

MEMORANDUM

Date: January 24, 2011
To: Water Right File 37-7826
From: medl
Re: license review

Applicant

The permit was assigned in 2001 to four individuals: Brock Weaver, and David W Lunte and Julie Ann Lunte and Todd J. Burkhart. The connector was missing from the database. The Warranty Deed supplied with the assignment shows the name J. Todd Burkhart not Todd J. Burkhart. I believe that the assignment of permit has a clerical error and that J. Todd Burkhart is the correct legal name. I corrected Mr. Burkhart's name and applied AND connector linking all four names.

According to available Lincoln County taxlot information, Brock Weaver may be the sole owner of the property nearest to and providing access to the place-of-use. That property has an appurtenant right surface water right.

I contacted Water District 37M watermaster 37M on 1/6/2011 and received updated contact information for Todd Burkhart and Brock Weaver. However, I was unable to connect directly with any of the permit holders.

Another assignment to may be needed to clarify ownership.

Source, Point of Diversion and Place of Use

I created the POD and POU shapes based on a comparison of the field examiner's photos and contemporary aerial photography.

An arch shaped, check dam spans the Little Wood River at the point of diversion. The application for permit proposed a 6-ft high dam and the exam photos show a dam approximately that height. A small power plant is perched atop that dam. A portion of the river is routed through a single, active turbine.

Water Use

The only use is hydropower generated in a run-of-river plant. A single, belt-driven generator is shown in an exam photo but the examiner does not record if any generation was occurring at the time of the exam. The powerhouse could be fit with more generation capacity. Two empty bays are visible in exam photos. However, I have no records that additional generators have been added.

The lack of generation data has delayed the processing of this right. The examiner reported personal use only and a generation capacity of 4000 W. He does not provide any information about the turbine. The examiner recommended a rate but not a volume. It's unlikely that water use data or generation data from development period of this permit is available.

The power generation is likely high flow-low head type configuration similar to the attached image. There is no trash rack visible in exam photos so the life of the turbine would be shortened by exposure to garbage floating in the river.

4000 watt (4kW) generation capacity is not enough for peak demand but generation could be managed to adequately supply most routine power needs. I have not confirmed whether or not the property was connected to electrical grid at the time the permit was active.

Water District 37M Watermaster Budget Reports document a short term of use before Mr. Kissler ceased generating under the weight of an increased watermaster assessment. The assessment was refunded

but it is not clear that generation resumed.

The original permit holder, Gary Kissler, claimed government delay on his request for an extension of time to submit beneficial use. He stated that the FERC was slow in processing his exemption and that an exemption was issued in the winter of 1983. I made inquiries of the FERC database and I have found no evidence that Mr. Kissler requested an exemption or that the FERC issued any opinion on this project.

Status, Combined Use and Conditions

This diversion is in Water District 37M and the permit required a measuring device. The examiner was able to determine the flow by using submerged orifice charts compatible with the control structure built across the active bay. He stated that he used the same method as the watermaster used.

I believe that decreed right 37-4117 is diverted from the headwater pool created by the check dam. There are no overlapping rights.

The default date for Director's review condition is set at standard 10 years after proof submitted. This date may not be appropriate for licensing 20+ years after proof was submitted.

I assumed that for economic reasons the permit holder would build this system to meet his personal needs only and that it would be sized consistent with the lowest available flow and therefore available to generate year-round. I also assumed this is a non consumptive use and that the subordination condition would allow adequate watermaster control of the diversion.

Calculations

The field examiner measured more than 10 cfs at the stoplog-weir control works. The maximum rate for this license is limited by the permit rate. I assume that the powerhouse was generating power from the 10 +cfs that the field examiner measured.

No volume was recommended by the examiner. I propose a volume based on the annual average kW use in households during the year of the exam and back calculate, using the power equation, to a volume of water that could have been beneficially used. That volume is 3900 AF.

My reasoning and calculations for rate and volume are available on the attached sheet.

The most useful equation for this situation is the Power Equation. The most useful form of the Power Equation is $P = Q \times H \times e / 11.81$

Where

Q is flow rate in cfs

H is the height that the water falls in feet

e is efficiency (assumed to be 60% for a first cut)

11.81 is a conversion factor

P is power in kW

The topographical maps of the area near the POU indicate that this reach of the Little Wood River drops as much as 50 ft from RM 38 to RM 40. Based on the examiners photos, the drop across Kissler s check dam is ~ 6 ft which was the height estimated in his Application for Permit and is reasonable for this stretch of river.

