture, OM, NO_3-N, P(Olsen), K(H_2O), Mg, Ca, Na, Cu, Zn, Mn** and **Fe** from an approved laboratory's analysis. Make sure units for Mg, Ca and Na are entered as reported in the lab analysis, either as meq/l or as ppm. Amounts in lbs/ac and color-coded bar graphs will auto-populate.

Enter **Crop to Grow** from pull-down menu and enter **Yield Goal**.



Recommended Nutrient Rate auto-populates from data entered.

Organic Nutrient Source auto-populates from entries on the Organic Nutrient Source sheet, if used.

Irrigation Water Credits can be added from a water analysis report.

Other Nutrient Sources such as from a standing legume crop can be added. See **Nitrogen Credits Table** on page 12

Supplemental Nutrient Rate auto-populates.

If **Available Nutrients > Crop requirements,** a "Yes" appears. If not "No" appears. If the word "Caution" appears it indicates that the nutrient will exceed recommended levels

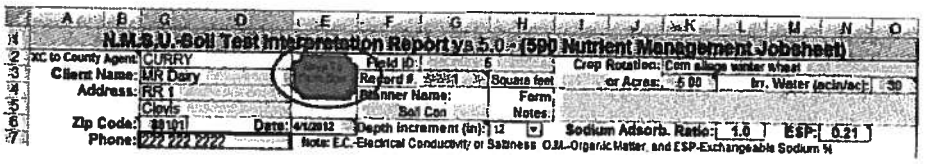
General Note auto-populates. **Specific Notes** can be added.

Salinity Rating	Very Low		0	lbs/ac or	0	lbs/1000ft²	No sodium issues	
Salinity not an issue		Suggested Fertilizer Blend			659	lbs/ac	N Solutions 28%	3,295.0 lbs Total Needed
		Total Blend (lbs/ac):	716		57	lbs/ac	18-46-0 (DAP)	285.8 lbs Total Needed
		Blend Cost ($/ac):	$35.15		0	lbs/ac		0.0 lbs Total Needed
Client Signature:		Planner Signature:				27%	45%	0%	3,581.8 Tt Blend (lbs)
Fertilizer Cost Note: *Default costs are from NASS and are estimated. Enter actual cost in "Fert Cost" tab. Application cost not included.*								

Salinity Rating auto populates.

Gypsum Rate auto-populates.

Suggested Fertilizer Blend auto-populates lbs/ac and total lbs needed. The N, P and K materials are selected on the **Fertilizer Cost sheet** from the pull down menus. These choices auto-populate the second and third columns and the salmon colored box next to the **Planner Signature** box.



When all data has been entered the **Save to Farm Sum** button will auto-populate the **Farm Summary of Nutrient Recommendation** sheet which can be used to share data with the producer.

Organic and Manure Application sheet

Organic Nut Source | Report | Farm Sum | P Uptake | Nutrients | Nut Cost | Crop | Tables | P4

590 Nutrient Mgt. Jobsheet for Organic and Manure Land Application						
Client Name:	Mr Dairy Producer	Acres:	130	Date: 4/2/2012	Field ID:	Field 1
Application information (enter the units that will be or has been applied to the field):	Crop Rotation: Corn silage Wheat			Needed for field (acin):		130
	Liquid Applied:	1	Acin/ac	(gal):		3,529,500
	Solids Applied:	1	ton/ac	Needed for field (tons):		130
	Liquid Loads Applied:	1	1000gal/ac	Loads needed for field:		130

Client Name, Acres, Date, Field ID and Crop Rotation will auto-populate from data entered on the **Report sheet.**

Enter **Liquid Applied. Needed for Field (ac in) and (gal)** will auto-populate

Enter **Solids Applied. Needed for Field(tons)** will auto-populate

Enter **Liquid Loads Applied. Loads needed for Field** will auto-populate.

Solid-Lab Report	% Moisture		TKN (%) (dry)		NH_4-N (ppm) (dry)		P_2O_5 (%) (dry)		K_2O (%) (dry)	
Fill in Lab data:										
Solid Book Values (select even if test values are used)	% Moisture		TKN (lbs/wet ton)		NH_4-N (lbs/ton)		P_2O_5 (lbs/wet ton)		K_2O (lbs/wet ton)	
	Book	Test	Book	Test	Book	Test	Book	Test	Book	Test
Beef (DM)	0	0	34	0	10.3	0.0	35	0	60	0

Enter Solid-Lab Report data for: **Moisture, TKN, NH_4-N, P_2O_5 and K_20**

Select type of **Solids** from pull down menu. **Book** values will auto-populate. Enter **Test** values.

Liquid-Lab Report	NH_3-N (mg/L)		TKN (mg/L)		NO_3-N (mg/L)		Tot-PO_4 (mg/L)		K (mg/L)	
Fill in Lab data:										
Liquid	% Moisture		TKN (lbs/acin)		NH_4-N (lbs/acin)		P_2O_5 (lbs/acin)		K_2O (lbs/acin)	
	Book	Test	Book	Test	Book	Test	Book	Test	Book	Test
NM Dairy Ponds (99-99.4% liq.)	99		106	0	59	0	35	0	256	0
			TKN (lbs/1000gal)		NH_4-N (lbs/1000gal)		P_2O_5 (lbs/1000gal)		K_2O (lbs/1000gal)	
			Book	Test	Book	Test	Book	Test	Book	Test
			3.9	0.0	2.2	0.0	1.3	0.0	9.4	0.0

Enter Liquid-Lab Report data for: **TKN, NH_4-N, Total P_4 and K_20**

Select type of **Liquid** from pull down menu. **Book** values will auto-populate. Enter **Test** values.

N Volatilization			
Solid (type of application)	Type of Climate	Percent Remaining	NH_4-N Remaining
Broadcast-incorporated in 4 days	Warm Wet	80 %	8 (lbs/ton) NH4-N
Liquid (type of application)	Type of Climate	Percent Remaining	32.7 (lbs/acin) NH4-N
Sprinkler w/o incorporation	Warm Wet	55 %	1.2 (lbs/1000gal) NH4-N

Select type of **Solid** application and **Type of climate** from pull down menus. **Percent Remaining** and **NH_4-N Remaining** will auto-populate.

Select type of **liquid** application and **Type of climate** from pull down menus. **Percent Remaining** and **NH_4-N Remaining** will auto-populate.

Mineralization of N, P, & K				
Manure Source	Percent Nutrient Available the 1st Year			
	Organic N	P	K	
Soy meal (6.5-1.5-2.4)	75 %	75 %	80 %	Solid Source
Lagoon or diluted Pond	40 %	75 %	80 %	Liquid Source
Solid	Organic N (lbs/ton)	P_2O_5 (lbs/ton)	K_2O (lbs/ton)	
	18	26	48	
Liquid	Organic N (lbs/acin)	P_2O_5 (lbs/acin)	K_2O (lbs/acin)	
	19	26	205	
	Organic N (lbs/1000gal)	P_2O_5 (lbs/1000gal)	K_2O (lbs/1000gal)	
	0.69	1.0	7.5	

Select **Manure Source** from pull down menus. All other boxes will auto-populate.

Denitrification of N		
Organic Matter Content (%)	Soil Drainage Class (See Survey Information)	Percent Remaining (%)
<2	Poorly Drained	60

Select type **Organic Matter Content % and Soil Drainage Class** from pull down menus. **Percent Remaining** will auto-populate.

Summary of Nutrients			
Net by Form as applied	lbs/1000gal	lbs/ac in	lbs/ton
N	1.1	31	13
P_2O_5	1.0	26	32
K_2O	7.5	205	54
Total Nutrients Applied (net to the field)	All Forms N (lbs/ac)	P_2O_5 (lbs/ac)	K_2O (lbs/ac)
	178.2	233.1	1043.1

Summary of Nutrients will auto-populate.

