

MEMORANDUM

TO: File 85-7664

FROM: Daniel Nelson – Staff Hydrologist

DATE: June 17, 2014

SUBJECT: Review of System for Licensing

Sandy Hemenway performed the field exam on this permit and was unable to complete the field report due to retirement. Sandy properly located the point of diversion and place of use for this permit, but there were several issues that needed to be resolved prior to licensing of this permit. Due to the amount of information that was missing, I went back to the site and worked with the hatchery Manager, Aaron Penney.

Ms. Hemenway mentions in her write up the horsepower for this well is a 15 Hp pump, and she performed a theoretical calculation that gave a flow rate of 1.02 cfs. She also mentioned that there was a flow meter on the well that read 125 gpm or 0.28 cfs. I visited the site to measure this system due to variations in flow described. While at the site, I checked the flow meter, and it was still reading 125 gpm. I measured the pipe using the Thyme Flyte polysonic meter and came up with a flow rate of 112 gpm or 0.25 cfs. I then went back up to the well and discovered that the well pump was not a 15 Hp pump, but it was a 7.5 Hp pump. When doing a theoretical on this pump using the drawdown shown on the well driller's report and a range of pressures, this measurement seems correct. I am recommending 0.25 cfs for this permit.

Instead of doing the calculations for the storage component based on the actual tank size, Ms. Hemenway used ArcMap to get a general volume. I have attached a spreadsheet showing the volume of the tanks based on their size, so I am recommending a volume of 0.4 acre feet. An X35 condition will be needed to account for the same storage on both water rights 85-7660 and 85-7664.

I have included a fish propagation worksheet with this memo, and it looks as though they are operating this facility within normal standards. This facility operates between April 1 and June 15th of each year or 43 days. The total volume for fish propagation will be the rate of flow of 0.25 cfs for 43 days or 21.3 acre-feet minus the storage component of 0.4 acre feet for a balance of 20.9 acre feet.

I am recommending this permit as follows:

Diversion to storage = 0.25 cfs
Fish propagation storage = 0.4 af
Fish propagation = 0.25 cfs and 20.9 af
For a total of 0.25 cfs and 21.3 af.

POLYSONIC READINGS

PERMIT #: 85-7664

POINT OF DIVERSION

Ground water

FIRST SET OF INFORMATION:

SET-UP IMPUTE DATA USED DURING
PREPARATION FOR FLOW MEASUREMENTS.

SECOND SET OF INFORMATION:

THESE ARE THE READINGS TAKEN FOR
THIS PUMP. THE TOTAL FLOW WAS
AVERAGED OVER A 10 MINUTE READING.

FLows IN GALLONS PER MINUTE (GPM)

112 GPM FLOW RATE

The totalizer didn't work on this test
Therefore, I averaged the 12 readings.
The total gallons measured was 1340.373
divided by 12 equals 111.6978 or 112 gpm.

FLows IN CUBIC FEET PER SECOND (CFS)

112 GPM / 448.8 = 0.25 CFS FLOW RATE

	14:30+118.613E 00GPM	00R
	+02906 *10 G	00R
	-00000 *10 G	00R
	14:31+110.952E 00GPM	00R
	+02906 *10 G	00R
	-00000 *10 G	00R
	14:32+108.046E 00GPM	00R
	+02906 *10 G	00R
	-00000 *10 G	00R
	14:33+110.423E 00GPM	00R
	+02906 *10 G	00R
	-00000 *10 G	00R
MODE SELECT-- INPUT	14:34+111.480E 00GPM	00R
OUTER DIAMETER	+02906 *10 G	00R
8.6300 IN	-00000 *10 G	00R
PIPE MATERIAL	14:35+110.952E 00GPM	00R
? PUC	+02906 *10 G	00R
	-00000 *10 G	00R
WALL THICKNESS	14:36+113.065E 00GPM	00R
0.3590 IN	+02906 *10 G	00R
	-00000 *10 G	00R
INNER LINING	14:37+115.443E 00GPM	00R
? NO LING.	+02906 *10 G	00R
	-00000 *10 G	00R
KIND OF FLUID	14:38+103.555E 00GPM	00R
? WATER	+02906 *10 G	00R
	-00000 *10 G	00R
SENSOR MOUNTING	14:39+113.065E 00GPM	00R
? U	+02906 *10 G	00R
	-00000 *10 G	00R
TYPE OF SENSOR	14:40+110.423E 00GPM	00R
? SMALL	+02906 *10 G	00R
	-00000 *10 G	00R
DATA CHANGE	14:41+114.386E 00GPM	00R
? NO	+02906 *10 G	00R
	-00000 *10 G	00R
SPACING	14:42+110.423E 00GPM	00R
6.264 IN U	+02906 *10 G	00R
	-00000 *10 G	00R
SPACING	14:43+110.423E 00GPM	00R
6.264 IN U	+02906 *10 G	00R
	-00000 *10 G	00R
ZERO MODE		
CLEAR		
05-28 14:2200 *R	14:44+114.386E 00GPM	00R
+003.00 % A12	+02906 *10 G	00R
	-00000 *10 G	00R
ZERO MODE		
AUT ZERO		

