

MEMO

To: 36-8735 Andresen Dairy LLC

From: Sandy Hemenway

Date: 4/21/2011

REF: Rationale for CFS and AF Recommendations

Upon completing the review for licensing, it was determined that the following should be recommended for 36-8735 licensing:

<u>Beneficial Use</u>	<u>From</u> <u>To</u>	<u>Diversion Rate</u>	<u>Annual Volume</u>
COMMERCIAL	01/01 to 12/31	0.040 CFS	19.00 AF
STOCKWATER	01/01 to 12/31	0.040 CFS	19.00 AF
<u>Total Diversion:</u>		0.040 CFS	19.00 AF

This determination was due to:

Water Right 36-8735 was to supplement 36-8215:

36-8215

<u>Beneficial Use</u>	<u>From</u> <u>To</u>	<u>Diversion Rate</u>	<u>Annual Volume</u>
COMMERCIAL	01/01 to 12/31	0.070 CFS	5.80 AF
DOMESTIC	01/01 to 12/31	0.040 CFS	1.20 AF
STOCKWATER	01/01 to 12/31	0.060 CFS	4.60 AF
<u>Total Diversion:</u>		0.070 CFS	11.60 AF

Volume

Water right **36-8215** does not show the "same" annual volume for both commercial and stockwater to allow for flexibility, but instead shows the commercial volume (5.8 af), and the stockwater volume (4.6 af), with an additive annual volume of 10.4 af to represent "dairy use."

Using the #4 Condition of Approval on the 5/4/1995 Application for Amendment for 36-8735, the Dairy Spreadsheet was calculated using 600 milking cows, and 100 dry cows (the 6/3/1996 Proof of Beneficial Use confirmed "700 total head"). The **Dairy Spreadsheet total Consumptive Use shows 29.4 af required** for 600 milking cows, and 100 dry cows, in addition to all cleaning, water uses involved for dairy use (a lot of categories were not available to be entered on to this spreadsheet, so 29.4 af is a ballpark figure, and is usually low if you were to use 19.9 +/- 14.0 gpd thru 47.1 +/- 17.7 gpd per milking cow, as shown on the article written by Dean E. Falk, Extension Dairy Specialist, U of I, Fresh Water Needs for Dairy Farms. <http://www.oneplan.org/stock/dairywater.asp>

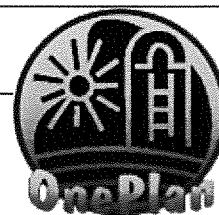
From the information above: 29.4 af (Dairy Use Spreadsheet Total Consumptive Use) – 10.4 af (36-8215 dairy use) = 19.0 af. So the recommended volume for water right 36-8735 would be stockwater 19.0 af, and commercial 19.0 af, with the Total Annual Volume of 19.0 af. The amendment approval for 36-8735 authorized the use of 26.5 afa for commercial and stockwater uses in connection with a dairy, and did not stipulate any combined limits with any other water rights, so the 19.0 af recommended does not exceed the amount authorized, and by combining the 10.4 af (36-8215 dairy use) with 19.0 af (36-8735) that equals the 2006 Dairy Use Spreadsheet Total Consumptive Use of 29.4 af.

CFS:

The Dairy Use Spreadsheet calculated 0.09 cfs as the total diversion rate, of which this spreadsheet was designed to be used as a “tool.” The **physical measurement conducted** during the 5/10/2007 beneficial use field exam, calculated **0.11 cfs with a polysonic** as the total diversion rate from the north and south wells combined. The two wells are “plumbed together,” and have a single magnetic meter for both wells, with 2 full years, and 1 partial year of monitoring records (per Cindy Yenter). Since a physical measurement was conducted, this is a true measurement of the total diversion rate, and should be used.

Using the information above, the non-additive diversion rate from water right 36-8215 of 0.07 cfs, the following was recommended: **0.11 cfs – 0.07 cfs (36-8215) = 0.04 cfs (36-8735).**

Fresh Water Needs for Dairy Farms

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By **Dean E. Falk**, Extension Dairy Specialist,
University of Idaho

Dairy cows and milking facilities require a reliable high quality water supply. Dairy production is changing with larger production units being planned and constructed. These dairy facilities require a water supply that can deliver high quality water to the cows at all times in sufficient amounts to meet both physiological and sanitation needs of the facility.

The data reported in the literature for water consumption for dairy facilities varies considerably. For example, in three different studies the water needs for lactating cow consumption, and milking center cleaning range between 40 to 50 gallons fresh water per cow per day. In these studies the free stall units were flushed with recycled lagoon water in all areas except the milk parlor and milk room. This concept reduces the amount of water that is introduced into the waste management system.