Farm Summary of Nutrient Recommendation sheet

Farm Summary of Nutrient Recommendation

Client	MR Dairy		Date:	4/1/12	Planner: Soil Con				Year: 2007		
Field Data	Record #	1	2	3	4	5	6	7	8	9	Total by Farm
	Field #	5									
	Acres:	5									5
	Crop Grown:	Corn, silage 35% DM									
Nutrients Needed	N (lb/ac)	263									
	P_2O_5 (lb/ac)	80									
	K_2O (lb/ac)	80									
Material per acre	Effluent (acre/ac)	4.0									
	Effluent (gal/ac)	108,600									
	Solids (tons/ac)	4.0									
	N (lb/ac)	56									
	P_2O_5 (lb/ac)	0									
	K_2O (lb/ac)	0									
Material Needed, field basis	Effluent (acre/field)	20									20
	Effluent (gal/field)	543,000									543,000
	Solids (tons/field)	20									20
	N Fert. (lb/yr)										
	N Fert. (lb/a)	619									619
	P_2O_5 Fert. (lb/yr)										
	P_2O_5 Fert. (lb/acre)	0									0
	K_2O Fert. (lb/yr)										
	K_2O Fert. (lb/acre)	0									0

Client, Date, Planner and **Year, Field Data, Nutrients Needed, Material per Acre and Material Needed, field basis** will auto-populate.

Clear Summary button clears the page.

This sheet can be used to present multiple field nutrient analysis data to the farmer.

Phosphorous Removed sheet

590 Nutrient Management Jobsheet for Phosphorus Removed by Crop Harvest

Client Name: MR Dairy **Date:** 4/1/2012
Field: 6

P Index (#): 35 **P Based (at 1.6 X crop removal)**

Type of Application (Units)	P_2O_5 (lbs/units)	Crop (name)	Acres (Ac)	Organic P_2O_5 Applied (lbs/ac)	P_2O_5 Crop Uptake (lbs/ac)	Total Amt. that can be applied by type* (Units/ac)
Liquid (ac in):	26.3	Corn, silage 35% DM	5	26	140	8 0
Liquid (1000 gal units):	1.0			1		217 6
Solid (tons):	26.5			26		8 0
			Total P Applied	54		

*Note: "None" means that because of the risk of P in the enviroment no more organic nutrients can be applied until the PI drops to 37 or lower. "NA" means that no application of that type is scheduled.
The number is the number of acre inches, 1000 gal units, or tons that can be applied and meet the P restrictions.
"N Based" means that orgainic nutrients can be applied based on the N requirement of the Crop.

Client Name, Date and **Field** will auto-populate.

Enter the **P Index (#)** from The Phosphorous Index, (PI) for NM. See Agronomy Technical Note 57. Download "Worksheet" under Agronomy Tech note 57. http://www.nm.nrcs.usda.gov/technical/tech-notes/agro.html

Remainder of boxes will auto-populate

Records sheet

NUTRIENT MANAGEMENT RECORDS JOB SHEET

Client: | Report Period: | to | Reviewer: mas

Truck Spreader Size (dry): tons/load | Spreader Size (Liquid): gallons | Date:

Application Record

Field (#)	Date Applied (date)	Acres (ac)	Current Crop (name)	Past Crop (name)	Harv. Date (mm/dd)	Yield (unit/ac)	Field Applied (lbs/ac)[1]		Field Applied (lbs/ac)[1]		Field Applied (lbs/ac)[1]
		N Application Section						P_2O_5 Application		K_2O Application	
		Vol. of Effluent Applied (ac in)				31 lbs/ac in		26 lbs/ac in		205 lbs/ac in	
		Loads Dry Applied (Number)				16 lbs/ton		26 lbs/ton		48 lbs/ton	
		Loads Liquid Applied (Number)				1.1 lbs/1000 gal		0.97 lbs/1000 gal		7.536 lbs/1000 gal	
		Commercial N applied with seed:									
		Commercial N applied, rest of the year:									
Res. Removed		Gross N (lbs/unit)	166 lbs/ac in		Total N applied:			Total P_2O_5:		Total K_2O:	
	lbs/ac		44 lbs/ton		Recom. N			Recom. P_2O_5:		Recom. K_2O:	
Field (#)	Date Applied (date)	Acres (ac)	Current Crop (name)	Past Crop (name)	Harv. Date (mm/dd)	Yield (unit/ac)	Field Applied (lbs/ac)[1]		Field Applied (lbs/ac)		Field Applied (lbs/ac)[1]
		N Application Section						P_2O_5 Application Sect.		K_2O Application Section	
		Vol. of Effluent Applied (ac in)				31 lbs/ac in		26 lbs/ac in		205 lbs/ac in	
		Loads Dry Applied (Number)				16 lbs/ton		26 lbs/ton		48 lbs/ton	
		Loads Liquid Applied (Number)				1.1 lbs/1000 gal		0.97 lbs/1000 gal		7.536 lbs/1000 gal	
		Commercial N applied with seed:									
		Commercial N applied, rest of the year:									
Res. Removed		Gross N (lbs/unit)	166 lbs/ac in		Total N applied:			Total P_2O_5:		Total K_2O:	
	lbs/ac		44 lbs/ton		Recom. N			Recom. P_2O_5:		Recom. K_2O:	

[1]Formula for Effluent Applied: Field applied (lbs/ac)=(lbs N, P, or K/acin) x (acin) applied / (field ac)
Formula for Dry Applied: Field applied (lbs/ac)=(lbs N, P, or K/ton) x (tons/load) spreader x (number of loads) / (field ac)
Formula for Liquid Spreader Applied: Field applied (lbs/ac)=(N, P, or K/1000 gal) / 1000 x spreader size (gal) x (number of loads) / (field ac)

Summary of Nutrients

Net by Form as applied	lbs/1000gal	lbs/ac in	lbs/ton
N	1.1	31	16
P_2O_5	1.0	26	26
K_2O	7.5	205	48

Total Nutrients Applied (net to the field)	All Forms N (lbs/ac)	P_2O_5 (lbs/ac)	K_2O (lbs/ac)
	186.6	211.9	1018.9

Auto-populates from **Organic Nutrient Source sheet, Summary of Nutrients.**

A producer can use this form to keep a record of the volume of effluent, loads of dry manure, loads of liquid applied in addition to the commercial N, P_20_5 and K_20 that is applied.

NRCS, NM
September 2012

Fertilizer Cost sheet

Least Cost Fertilizer and Blen

Fertilizer Need

Supplemental Nutrient Rate (lbs/ac):	N	P_2O_5	K_2O
	195	26	0

The table starting at row 31 contains average costs of fertilizer from NASS SW, M, and SC regions. No delivery, blending, or application costs have been added.

Fertilizer Blend

Select N, P, and K material	Blending Section			Need	Caution		
K_2O Material	N from K material	P from K material	K from K material	lbs/ac need	N balance	P balance	K balance
0-23-30	0	0	0	0	(195)	(26)	
P_2O_5 Material	N from P material	P from P material	K from P material	added lbs/ac need	N balance	P balance	K balance
8-32-16	7	26	13	82	(188)	0	13
N Material	N from N material	P from N material	K from n material	added lbs/ac need	N balance	P balance	K balance
Urea 45% N	188	0	0	418	0	0	13
					0	0	13

(%) N | (%) K_2O | Est. Cost ($/ton)

$377.81

Total deficit or surplus for blend.

Fertilizer Cost

N Material	lbs/ac	$/lbs	$/ac	Local Data
Urea 45% N	418	0.23	94.56	☑ Local Cost Data
P Material	lbs/ac	$/lbs	$/ac	Local Data
8-32-16	82	0.00	0.00	☑ Local Cost Data
K Material	lbs/ac	$/lbs	$/ac	Local Data
	0	0.00		☑ Local Cost Data
Total Blend Needed per Ac:	501	lbs/ac	$94.56	Total $ per Ac

Note: Your actual cost can be estimated by entering local cost data below. Be sure to including blending, delivery, and application charges on a per ton basis. Hit the **page down key** to see the table. Enter local cost in the shaded area. Then select the correct materials in column A above and put a check mark in the local cost data box in column E

Supplemental Nutrient Rate (lbs/ac) auto-populates.

Select **N, P and K materials** from pull down menus. **Blending, Section, Need, Caution** and **Blended Fertilizer Mix** auto-populate.

The **K_20, P_20_5 and N materials** auto-populate the **Suggested Fertilizer Blend** portion of the **Report** sheet.

Fertilizer Cost will auto-populate

Crop, Tables and **Fertilizer Cost Data Reference** sheets contain specific data. They do not require any entries and should not be altered.