THEORETICAL HORSEPOWER EQUATION WORKSHEET (cjh 1/92)

Water Right No.: 85-7664
 Reviewer: Dan Nelson
 Date of Review: 5/28/2014

P/D No.:	Senerio 1	Senerio 2	Senerio 3
PUMP HORSEPOWER	7.5	7.5	7.5
BOOSTER HORSEPOWER	0	0	0
PUMPING LEVEL	140	140	140
DISCHARGE PRESSURE	10	15	20
RATE OF FLOW (cfs)	0.28	0.26	0.25
	127	119	111

The above calculates the formula =
$$Q = \frac{8.8 * (\text{Efficiency}) * \text{hp}}{\text{depth to water} + 2.31 * (\text{psi}) + \text{friction}}$$

Assumptions: %70 efficiency.
 No Friction

Examiners Notes: There are two well logs for this site. The well logs state that the pumping water level for this well is between 134 to 140 feet. I used the 140 foot mark to make sure it was reasonable. The water travels some distance, but the majority of that distance is down hill, so I used a range of pressures to account for the friction loss and open discharge. The flow rate in this theoretical closely matches the measurement that I made on the system. of 112 gpm.

Permits 85-7660 an 85-7664

Storage Tank Calculations

By Dan Nelson

Number of Tanks	Tank Diameter in feet	Tank Depth in feet	Volume in Cubic Feet per tank	Volume of all tanks in Cubic Feet	Volume in Acre Feet
10	20	5	1570	15700	0.3604224

The total volume for this system is 0.4 acre feet.

Fish Propagation Worksheet

Determination of Density Index = Weight of Fish Produced in pounds/ (Fish length in inches X Facility Volume in ft³)		
Fish Weight	5,000.00	
Length	3.00	
Volume	1,570.00	
Density Index	1.06	
Under Ideal Conditions, Density Index should be between 0.4 and 1		

Determination of facility exchange = Diversion Rate in cfs X 3600/ Facility Volume in ft³		
Diversion Rate	2.83	
Facility Volume	15,700.00	
Exchanges per Hour	0.65	
Under Ideal Conditions, Exchanges per Day should be 2.5 for Trout.		

Diversion Capacity Calculation = Diversion Rate in cfs X 1.9835 X 43 days		
Diversion Rate	2.83	
Total Volume	241.37212	

Determination of Flow Index = Weight in Pounds/ (Fish Length X Diversion Rate in gpm).		
Fish Weight	5,000.00	
Length	3.00	
Diversion Rate	1,270.00	
Flow Index	1.31	
Under Ideal Conditions, Flow Index should be between 0.83 and 2.7		

Adjusted Density Index if the Facility was a Standard Facility is as follows: Adjusted Density Index = (Actual Density Index X Standard Exchange of 2.5 per Hour)/ Actual Exchanges per Hours=.		
Actual Density Index	1.06	
Actual Exchanges Per Hour	0.65	
Adjusted Density Index	4.09	
If the Adjusted Density Index is between 0.4 and 1 then the density Index was Lowered to handle a lower diversion rate, so the annual volume should equal diversion capacity.		

<---- Use This Volume if Adjusted Density Index falls Within
Standards.