If Q = 10.81 cfs, (the examiner s measurement), assumed e = 60% and assumed H = 6ft then P = 3.3 kW by the Power Equation above. A realistic range for peak demand in a single family household is 5 - 8 kW. At the maximum permitted flow rate, the calculated electricity supplied by this system would not meet peak demand load. However, I propose that the licensed rate be 10 cfs as recommended by the examiner. That rate would allow extra generation toward meeting peak demand.

The examiner does not record any generation actually occurring at the time of the exam. However, letters written by the original permit holder indicated that he was generating power. If the water was available, then generation could theoretically have occurred. I believe that sufficient water was available. It is unlikely that the flow in this reach of the Little Wood River would be less than 10 cfs.

Supplying power at peak demand levels is unnecessary for the majority of any typical day. According to documents provided to me by the Idaho Public Utilities Commission, Idaho Power Company calculated the average residential use in 1989 to be 14,441 kWh/ customer. Average use during the day would be 1.648 kW. The calculation is: $14441 \text{ kwh/cust/yr} / (365 \text{ days/yr} \times 24 \text{ hr/day})$.

The examiner found that the Kissler hydro would be limited to a generator capacity of 4000 watt (4 kW). That capacity would be more than sufficient to provide the average kW use.

To determine a volume I used the Power Equation again. This time the equation is arranged to solve for Q. I back-calculate average water use from average generation use. If P = 1.648 kW, and the other parameters are unchanged (assumed e = 60% and assumed H = 6ft) then I calculate that this powerhouse configuration would use an average 5.4 cfs to generate the average kW. Annual volume would then be: $365 \times 5.4 \times 1.9835 = 3909.48$; rounded to 3 significant figures = 3900 AF

FOR ILLUSTRATION PURPOSES ONLY

This contemporary hydro turbine setup would be compatible with the Kissler power plant configuration.

ABS Alaskan, Inc. introduces ...

The Neptune

Hydro Turbine



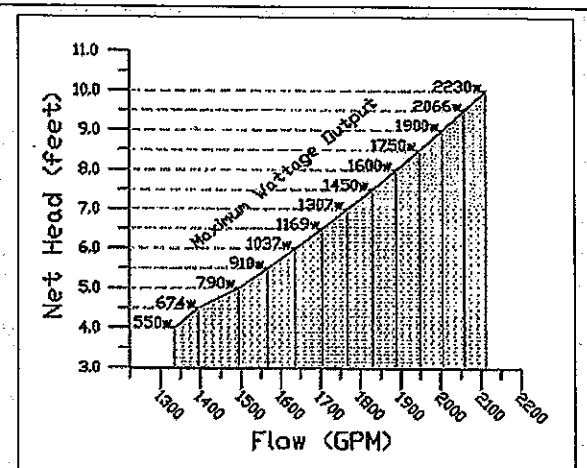
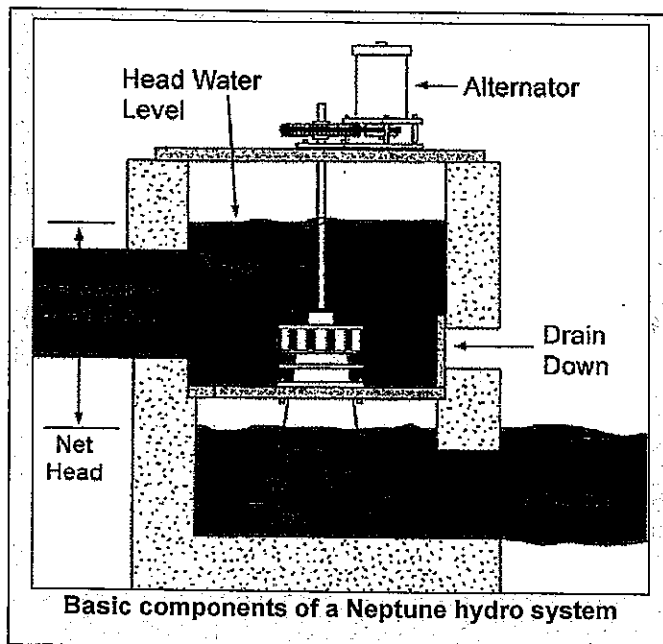
- **Produces over 2.2kW of power**
- **Very effective low head (3-10 ft) turbine**
- **High quality design and long service life**

