

MEMORANDUM

Date: July 12, 2013
To: Water Right File 96-9057
From: medl
Re: license review

Applicant

Thomas B. Renk is the sole permit holder.

According to available Bonner County taxlot information, Thomas B. Renk is the owner of record for the property containing the powerhouse (the POU). The property containing the POD is owned by Nancy F. Renk and Thomas B. Renk.

Source & POD

The source of the water is an unnamed stream. The POD is the intake to the penstock which is 3-inch diameter pipe submerged in an instream pool.

The examiner did not provide a water right POD/POU overlap analysis but the source waterway may be the same source as two licensed rights in the names of Thomas and/or Nancy Renk. Those rights are WR 96-7169(domestic) and WR 96-7169(irrigation). They name Steve Creek as the source and identify the Renk property as the place-of-use, but the DRG layer does not show a label for the creek running through this property.

Neither the POD or POU are visible in available aerial photography. I created the POD and POU shapes based on the field examiner s map.

Water Use

Storage use

Some storage is required for nearly all hydropower uses. This power use is no exception. However, the storage use will not be licensed because the volume of water stored is less than the 24-hour fill allowance. The examiner found and recommended only 0.04 AF for storage which is much less than the maximum fill allowance appropriate to the rate he found in use. At 0.13 cfs, an impoundment less than 0.26 AF would not require storage use authorization. The arithmetic is: $0.13 \text{ cfs} \times 1.984 = 0.257 \text{ AF}$

Power use

The IDWR field examiner measured 0.13 cfs discharging from the turbine but he did not record the watts generated by that flow. I assume that power generation was occurring.

Exam photos of the micro-hydro turbine, show it to be a pelton-wheel type turbine with two nozzle ports coupled to a permanent-magnet type alternator. The unit is capable of producing electricity through a range of flows by changing nozzles. In his application, Mr. Renk stated that he had 2 x 3/8-inch nozzles for use during seasonal low flow and that he expected to generate 0.337 kW (337 Watts). The application also estimated that 85 ft of elevation head was available. The field examiner s map and system diagram confirms at least 85 ft as the elevation change and shows that the penstock was approximately 800 ft length. Given those parameters, power generation can be estimated. See attached spreadsheet for theoretical calculations.

Place of Use

Exam photos show the turbine is enclosed in a powerhouse.

The examiner s map shows the water is conveyed by gravity through dedicated service piping which is buried most of the distance from the diversion pool to the powerhouse.

Point of Discharge

Discharge from the micro-hydro turbine is returned through a pipe to the same unnamed stream from which it was diverted.

Status/ combined use/ conditions

I consider the turbine to be a measuring device. The examiner was able to measure a flow consistent with the expected nozzle size.

Permit condition 9 is not relevant because the size of the impoundment does not require a storage authorization.

This is a run of river system. Therefore no volume is required for this power use.

The place-of-use and point-of-diversion are in a remote location away from any utility service. The project property is owned by the permit holder and all the power will be used by the permit holder. Neither FERC nor the IPUC are involved in this power use.

This is a personal use micro-hydro project. I am recommending a term date which is consistent with the language of term limit memo.

This right will be made subordinate to any subsequent rights also served by this unnamed stream.

HYDROPOWER ANALYSIS SHEET

Renk hydro on unnamed stream

[illegible]

OUTPUT IN WATTS & EFFICIENCY IN % WITH RECOMMENDED NOZZLE SIZE

versus head and flow

Note that permanent magnet alternator is more efficient and usually produces more output.
(Permanent Magnet Table updated 7/6/2008)

FLOW GPM	PERMANENT MAGNET ALTERNATOR 1500 WATTS MAX						FORD ALTERNATOR (DISCONTINUED) MAX: 750W @ 12V, 1500W @ 24V, 2500W @ 48V					
	NET (DYNAMIC) HEAD PRESSURE						NET (DYNAMIC) HEAD PRESSURE					
	25'	50'	75'	100'	200'	300'	25'	50'	75'	100'	200'	300'
	11PSI	22PSI	33PSI	43PSI	87PSI	130PSI	11PSI	22PSI	33PSI	43PSI	87PSI	130PSI
3	-	-	-	-	45W 42% (1)3/32"	80W 49% (1)3/32"	-	-	-	-	30W 28%	70W 43%
6	-	20W 37% (1)7/32"	30W 37% (1)3/16"	45W 42% (1)5/32"	130W 60% (1)5/32"	180W 56% (1)1/8"	-	-	25W 31%	35W 32%	100W 46%	150W 46%
10	20W 44% (1)5/16"	50W 56% (1)1/4"	80W 59% (1)1/4"	105W 58% (1)7/32"	225W 63% (1)3/16"	350W 65% (1)5/32"	-	35W 39%	60W 44%	80W 44%	180W 50%	275W 51%
15	35W 52% (1)3/8"	85W 63% (1)5/16"	115W 57% (1)11/32"	170W 63% (1)1/4"	350W 65% (1)5/32"	520W 64% (1)3/16"	20W 30%	60W 44%	95W 47%	130W 48%	260W 48%	400W 49%
20	65W 72% (1)7/16"	120W 67% (1)3/8"	170W 63% (1)11/32"	240W 67% (1)5/16"	480W 67% (1)1/4"	700W 65% (1)7/32"	30W 33%	80W 44%	130W 48%	200W 56%	400W 56%	550W 51%
30	100W 74% (2)3/8"	175W 65% (1)7/16"	270W 67% (1)13/32"	360W 67% (1)3/8"	675W 63% (1)5/16"	1000W 62% (1)5/16"	50W 37%	125W 46%	210W 52%	290W 54%	580W 54%	850W 52%
50	150W 67% (3)13/32"	310W 69% (2)7/16"	450W 67% (2)3/8"	620W 69% (2)11/32"	1100W 61% (1)7/16"	1500W 56% (1)3/8"	115W 51%	230W 51%	350W 52%	500W 56%	950W 53%	1400W 52%
100	300W 67% (4)1/2"	560W 62% (4)13/32"	850W 63% (3)7/16"	1100W 61% (3)13/32"	1500W 42% (2)7/16"	-	200W 44%	425W 47%	625W 46%	850W 47%	1500W 42%	-
200	-	725W 40% (4)5/8"	1050W 39% (4)9/16"	1300W 36% (4)1/2"	-	-	-	520W 29%	850W 31%	1300W 36%	-	-
	1 NOZZLE BEST						2 NOZZLES BEST					