Nitrogen Credits

There are nitrogen credits that should be added to the nutrient budget. The important ones for NM are: N in the irrigation water, OM N (added automatically when the NMSU Fertilizer Interpretation Software is used), and additions from a previous legume crop (NOT soil incorporated 2 months prior to the soil test). Table 5 shows the values to use for these credits.

Table 5 *Nitrogen Credits

Nitrogen Source[a]	Nitrogen Credit
Soil Organic Matter (auto calculated by software)	30 lbs/ac for each 1 percent OM
Residual Soil Nitrate (auto calculated by software)	3.6 lbs/ac for each ppm NO_3-N (1 ft sample)
Irrigation Water (needs to added)	1 ppm in the Irrigation Water = 2.7 lbs N per Ac Ft of water applied (2.7x ppm NO_3-N = lbs NO_3-N/Ac)
Previous Crop, Alfalfa >80% stand (not plowed out)	100-140 lbs/ac N, Use 100 lbs/ac
Previous Crop, Alfalfa 60-80% stand (not plowed out)	60-100 lbs/ac N, Use 60 lbs/ac
Previous Crop, Alfalfa <60% stand (not plowed out)	30-60 lbs/ac N, Use 45 lbs/ac
Other Legume Crop (not plowed out)	30 lbs/ac N

*From Colorado State Bulletin 568A "Best Management Practices for Manure Utilization".

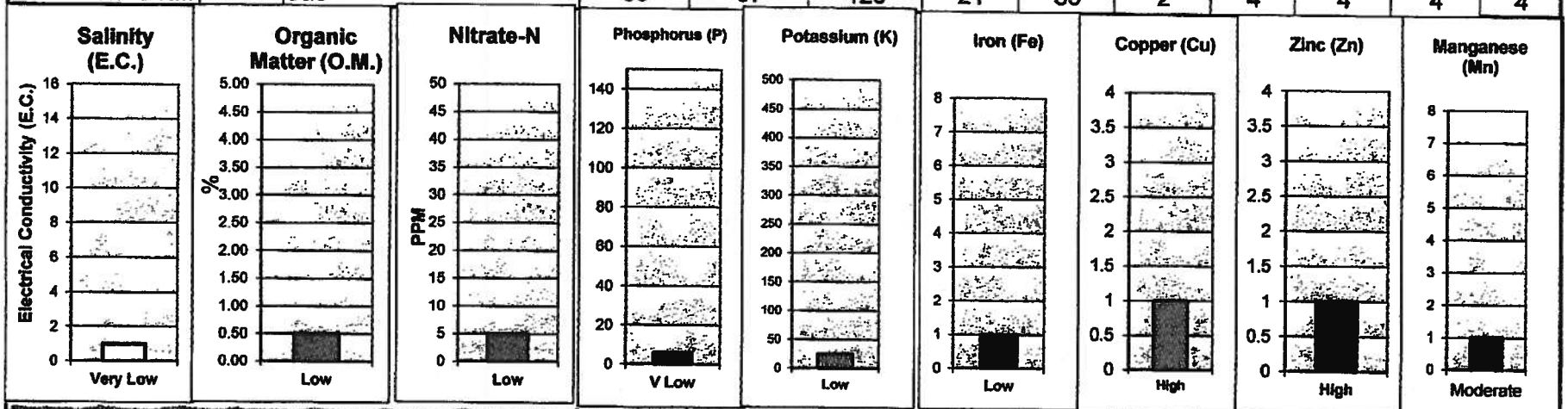
[a]N sources not added by the software need to be added in the other N sources cell.

N.M.S.U. Soil Test Interpretation Report vs 5.0 - (590 Nutrient Management Jobsheet)

XC to County Agent:	CURRY	Field ID:	5	Crop Rotation:	Corn silage winter wheat
Client Name:	MR Dairy	Record #:	1	Square feet:	or Acres: 5.00
Address:	RR 1	Planner Name:	Soil Con	Form Notes:	Irr. Water (acin/ac): 30
	Clovis				
Zip Code:	88101	Date:	4/1/2012	Depth increment (in):	12
Phone:	222 222 2222			Sodium Adsorb. Ratio:	1.0 ESP: 0.21

Note: E.C.-Electrical Conductivity or Saltiness, O.M.-Organic Matter, and ESP-Exchangeable Sodium %.

Samp. ID (#)	pH (#)	E.C. (mmhos/cm)	Soil Texture (Class)	O. M. (%)	NO_3-N (ppm)	P (Olsen) (ppm)	K (H2O) (ppm)	Mg (meq/l)	Ca (meq/l)	Na (meq/l)	Cu (ppm)	Zn (ppm)	Mn (ppm)	Fe (ppm)
	7.8	1	Sand	0.5	5.0	6.0	25.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Crop to grow:	Corn, silage 35% DM				lbs/ac	P_2O_5 lbs/ac	K_2O lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac	lbs/ac
Yield Goal:	35 t/ac				36	57	126	21	35	2	4	4	4	4



Nutrient Recommendation:	N lbs/ac	P_2O_5 lbs/ac	K_2O lbs/ac	Mg lbs/ac	Ca lbs/ac	Fe lbs/ac	Cu lbs/ac	Zn lbs/ac	Mn lbs/ac
Recommended Nutrient Rate:	263	80	80	0	0.0	7.5	0.0	0.0	0.0
Organic Nutrient Source (Liquid or Solid Manure):	48	54	260						
Irrigation Water Credits (ppm NO_3-N): 3	20								
Other Nutrient Sources (Standing Legume Crop.):									
Supplemental Nutrient Rate:	194	26	0	0	0.0	7.5	0.0	0.0	0.0
Available Nutrients >= Crop Requirements:	NO	NO	Caution K	NO	NO	NO	NO	NO	NO

General Note: Apply P2O5 & K2O at planting time if needed. Apply 1/2 N at planting time and side-dress 1/2 at lay-by. Split applying and banding can improve fertilizer efficiency.

Specific Notes:

Salinity Rating: Very Low

Salinity not an issue.

0 lbs/ac or 0 lbs/1000ft² — No sodium issues

Suggested Fertilizer Blend			
Total Blend (lbs/ac):	499	416 lbs/ac	Urea 45% N — 2,081.8 lbs Total Needed
Blend Cost ($/ac):	$94.10	82 lbs/ac	8-32-16 — 410.8 lbs Total Needed
		0 lbs/ac	0.0 lbs Total Needed
		Application	89% 5% 3% — 2,492.7 Tt Blend (lbs)

Client Signature: Planner Signature:

Fertilizer Cost Note: Default costs are from NASS and are estimated. Enter actual cost in 'Fert Cost' tab. Application cost not included.

EXHIBIT ASHCRAFT-4

EXHIBIT ASHCRAFT-5

United States Department of Agriculture

NRCS

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Albuquerque, New Mexico 87109
Phone: (505) 761-4400 Fax: (505) 761-4462
Web site: www.nm.nrcs.usda.gov

December 7, 2006

NATIONAL PLANNING PROCEDURES HANDBOOK (NPPH)
180-VI

AMENDMENT NM11 (PART 600.5)

SUBJECT: CPA – COMPREHENSIVE NUTRIENT MANAGEMENT PLANNING TECHNICAL GUIDANCE, NEW MEXICO

TO: All Offices

Purpose. To supplement NPPH with updated CNMP Technical Guidance.

Effective Date. Effective upon receipt

Filing instructions: File in the Field Office copy of the National Planning Procedures Handbook, Part 600.5, Comprehensive Nutrient Management Planning Technical Guidance, New Mexico.

Attached is a copy of the New Mexico Comprehensive Nutrient Management Planning Technical Guidance.

DENNIS ALEXANDER
State Conservationist

DIST: NPPH

5.0 CERTIFICATION

The development of a CNMP involves two types of skilled individuals. The "Conservation Planner-CNMP" is an individual who has been certified by NRCS with the ability to develop the overall CNMP. The "Conservation Planner-CNMP" pulls together all of the elements of a CNMP. The "Certified Specialist-CNMP" is an individual who has the skill to develop one or more of the elements of a CNMP as certified by NRCS.

Any CNMP that is developed by an NRCS or partner employee will have the plan approved by a certified Conservation Planner. The development of a CNMP by third party vendors or other approved sources does not imply concurrence or plan approval by NRCS.