The Neptune is a Francis-style turbine capable of tremendous power output in a compact design. It will provide power for generations on as little as four feet of head. It is essential the same as the Nautilus turbine, except that the water, whether channeled to the turbine via pipe or open canal, empties into an open chamber in the turbine. This 'open' water diversion system prior to the turbine means that the 'pressure head' is limited to the depth of the water directly above the turbine. Like the Nautilus turbine, it uses a 'Draft Tube' from the turbine to the tail water, also producing 'suction head'. The Neptune turbine is ideally suited for low head applications. For heads over 8 ft (2.5 m), the Nautilus turbine is recommended.

The Neptune has an expected life of over 50 years. All components are made of laser-cut stainless steel to insure smooth water surfaces that will never rust. Massive taper roller bearings and carbon/ceramic face seals will last 7-10 years between refits.

The Neptune can be disassembled and easily transported into the most areas. There are several permanent magnet alternator choices, available in both direct-coupled and timing-belt driven configurations, and with 24VDC, 48VDC, and high voltage DC output.

The Neptune turbine is available with either an 8 inch (203 mm) or a 10 inch (254 mm) stainless steel runner. Using the 10" runner (shown in graph), electrical output will vary from 550 watts at 4 ft (1.2 m) of head and 1350 GPM of flow to over 2200 watts with 10 ft (3 m) of head and 2100 GPM of flow.



Optimal Neptune Power Output
With 10 inch runner option

IDAHO POWER COMPANY
RESIDENTIAL SALES
(WEATHER-NORMALIZED)

	YEAR	CUSTOMERS	KWH/CUST	THOUSAND MWH	% CHANGE
	-----	-----	-----	-----	-----
HISTORICAL:					

	1970	132,134	9,978	1,319	-
	1971	138,070	10,543	1,456	10.4
	1972	145,514	10,979	1,598	9.7
	1973	153,310	11,539	1,769	10.7
	1974	160,521	12,068	1,937	9.5
	1975	168,017	12,995	2,183	12.7
	1976	176,171	13,556	2,388	9.4
	1977	185,091	13,755	2,546	6.6
	1978	195,206	14,273	2,786	9.4
	1979	203,616	14,951	3,044	9.3
	1980	210,296	14,723	3,096	1.7
	1981	214,324	14,425	3,092	-0.1
	1982	217,516	14,566	3,168	2.5
	1983	220,686	14,433	3,185	0.5
	1984	223,634	14,363	3,212	0.8
	1985	226,142	14,321	3,238	0.8
	1986	228,029	14,225	3,244	0.2
	1987	229,805	14,249	3,274	0.9
	1988	231,720	14,489	3,357	2.5
	1989	234,335	14,441	3,384	0.8
FORECAST:					

	1990	239,278	14,227	3,404	0.6
	1991	246,630	14,196	3,501	2.8
	1992	253,930	14,170	3,598	2.8
	1993	260,276	14,027	3,651	1.5
	1994	266,010	13,923	3,704	1.4
	1995	270,084	13,771	3,719	0.4
	1996	273,711	13,645	3,735	0.4
	1997	278,473	13,622	3,793	1.6
	1998	283,773	13,574	3,852	1.5
	1999	289,443	13,483	3,902	1.3
	2000	294,277	13,432	3,953	1.3
	2001	299,063	13,384	4,003	1.3
	2002	305,023	13,285	4,052	1.2
	2003	311,240	13,291	4,137	2.1
	2004	317,414	13,298	4,221	2.0
	2005	323,511	13,280	4,296	1.8
	2006	328,618	13,302	4,371	1.7
	2007	334,159	13,188	4,407	0.8
	2008	341,071	13,025	4,443	0.8
	2009	348,094	13,094	4,558	2.6
	2010	355,159	13,159	4,673	2.5

N91A2.07