Texas data illustrates that water use on eleven dairy farms varied widely, depending on the type of manure removal system and other factors. The greatest variable was the use of sprinkler cow wash systems and/or flush systems versus manual manure removal. The total amount of fresh water used for sanitation and manure removal averaged 39.6 gallons per cow per day. The mean value for each farm ranged from 12.3 to 69.2 gallons per cow per day. The water used for cattle drinking water troughs on seven of the dairies studied averaged 28.7 ± 12.0 gallons per cow per day. Thus the Texas data average fresh water use per cow per day for sanitation and drinking was 68.3 gallons. Their data showed wide differences in water use for facilities that flushed or had cow sprinklers versus those that used manual cleanup. The average water use for milking parlors and holding pens without flush or cow sprinklers averaged 19.9 ± 14.0 gallons per cow per day. In contrast, milking parlors and holding pens with sprinkler cow washers used an average of 47.1 ± 17.7 gallons per cow per day.

Calculating Herd Requirements for Fresh Water

It is possible to estimate fresh water use on individual dairies, even with the wide variation reported in the literature. Estimates for total requirements can be developed for drinking water, wash pen sprinklers (if used), and milk house and parlor. Water needs can be estimated by completing Worksheet 1 (*requires Adobe Acrobat*) with information found in Tables 1-4.

Drinking Water Needs

Drinking water needs can be determined by using the information found in Table 1 and Table 2. Table 1 shows a typical herd makeup assuming a uniform year around calving, 13 month calving interval, a 33% replacement rate (1/2 supplying a calf), 50% female calves and males sold at birth for a 100 lactating cow herd.

Table 1: Typical Dairy Herd Composition

Category	Number	% of herd	Avg. weight (lbs.)
Milking cows	83	83	1400
Dry cows	17	17	1550
Total mature cows	100		
Heifers			
16 - 24 months	42	38	1050
13 - 15 months	13	12	800
9 - 12 months	19	17	600
5 - 8 months	19	17	400
3 - 4 months	9	8	250
0 - 2 months	9	8	150
Total replacements	111		

Water intakes for dairy cattle are influenced by several factors including dry matter intake, milk production, ambient temperature, and sodium intake. However, Table 2 provides a good estimate of water intake based upon size, milk production and temperature. The data from the water intake table when matched with the herd makeup

table will estimate herd drinking water.

Table 2: Dairy Cattle Water Intake

Weight (lb)	Milk (lb)	40° & below	60°	80°F	
Lactating cows					
1400	20 ²	12.0	14.5	17.9	gal/day
	60 ²	22.0	26.1	24.7	
	80 ²	27.0	31.9	38.7	
	100 ²	32.0	37.7	45.7	
Dry cows					
1400 ¹		9.7	12.0	16.2	
1600 ¹		10.4	12.8	17.3	
Heifers					
1200 ¹		8.7	10.8	14.5	
800		6.3	7.9	10.6	
400		3.7	4.6	6.1	
200		2.0	2.5	3.3	
¹ Maintenance and pregnancy					
² Maintenance and milk production					

Wash Pen Needs

The wash pen can be a large user of fresh water on typical dairies. The amount used is dependent on line pressure, sprinkler orifice, number of sprinklers and minutes per day used. Table 3 shows the gallons per minute per sprinkler with different line pressure in pounds per square inch. The number of sprinklers in the wash pen, the minutes used per day and the nozzle discharge will determine water used in the wash pen.

Table 3: Nozzle Discharge (gpm)

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	1/8" dia.	9/64" dia.	5/32" dia.	11/64" dia.	3/16" dia.
40 psi	2.96	3.74	4.61	5.54	6.64
45 psi	3.13	3.99	4.91	5.91	7.03
50 psi	3.3	4.18	5.15	6.19	7.41
55 psi	3.46	4.37	5.39	6.48	7.77

Milk House and Parlor Needs

Milk house and parlor waste can be estimated from data found in Table 4.

Table 4: Volume of Milkhouse and Parlor Wastes

Washing Operation	Water Volume
Bulk Tank	
Automatic Wash	50 to 60 gal. per wash
Manual Wash	30 to 40 gal. per wash
Pipeline, in parlor Volume is higher for long stanchion barns)	75 to 125 gal. per wash
Pail Milkers	30 to 40 gal. per wash
Miscellaneous Equipment	30 gal. per day
Cow Prep Wash	
Automatic	1 to 4.5 gal. per wash per cow
Manual	0.25 to 0.5 gal. per wash per cow
Parlor Floor	40 to 75 gal. per day
Milkhouse floor	10 to 20 gal. per day
Holding Pen (sprinklers)	5 gpm per head (depending on nozzle size and pressure)

Summary

Dairies under construction or expanding must evaluate their water needs to ensure that a water source is capable of supplying the production needs of the facility. The information provided in this article can aid in that estimation.

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