CERTIFIED CNMP SPECIALIST CERTIFICATION REQUIREMENTS:

(as stated in NRCS General Manual 180-CPA, NM, 4/01)

Certified CNMP specialists are individuals who have demonstrated a competency in developing an element of a CNMP. Listed below are the general requirements and those specific to each element of a CNMP.

General Requirements:

1. An awareness of the NRCS conservation planning policy process comparable to the information contained in the NRCS "Conservation Planning Modules 1-5".
2. An awareness of agricultural waste management systems equivalent to the information contained in NRCS' Agricultural Waste Management Systems: A Primer Course.
3. Demonstrated ability to use applicable sections of the local Field Office Technical Guide.
4. Knowledge of criteria associated with the various elements of a CNMP as contained in the "Comprehensive Nutrient Management Policy and Guidance Document, New Mexico".
5. Meet applicable local, state and federal regulations that impact the elements of the CNMP.

These general requirements and related competencies are incorporated as part of the Job Approval process for New Mexico. Competencies for third party vendors will be developed when needed.

Requirements Specific to Elements of a CNMP:

1. **Manure Production, Collection, Storage, Treatment and Transfer** – This element addresses the components and activities associated with the production facility, feedlot, manure and wastewater storage and treatment structures and areas, and any areas or mechanisms used to facilitate transfer of manure and wastewater. The following are required:
   a. Knowledge adequate to design and implement conservation practices typically used to address this element of a CNMP. (See Appendix D for List of conservation practice standards most commonly used when developing a CNMP).

   b. Working knowledge of the information contained in the NRCS Agricultural Waste Management Systems Level 2 Course or its equivalent.

2. **Land Treatment Practices** – This element addresses the land on which manure and wastewater from an animal feeding operation will be applied. The following knowledge and skills are required:

   a. Skill in applying appropriate erosion prediction technology.

   b. Skill in using site vulnerability assessment tools, including P Index, Leaching Index.

   c. Ability to plan and implement conservation practices common to the geographic area.

3. **Nutrient Management** – This element addresses the requirements for land application of all nutrients and organic by-products (e.g. animal manure, wastewater, commercial fertilizers, crop residues, legume credits, irrigation water, etc.) that must be evaluated and documented for each Conservation Management Unit. The following knowledge, skills, and abilities are required:

   a. Working knowledge of the information contained in the NRCS Introduction to Water Quality Course, or equivalent.

   b. Skill in using nutrient risk assessment tools, including P Index and Leaching Index.

   c. Working knowledge of the information in the NRCS Nutrient Management Course or its equivalent.

   d. Skill in developing nutrient management plans in compliance with the NRCS Nutrient Management (590) and, as appropriate, Irrigation Water Management (449) conservation practice standard(s).

CERTIFIED CNMP PLANNER DRAFT CERTIFICATION REQUIREMENTS:
(as stated in NRCS General Manual 180-CPA, NM, 4/01)

For certified Conservation Planner – CNMP, the candidate must take the New Mexico CNMP Training Workshop or obtain a waiver from the NRCS State Resource Conservationist. The candidate must also take the NEDS Conservation Planning Modules 1-10 and Introduction to Water Quality Courses and submit a CNMP for review to the State Resource Conservationist. Recertification will consist of obtaining a minimum of one week of training in a three-year period for the type of certification approved and submitting a CNMP to the State Resource Conservationist for approval in the third year.

These specific requirements and related competencies are incorporated as part of the Job Approval process in New Mexico. Specific requirements and competencies for third party vendors will be developed when needed.

See Appendix F for specific CNMP certification requirements and training courses.

APPENDIX F

NM CERTIFICATION REQUIREMENTS AND TRAINING FOR CNMP

Certification Requirements for NRCS Certified Conservation Planner - CNMP and CNMP Specialist

Certified Conservation Planner – CNMP

a. NEDC Conservation Planning – All Modules
b. 1 CNMP
c. Renew every 3 years (1 CNMP and 3 day training course)
d. NM CNMP Workshop
e. NEDC Introduction to Water Quality Course

Certified CNMP Specialist (Job Approval Authority) – General Requirements

a. NEDC Conservation Planning Modules 1-5
b. NEDC Introduction to Water Quality Course
c. NEDC Agricultural Waste Management Systems Level I Course
d. Knowledge of FOTG **(NM CNMP Workshop)**
e. Understanding of the CNMP Technical Guidance **(NM CNMP Workshop)**
f. Knowledge of federal, state, tribal, and local laws and regulations **(NM CNMP Workshop)**

Certified CNMP Specialist (Job Approval Authority) - Specific Element Requirements

(For certification in each specific element below, a specialist must also complete the general requirements)

1. Manure and Wastewater Handling and Storage (MHS)

a. Knowledge adequate to plan conservation practices typically used to address this element, including Animal Mortality Facility (316), Closure of Waste Impoundments (360), Composting Facility (317), Covered Anaerobic Digester (365), Manure Transfer (634), Pond Sealing or Lining (521), Roof Runoff Management (558), Waste Storage Facility (313), Waste Treatment Lagoon (359), Waste Utilization (633), and Wastewater Treatment Strip (635) - **(Planning Job Approval for each practice)**.
b. NEDC Agricultural Waste Management Systems Level II Course.

2. Land Treatment (LT)

a. Knowledge adequate to plan conservation practices typically used to address this element, including Conservation Crop Rotation (328), Cover Crop (340), Cross Wind Ridges (589a), Cross Wind Strip Cropping (589b), Cross Wind Trap Strips (589c), Diversion (362), Fence (382), Filter Strip (393), Grade Stabilization Structure (410), Grassed Waterway (412), Irrigation Land Leveling (464), Irrigation Water Management (449), Residue Management (329), Riparian Forest Buffer (391a), Tree and Shrub Establishment (612), and Windbreak/Shelterbelt Establishment (380) - **(Planning Job Approval for each practice)**
b. Application of Approved Erosion Prediction Technology - **(NM CNMP Workshop)**
c. Site Vulnerability Tools - **(NM Nutrient Management Module 7 Course)**

3. Nutrient Management 590 (NM)

a. Knowledge adequate to plan and implement conservation practice 590 - **(Job Approval)**
b. NEDC Nutrient Management (Modules 1-6) Course
c. NM Nutrient Management (Module 7) Course

4. Feed Management (optional component)

a. Knowledge of various feeding technologies and feeding techniques described in the NRCS conservation practice standard for feed management (Code 592).
b. Acquire 15 hours of training in feed management.
c. Submit plan component for review.

5. Recordkeeping

No NRCS practice or certification.

6. Other Utilization

No NRCS certification.

NM Certification Requirements for Technical Service Provider Certified Conservation Planner - CNMP and Certified CNMP Specialist

Certified Conservation Planner – CNMP

a. NRCS National Employee Development Center (NEDC) Conservation Planning Modules 1-5

b. NM CNMP Workshop plus 1 CNMP Plan (must include elements 1,2,3,5)

c. NEDC Introduction to Water Quality Course

d. Renew every 3 years (1 CNMP Plan)

Certified CNMP Specialist - General Requirements

a. NEDC Conservation Planning Modules 1-5

b. NEDC Introduction to Water Quality Course

c. NEDC Agricultural Waste Management Systems Level I Course

d. Knowledge of Field Office Technical Guide **(NM CNMP Workshop)**

e. Understanding of the CNMP Technical Guidance **(NM CNMP Workshop)**.

f. Knowledge of federal, state, tribal, and local laws and regulations **(NM CNMP Workshop).**

Certified CNMP Specialist - Specific Element Requirements

(For certification in each specific element below, a specialist must also complete the general requirements)

1. Manure and Wastewater Handling and Storage (MHS)

a. Knowledge adequate to plan conservation practices typically used to address this element, including Animal Mortality Facility (316), Closure of Waste Impoundments (360), Composting Facility (317), Covered Anaerobic Digester (365), Manure Transfer (634), Pond Sealing or Lining (521), Roof Runoff Management (558), Waste Storage Facility (313), Waste Treatment Lagoon (359), Waste Utilization (633), and Wastewater Treatment Strip (635). **(Plan component will be submitted for review by NRCS State Resource Conservationist).**

b. NEDC Agricultural Waste Management Systems Level II Course.

2. Land Treatment (LT)

a. Knowledge adequate to plan conservation practices typically used to address this element, including Conservation Crop Rotation (328), Cover Crop (340), Cross Wind Ridges (589a), Cross Wind Strip Cropping (589b), Cross Wind Trap Strips (589c), Diversion (362), Fence (382), Filter Strip (393), Grade Stabilization Structure (410), Grassed Waterway (412), Irrigation Land Leveling (464), Irrigation Water Management (449), Residue Management (329), Riparian Forest Buffer (391a), Tree and Shrub Establishment (612), and Windbreak/Shelterbelt Establishment (380). **(Plan component will be submitted for review by NRCS State Resource Conservationist).**

b. Application of Approved Erosion Prediction Technology - **(NM CNMP Workshop)**

c. Site Vulnerability Tools - **(NM Nutrient Management Module 7 Training)**

d. Certified Crop Advisor Certification in NM

3. Nutrient Management 590 (NM)

a. Knowledge adequate to plan and implement conservation practice 590

b. NEDC Nutrient Management (Modules1-6) Course

c. NM Nutrient Management (Module 7) Course **(includes submittal of plan component for review).**

d. Certified Crop Advisor Certification in NM

4. Feed Management (optional component)

a. Knowledge of various feeding technologies and feeding techniques described in the NRCS conservation practice standard for feed management (Code 592).

b. Acquire 15 hours of training in feed management.

c. Submit plan component for review.

5. Recordkeeping

No NRCS certification.

6. Other Utilization

No NRCS certification.

Training Courses for CNMP Certification

A. NRCS National Employee Development Center (NEDC) Courses:

Course Registration:

a) **NEDC Webpage:** HTTP://WWW.NEDC.NRCS.USDA.GOV/. click on course catalog and course listing.

1.) **Conservation Planning Modules 1-5** – no prerequisites. It includes a web-based exam. Please go to the following URL to access the training and exam: http://www.nedc.nrcs.usda.gov/catalog/consplan.html. When you complete the exam, your scores will automatically be stored in a database.

2.) **Introduction to Water Quality** – no prerequisites. This training program creates an awareness of NRCS Water Quality policy, and teaches principles and how to apply them in daily NRCS activities at the field, farm, and watershed scales. The course utilizes video and student workbook for the self-study delivery. A score of 80% or above on the on-line Pretest qualifies for a Certificate of Competency. Otherwise, course materials will be sent to student for completion within 3 months. The training program requires approximately 20 hours of concentrated study to complete. A score of 70% or above on the on-line Posttest qualifies for a Certificate of Completion.

3.) **Nutrient and Pest Management Considerations in Conservation Planning** – prerequisite is Introduction to Water Quality Course. This training course introduces NRCS' mission in the nutrient and pest management arena and how it relates to the Resource Management System (RMS) planning process. It provides the participant with a basic understanding of the science of nutrient and pest management, as well as environmental concerns associated with the use of nutrients and pest management measures, including environmental risk, and the processes that affect the fate and transport of nutrients and pesticides in the environment. The training program is divided into two tracks: Track 1 – Nutrient Management and Track 2 – Pest Management. Each track will be offered as individual components of the overall course. The course contains a video and student workbook for the self-study delivery. This portion requires approximately 40 hours of concentrated study to complete. After successful completion of the self-paced Modules 1-6, participants will attend an in-state facilitated session (Module 7) using exercises and assessment tools to reinforce and apply important concepts. Contact Linda Scheffe, NRCS, 505/761-4448, Linda.Scheffe@nm.usda.gov to register for an in-state facilitated session. The participant will prepare a nutrient and/or pest management component of an RMS plan to complete the training.

4.) **Agricultural Waste Management Systems – Level I** – no prerequisites. This training provides an overview of agricultural waste management systems. It covers background, safety and hazards, planning, and functions of agricultural waste management systems. The course is comprised of a self-paced booklet with an accompanying video and requires approximately 1 hour to complete. This course may be requested by sending an e-mail with the information shown below to gspiller@ftw.nrcs.usda.gov.

- Name

- Job title
- Address
- Telephone
- E-mail address
- Supervisor's name

5.) **Agricultural Waste Management Systems – Level 2** – Prerequisites– Agricultural Waste Management Systems – Primer 1 and Introduction to Water Quality Courses (the Nutrient and Pest Management Considerations in Conservation Planning Course is also highly recommended). This course provides training on planning and designing agricultural waste management systems with an emphasis on systems for livestock and poultry operations. It provides guidance in developing an agricultural waste management system that manages the waste from its production through its utilization. The Agricultural Waste Management Field Handbook serves as the textbook and reference. The delivery of the training is a self-paced computer based training, packaged as a CD and a workbook. Participants will have 3 months from the day they register and complete the Pretest until they must take the Posttest. The training program requires approximately 32 hours of concentrated study to complete.

B. In-State CNMP Courses:

1.) New Mexico CNMP Workshop

Course Registration: Contact Linda Scheffe, NRCS, 505/761-4448, Linda.Scheffe@nm.nrcs.usda.gov to register for next session. This course will be held annually or as needed.

Summary: Prerequisite: NEDC Introduction to Water Quality Course and NEDC Conservation Planning Course (Modules 1-5). This interagency course covers the major components associated with the Comprehensive Nutrient Management Plan in partial fulfillment of the certification requirements for Certified Conservation Planner – CNMP and CNMP Specialist. The duration of the course is 3 days, covering policy, procedures and technical standards for planning, implementing and evaluating the CNMP component for an animal feeding operation of a Resource Management System. Upon completion of the course, participants will prepare a comprehensive nutrient management component of an RMS plan to complete the training.

Exhibit (how to calibrate)

Flow Meter Calibration

Prepared by Robert George, NMED-GWQB

Definition of Flow Meter Calibration

The Bureau of Reclamation's *Water Measurement Manual* defines calibration as:

"**Calibration** is the process used to check or adjust the output of a measuring device in convenient units of gradations. During calibration, manufacturers also determine robustness of equation forms and coefficients and collect sufficient data to statistically define accuracy performance limits. In the case of long-throated flumes and weirs, calibration can be done by computers using hydraulic theory. Users often do less rigorous calibration of devices in the field to check and help correct for problems of incorrect use and installation of devices or structural settlement. A calibration is no better than the comparison standards used during calibration."

This definition makes clear that calibration is the act of comparing and adjusting a measuring device against a standard. It also highlights that there are different levels of calibration that are performed for different purposes. NMED has proposed that all flow measurement devices be calibrated in-place, under actual operating conditions (field calibration) to within ± 10% of the actual flow. Calibrations are required following the installation of a device, repair of a device and annually thereafter. This proposal fits the latter description of calibration from the definition above, which is a calibration performed by users to a less rigorous standard for the purposes of checking and correcting problems with newly installed or repair devices or for devices that have been affected over the course of time. It is not intended to require a rigorous field calibration to determine the maximum accuracy that a manufactured device is capable of achieving in a particular setting, which NMED recognizes would be overly time-consuming, difficult and costly.

The Need for Flow Meter Equipment Field Calibration

The need for field flow meter equipment calibration is not obvious to some. Devices are frequently sold with statements that no calibration is required in order to achieve a stated accuracy, provided the device is installed and maintained in accordance with specific requirements. In the case of an ideal installation, this statement may be true. However, what is not considered is that: (1) most installation situations require compromise which leads to less that ideal installation conditions, (2) there are a wide variety of errors that can contribute to inaccuracy and these often go unidentified, and; (3) degradation tends to affect the accuracy of all installations over time in a manner that cannot be predicted. Without field calibration of flow measurement devices, NMED has no way of determining that gross inaccuracy of a flow measurement device does not exist. To this

end, NMED is less concerned with absolute precision than with verifying that measurements are reasonably accurate and repeatable over time.

Definition of Terms Related to Calibration Accuracy
(Adapted from the Bureau of Reclamation's Water Measurement Manual)

Precision is the ability to produce the same value within given accuracy bounds when successive readings of a specific quantity are measured. Precision represents the maximum departure of all readings from the mean value of the readings. Thus, a measurement cannot be more accurate than the inherent precision of the combined primary and secondary device precision.

Error is the deviation of a measurement, observation, or calculation from the truth. The deviation can be small and inherent in the structure and functioning of the system and be within the bounds or limits specified. Lack of care and mistakes during fabrication, installation, and use can often cause large errors well outside expected performance bounds. Since the true value is seldom known, some investigators prefer to use the term uncertainty.

Spurious errors are commonly caused by accident, resulting in false data. Misreading and intermittent mechanical malfunction can cause discharge readings well outside of expected random statistical distribution about the mean. A hurried operator might incorrectly measure discharge on a staff gauge. Spurious errors can be minimized by good supervision, maintenance, inspection, and training. Experienced, well-trained operators are more likely to recognize readings that are significantly out of the expected range of deviation. Unexpected blockages of flow in the approach or in the device itself can cause spurious errors. Repeating measurements does not provide any information on spurious error unless repetitions occur before and after the introduction of the error. On a statistical basis, spurious errors confound evaluation of accuracy performance.

Systematic errors are errors that persist and cannot be considered entirely random. Systematic errors are caused by deviations from standard device dimensions. Systematic errors cannot be detected by repeated measurements. They usually cause persistent error on one side of the true value. For example, error in determining the crest elevation for setting staff or recorder chart gage zeros relative to actual elevation of a weir crest causes systematic error. The error for this case can be corrected when discovered by adjusting to accurate dimensional measurements. Worn, broken, and defective flow meter parts, such as a permanently deformed, over-stretched spring, can cause systematic errors. This kind of systematic error is corrected by maintenance or replacement of parts or the entire meter. Fabrication error comes from dimensional deviation of fabrication or construction allowed because of limited ability to exactly reproduce important standard dimensions that govern pressure or heads in measuring devices. Allowable tolerances produce small systematic errors which should be specified.

Calibration equations can have systematic errors, depending on the quality of their derivation and selection of form. Equation errors are introduced by selection of equation forms that usually only approximate calibration data. These errors can be reduced by finding better equations or by using more than one equation to cover specific ranges of measurement. In some cases, tables and plotted curves are the only way to present calibration data.

Random errors are caused by such things as the estimating required between the smallest division on a head measurement device and water surface waves at a head measuring device. Loose linkages between parts of flow meters provide room for random movement of parts relative to each other, causing subsequent random output errors. Repeating readings decreases average random error by a factor of the square root of the number of readings.

Total error of a measurement is the result of systematic and random errors caused by component parts and factors related to the entire system. Sometimes, error limits of all component factors are well known. In this case, total limits of simpler systems can be determined by computation. In more complicated cases, different investigators may not agree on how to combine the limits. In this case, only a thorough calibration of the entire system as a unit will resolve the difference. In any case, it is better to do error analysis with data where entire system parts are operating simultaneously and compare discharge measurement against an adequate discharge comparison standard.

Comparison standards for water measurement are systems or devices capable of measuring discharge to within limits at least equal to the desired limits for the device being calibrated. Outside of the functioning capability of the primary and secondary elements, the quality of the comparison standard governs the quality of calibration.

Discrepancy is simply the difference of two measurements of the same quantity. Even if measured in two different ways, discrepancy does not indicate error with any confidence unless the accuracy capability of one of the measurement techniques is fully known and can be considered a working standard or better.

Flow Measurement Device Field Calibration

NMED is seeking to have initial and routine calibrations performed on flow measurement devices under actual operating conditions (field calibrations). Field calibrations of this type are to be performed by individuals knowledgeable in flow measurement and in the installation/operation of the particular device. As mentioned before, this type of calibration is performed for the purposes of checking and correcting problems with newly installed or repaired devices or for devices that may have been affected over the course of time and is recognized to be held to a less rigorous standard than a full characterization of a device to it maximum accuracy. NMED is proposing that accuracy of flow measuring devices be maintained to within ± 10% of the comparison standard discharge (actual

flow). The acceptable level of accuracy to be attained by the comparison standard discharge is at least equal to that of the allowable error of the device being calibrated (± 10%). The comparison standard is accepted to be "actual flow" but understood to contain some (undetermined) systematic and random level of error, although reasonable efforts should be made to minimize both. Spurious errors in establishing the comparison standard are to be largely avoided by careful oversight.

Typically during field calibration, the measurement output of the flow measurement device is evaluated at a stable discharge rate against the comparison standard. The discrepancy between the indicated discharge for the device and the actual flow (as determined by the comparison standard) is use to calculate percent of error (offset) as follows:

$$E_{\%Q_{Cs}} = \frac{100(Q_{Ind} - Q_{Cs})}{Q_{Cs}}$$

Where:

Q_{Ind} = *indicated discharge from device output*
Q_{Cs} = *comparison standard discharge concurrently measured in a more precise way*
$E\%Q_{Cs}$= *offset error in percent of comparison standard discharge*

The level of error detected during the calibration represents the positive or negative offset of the device from the actual flow. Technically, this is not a statistically appropriate representation of the measurement error of the device, because no attempt at characterizing the accuracy of the calibration standard or of the discrepancy of the output of the device from the calibration standard throughout the measurement range (zero, mid-range and full scale) is made. Additionally, the level of inaccuracy allowable (± 10%) is not defined in terms of scale (zero, mid-range, full scale), so ±10% is potentially acceptable at any range. However, because NMED is less concerned with absolute precision than with attaining a reasonable accuracy and a reasonable degree of repeatability, this level of calibration measurement is sufficient for this purpose. More sophisticated statistical analysis of the accuracy of a measurement device will be accepted by NMED, provided it follows accepted principals for calibration.

If the offset of the device is beyond the bounds of ± 10% of the calibration standard, adjustment of the device to bring it within these bounds is appropriate and should be attempted and the calibration rechecked. If the device shows a high level of inaccuracy beyond these bounds, displays an inability to repeat a measurement (within the same bounds), or calibration to within ± 10% cannot be attained, a faulty device or non-standard installation may be indicated and more in-depth investigation and device repair/replacement may be warranted.

Calibration of Hydraulic Structure Primary Measuring Devices

Hydraulic structure primary measuring devices are capable of accuracies of varying degree, dependent upon the device type and the range that it is operating in (scale) compared with its design range (full scale). Virtually all hydraulic structure primary measuring devices are capable of accuracies within ± 10% when installed in accordance with the specific requirements for each unique device. Beneficially, under most circumstances, the errors that can adversely affect the accuracy of hydraulic structure primary measuring devices are relatively limited and easy to detect. Should a hydraulic structure be installed improperly or damaged in place, problems with its operation can be readily identified by visual inspection (provided the inspector has an understanding of the function of the particular structure type). Once identified, most problems are easily corrected. Put simply, this class of device is fairly easy to install in a manner that will produce reasonably accurate results and the causes of inaccuracy are readily indentified.

Because of these two characteristics, hydraulic structure primary measuring devices, when installed correctly, constitute a suitable comparison standard discharge (in and of themselves) which can therefore be used to represent "actual flow" for the purposes of calibrating secondary devices (head sensing, readout and totalizers). For this reason, NMED is not seeking field calibration of *standard* hydraulic structure primary measuring devices. The ability to act as a calibration standard and the inherit simplicity of these devices, accounts for their widespread use throughout the water supply, wastewater treatment and agricultural industries.

Calibration of Head Sensing, Readout and Totalizing Secondary Devices

In the case of head sensing, readout and totalizing equipment, initial and routine calibration/adjustment by comparison to the hydraulic structure primary measuring device is necessary to ensure that accurate flow measurements are first established and then maintained. NMED is proposing that calibrations be performed initially and then annually thereafter. When an initial or routine calibration is performed, the degree of inaccuracy (positive or negative offset) is characterized in relation to the flow in the hydraulic structure primary device.

Calibration of Commercial Velocity Sensing Meters

Commercial meters are sold with the device's stated accuracy clearly identified. Many meters claim that the device is sold pre-calibrated and that no field (sometimes referred to as "wet") calibration is needed. Some of the newest velocity sensing meters do allow diagnostics of the primary device elements (e.g. mag-meters often have the ability to self check their magnetic field characteristics), but they do not provide a suitable comparison standard discharge in and of themselves. Furthermore, what is not typically clear is that any deviation from the laboratory conditions under which the device was calibrated can result in inaccuracy. For example; the application of a device that was calibrated on

clean water to measuring wastewater with a high concentration of suspended solids could greatly affect accuracy. Unexpected (or detected) turbulence induced prior to a meter can result in very different performance than during calibration conditions. The length of pipe prior to and after a meter, the pipe material and even the roughness of the interior surface of the pipe can affect accuracy. The incident angle that a device is mounted at can affect accuracy and function. In fact, a great number of systematic, random and spurious errors can contribute to inaccuracies in real world conditions. Worse, these errors are generally not readily observable or measurable in closed-pipe systems and therefore not easily detected. NMED has no way of ensuring that closed-pipe flow measurement devices have been installed and are operating completely within the manufacturer's requirements, and therefore capable of accurate flow measurement. For this reason, field calibration of the primary and secondary elements of commercial closed-pipe velocity sensing meters is critical.

The selection of a suitable comparison standard discharge for the field calibration of commercial velocity sensing meters requires skill and knowledge about flow measurement. NMED is seeking to have individuals knowledgeable in flow measurements with the particular device in use develop and perform field calibrations. Examples of the type of comparison standard discharges that could be utilized for field commercial meter calibrations include:

- Volume/time comparison, where a known volume of liquid moves through the meter in a known amount of time. For example, the liquid level in a sump of known dimensions is measured before and after a pump moves liquid from the sump and through the meter over a five minute interval. By calculating the volume of liquid pumped in five minutes, a comparison standard discharge can be established. The totalized meter reading discrepancy from the actual flow for the five minute interval can be determined and the meter offset calculated. Errors of measurement and timing must be controlled.
- A standard hydraulic device primary measuring structure, such as an orifice plate can be inserted in the pipe metered by the device in question. Head readings taken at standard locations before and after the orifice plate can be used to determine the discharge (using an equation or table specific for the orifice plate) and the discharge can be used as a comparison standard discharge. Care must be taken in the centering of the orifice plate and in the head readings. The method can typically only be employed on wastewater for short calibration durations due to plugging at the head measurement locations.
- A standard hydraulic structure primary measuring device, such as a weir or flume can be constructed at the outlet of the discharge stream so that the actual discharge can be determined from the weir or flume for comparison by the close-pipe measuring device output.

NMED acknowledges that field calibration of commercial in-pipe meters can be difficult to accomplish under many circumstances but contends that field calibrations are necessary to eliminate gross inaccuracies of flow measurements at dairy facilities. NMED is seeking to have field calibration procedures outlined by dairy facilities (as

opposed to requiring specific approaches) to allow the use of the least expensive, most easily accomplished procedure for a given facility. NMED is proposing that calibration procedures be performed by individuals with experience in flow measurement and the use of the particular device in question. NMED anticipates that a variety of calibration methods will be used, as applicable in various settings.

Flow Meter Calibration Reports

NMED is proposing to have dairy facilities submit a flow meter calibration report annually to demonstrate that flow measurements are achieving the required level of accuracy. The reports are required to contain an identification of the flow meter consistent with the Discharge Permit, the location of the meter, the method of flow meter calibration employed (assumed to be a narrative description), the measured accuracy of the meter before and after adjustment and a list of any repairs made to the meter in the previous year.

The report is to be submitted in the facility's monitoring report due by May 1 of each year.

References

United States Department of the Interior, Bureau of Reclamation, *Water Measurement Manual*, Revised Reprint 2001, available at:
http://www.usbr.gov/pmts/hydraulics_lab/pubs/wmm/

United States Department of the Interior, Environmental Protection Agency, NPDES Compliance Inspection Manual, Chapter 6, Flow Measurement, available at:
http://www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesmanual.html

EXHIBIT ASHCRAFT-7

Colorado Department of Agriculture

Plant Industry Division

Rules and Regulations Pertaining to the Administration and Enforcement of the Colorado Chemigation Act

8 CCR 1203-8

SECTION 1. TERMS DEFINED AND CONSTRUED

1.01. All terms used in the singular form in these rules shall include the plural, and vice versa, as the case may be. All terms used in these rules shall have the meaning set forth for such terms in the Act. In addition the following terms shall be defined as follows.

1.02. "Backflow prevention check valve" means a valve to prevent backflow of irrigation water.

1.03. "Chemical injection line check valve" means the check valve in the chemical injection line.

1.04. "District" means ground water management district.

1.05. "Irrigator" or "Chemigator" means any person employing any device or combination of devices having a hose, pipe, or other conduit, which connects directly to any source of ground or surface water through which water or a mixture of water and chemicals is drawn and applied for agricultural or horticultural purposes.

1.06. "Open discharge system" means a system in which the water is pumped or diverted directly into a ditch or canal in such a manner that the force of gravity at the point of discharge into the ditch or canal cannot cause water to flow back to the point from which the water was pumped or diverted.

1.07. "Permit holder" means the owner or operator of land who applies or authorized the application of chemical to such land by means of chemigation. The permit holder shall be the party primarily responsible for any liability arising from chemigation on the property.

1.08. "Permittee" means the person to whom the permit is issued.

1.09. "Pipeline check valve" means a backflow prevention pipeline check valve.

SECTION 2. AFFIDAVIT OF NON-CHEMIGATION

2.01. Affidavits shall be submitted annually by March 31 by persons who do not utilize or intend to utilize chemigation. Such affidavits shall be made on a form provided by the Department.

2.02. The affidavit shall provide:

(a) Name, address and telephone number of the irrigator;

(b) Legal description of the location of the irrigation water source; and

(c) Signature and date of affidavit.

SECTION 6. EQUIPMENT, STANDARDS AND INSTALLATION

6.01. Any irrigation distribution system through which chemigation is performed, except open discharge systems, shall be equipped with the mechanical devices specified below. The equipment shall be permanently installed in accordance with the manufacturer's specifications and at the location specified therein.

6.02. The irrigation pipeline check valve shall be located in the pipeline between the irrigation pump and the point of chemical injection into the irrigation pipeline. Its purpose is to prevent reverse flow, which is a mixture of water and chemical draining or siphoning back into the irrigation water source.

6.03. Irrigation systems which, as of July 1, 1989, were equipped with a properly located irrigation pipeline check valve shall be considered in compliance with these rules if the valve provides a seal against reverse flow.

6.04. Repealed.

6.05. The vacuum relief valve shall be located on the pipeline between the irrigation pump and the irrigation pipeline check valve. Its purpose is to prevent creation of a vacuum in the pipeline and possible reverse flow into the water source when the pump stops.

6.06. The vacuum relief valve shall be sized in accordance with the manufacturer's specifications.

6.07. If the vacuum relief valve connection will also serve as the inspection port, the permit holder will ensure removal of the valve at the time of inspection. The inspection port shall be located on the pipeline between the irrigation pump and the irrigation pipeline check valve. The inspection port shall be situated in such a manner that the inlet to the low pressure drain can be observed. A minimum four-inch or larger diameter port is required. If a chemigation system has a vacuum relief valve of a minimum two inch diameter, which was in place as of the effective date of these rules, and the irrigator will ensure its removal at the time of each inspection, such valve may be used as the inspection port.

6.08. An automatic low-pressure drain shall be located so as to drain any water-chemical mixture which may enter the pipeline between the irrigation pump and the irrigation pipeline check valves by reverse flow when the pump stops. When the pipeline water flow stops, the drain valve shall automatically open. A tube, pipe or other conduit shall be used to discharge the solution at least twenty feet downslope from the irrigation water source or otherwise prevent it from collecting on the ground surface around the well casing.

6.09. The drain valve shall be constructed of corrosion resistant material or otherwise coated or protected to prevent corrosion.

6.10. The drain shall have an orifice of at least three-quarter inch diameter.

6.11. The chemical injection line check valve shall be located at the point of chemical injection into the irrigation pipeline. Its purpose is to prevent flow of water from the irrigation system into the chemical supply tank and to prevent gravity flow from the chemical supply tank into the irrigation pipeline. The valve shall be constructed of chemically resistant materials. The valve shall be designed to prevent water in the irrigation pipeline under operating pressure from entering the chemical injection line.

6.12. Repealed.

6.13. The irrigation pumping plant and the chemical injection pump shall be interlocked so that if the pumping plant stops, the injection pump will also stop. Its purpose is to prevent pumping chemicals into the irrigation pipeline after the irrigation pump stops.

6.14. Repealed.

6.15. Replacement equipment shall meet specified requirements and in the case of irrigation pipeline check valves, shall meet the following minimum requirements:

(a) The valve body and all components shall be constructed of corrosion resistant materials or otherwise coated or protected to prevent corrosion;

(b) The valve shall contain a sealing mechanism designed to close prior to or at the moment water ceases to flow in the downstream direction. This mechanism shall be either diaphragm-actuated by hydraulic line pressure, spring loaded or weight loaded to provide a watertight seal against reverse flow;

(c) All moving components of the valve shall be designed to prevent binding, distortion or misalignment during water flow; and

(d) The valve shall be designed to allow repair and maintenance, including removal from the pipeline if required to perform such work.

6.16. The equipment required in these rules and regulations shall be maintained in working condition. When required, the equipment shall be repaired to its originally designed condition.

SECTION 7. REPEALED

SECTION 8. EXEMPTIONS

In those instances in which irrigation water is drawn from a reservoir at an elevation higher than the point of chemical injection, the permittee may be exempted from Section 35-11-107(1)(a), (b) or (c) of the Chemigation Act if there is no possibility that the water source can be polluted or contaminated as the result of utilizing such irrigation system for chemigation.

SECTION 9. SEVERABILITY

If any clause, paragraph, subsection or section of these regulations shall be held invalid, it shall be conclusively presumed that the remainder of these regulations not directly related to such clause, paragraph, subsection or section shall not be invalid.

The effective date of these Rules and Regulations is July 1, 1989.

SECTION 10. – 12. RESERVED

SECTION 13. STATEMENTS OF BASIS, SPECIFIC STATUTORY AUTHORITY AND PURPOSE

13.01. Adopted March 31, 1989 – Effective July 1, 1989

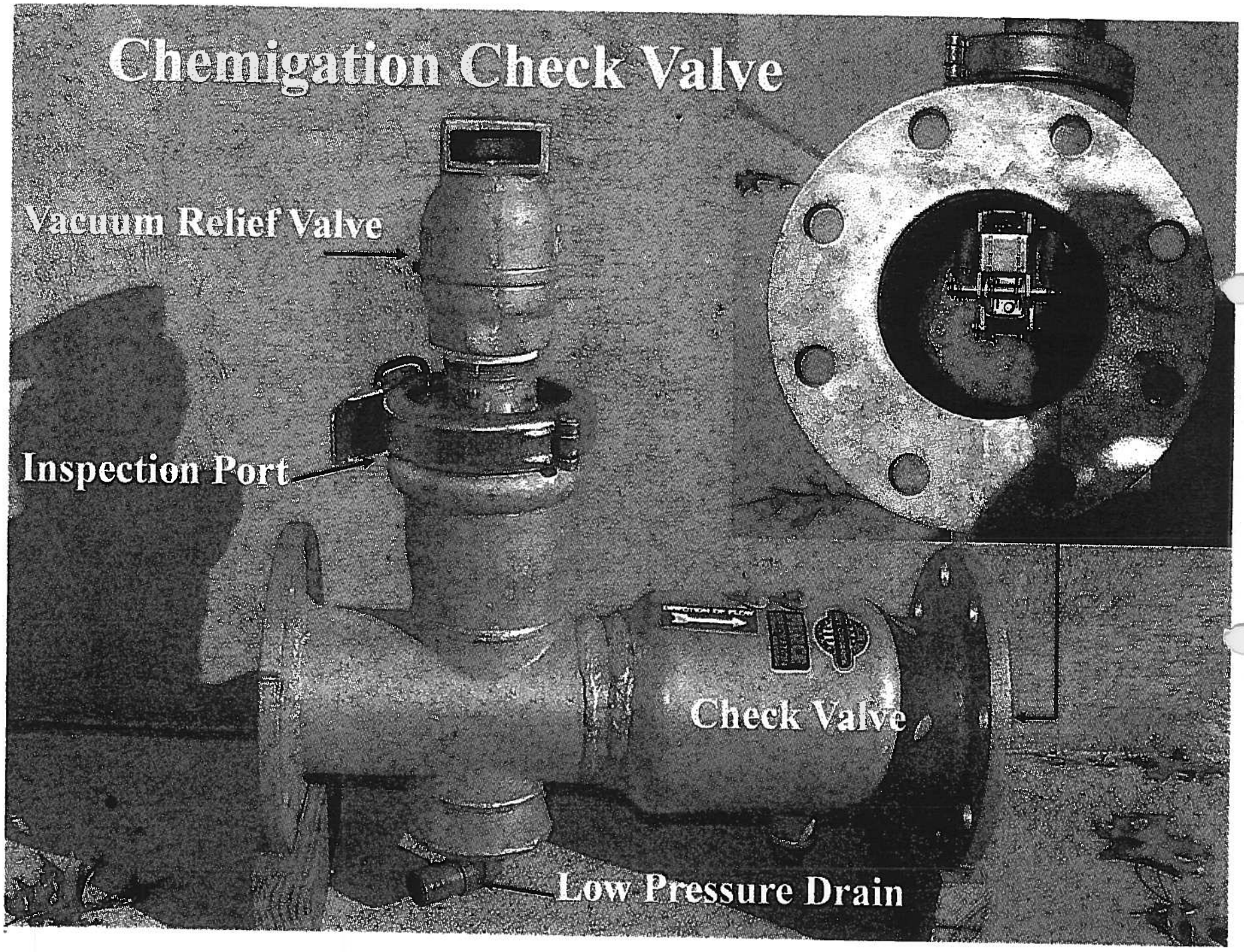
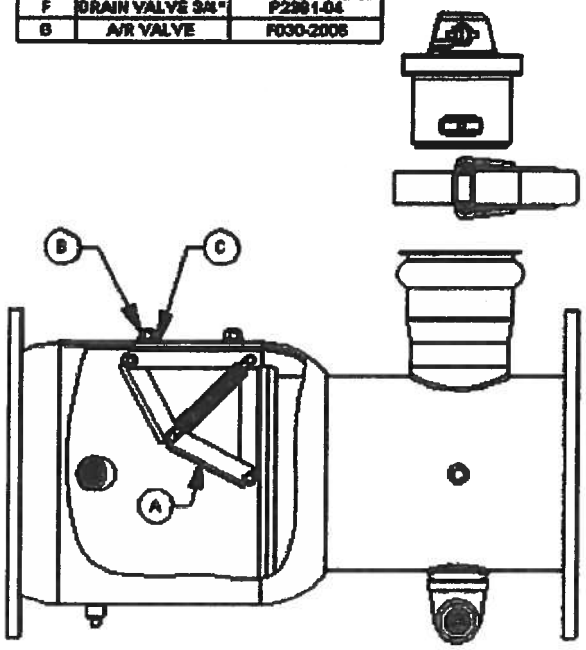
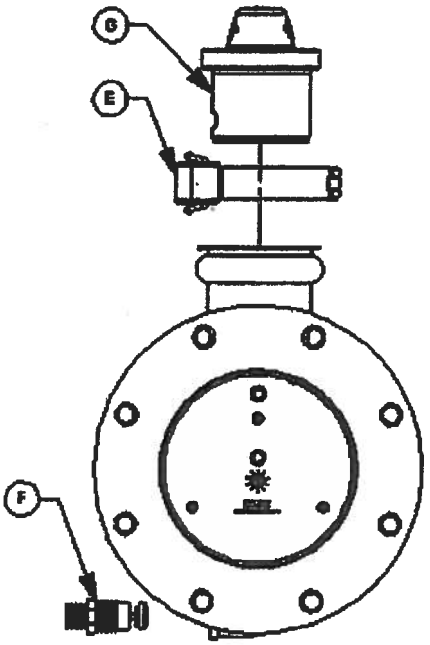


EXHIBIT ASHCRAFT-8

A	DISK ASM 6"	P1751-02
B	NUT (2)	P2031-05
C	SEAL WASHER (2)	P2043-03
E	4" R/L CLAMP	P2123-08
F	DRAIN VALVE 3/4"	P2981-04
G	A/R VALVE	F030-2006





PIERCE FITTINGS

VALVE CHEM BDY W/PORT 8 IN

P1778-22

MATERIAL: SEE BOM

DWG BY: DPE

DATE: 2/24/10

SCALE: 1/5

SHEET 1 OF 1