

MEMORANDUM

Date: December 3, 2009
To: Water Right File 37-7861
From: Michele Edl
Re: license review

Applicant

The permit holders hired Gerald Martens to conduct the beneficial use field exams for this water right and for 3 other rights: 37-7719 hydropower use, 37-7756 stock and domestic uses and 37-7862 fish propagation and aesthetic uses. Mr. Martens was a certified water right examiner and conducted all four exams in a single visit on October 29, 1987. The completed field reports were received in the Southern Region office November 25, 1987. The reports were not detailed enough to make the licensing process for all four permits easy. System complexities were glossed over or were not addressed in the field exam reports. However, the Mechams have been the only permit holder for the life of this permit and have provided supplemental information on several occasions in an attempt to assist department personnel in the licensing process.

Source and POD

POD for this right is located in NWNW of section 27, almost due north of the Mecham property. Because two springs, Stoddard Springs and Upper Waddington Springs, daylight very close to each other, there has been confusion over the correct identity of the source for this right. Recent site reconnaissance done by Corbin Knowles (IDWR Water Distribution Section) in 2009 confirmed that this right has Stoddard Springs as its source.

Mr. Mecham has decreed right 37-1244 for irrigation and stockwater uses and is limited to 0.714 cfs in combined use with 37-4389 a (Waddington Spring right) during irrigation season. It is the decreed water that is put to use in this hydro power application. The same pipeline conveys the water licensed under 37-7756 and a portion of the water use authorized under permit 37-7719 and license 37-7862.

Jim Mecham and his neighbors have been sharing the Stoddard Springs water with bare minimum controlling works. A pipeline conveys Stoddard Spring water from where it daylights in the NWNW, under a pond and under the road to the SWNW and the first of 3 collection or splitter boxes enroute to the Mecham property. From the Harrison division box, the water destined for the Mecham property is piped further south, along the road to a splitter box which separates Sinkenson (Hamilton) water from Mecham water. Jim Mecham's share of the Hamilton Decree is then piped from that splitter box to his collection box/weir. The Mecham collection box/weir is in the SWNW of section 27, but still ~0.6 mile north and still outside of the Mecham property located in the NWSW. Please refer to the companion aerial photo.

The examiner found a Cippoletti weir built into the collection box. The recommended flow for this right was calculated from a reading taken at the collection box weir. The weir/collection box is still in place and contemporary readings are taken at this location. Also attached to this memo is a data sheet of flow measurements (and measurement interpolations) taken during irrigation year 2003. Jim Mecham agreed to make weekly readings from the collection box weir which he aggregated and turned into Water Distribution staff. Stoddard Spring flows year-round and although most of the 2003 entries are not actual readings, the contemporary flow from this spring is probably less than was available in 1987.

According to Corbin Knowles in a typical year, flow from the springs varies some by season with peak flow occurring in the fall. It was likely that an Oct 29th field exam represented the most

favorable flow conditions of that year. The examiner found a flow of 0.74 cfs which is greater than the permit rate. The permitted rate is the constraint to the license.

Water Use

Based on recommendations made by IDWR s J Johnson in 1990, power is the only use to be licensed through this right. The field examiner does not mention any recreation use in his exam reports and the small size of the recreation pond makes a recreation storage use unnecessary.

There is only one fish propagation pond on the Mecham property. That pond also serves as the stilling area/forebay for a second small hydroturbine system that is downstream from the inline turbine associated with this right. Fish propagation is identified and fully recognized under water right license 37-7862. Therefore, I deleted the recreation and fish propagation uses from this water right.

No equipment specs or nameplate data for the installed Pelton wheel hydroturbine were provided in the field exam report. Information supplied to the Department by the water right holder after the field exam also proved inadequate to confirm a beneficial use for hydropower. In search of an acceptable theoretical method for analyzing a personal hydropower use, I consulted with John Crockett (currently with Office of Energy Resources). He shared with me a hydropower analysis spreadsheet which I used to evaluate the potential for power production given the water and terrain conditions at this site. Although Pelton wheel hydroturbines are usually 80-90% efficient, Mr. Crockett recognized that the alternator attached to this system was not efficient and he recommended that I accept a very low total system efficiency. John stated that 25% efficiency for the system was being generous.

This hydro production system is not a designed system. It is not intended to optimize available water for power production. Instead this system takes advantage of the fact that the water decreed to the Mechams is either not fully consumed or is not used continuously. It makes an additional use of water already available to the Mecham property. The system s components were pieced together by local talent from readily available materials. My desktop analysis of the hydropower potential indicates that there is significant energy lost due to friction in the 2725 ft of mixed diameter pipe which acts as the penstock for the system and due to turbulence at the fittings and sudden contractions just before the turbine inlet. However, at a system efficiency of approximately 15%, an inline Pelton wheel on this system would be able to provide supplemental electric power in the wattage range that Jim Mecham claims to generate and use. (Refer to the attached hydropower analysis spreadsheet).

The onsite power generation is not sufficient to meet the entire electricity demand. According to the permit holder, the power generated onsite is used is for lights, refrigeration and in cooler months, for heat in the manufactured homes on the Mecham property. The homes are also connected to and supplied by Idaho Power Company s electrical grid. This hydro supplies supplemental power only. In one of my conversations with Mr. Mecham he stated that he gets 500 watts in continuous generation and that 750 watts is the maximum that system will generate. Jim said he measured the capacity by stringing a series of light bulbs until the bulbs started to dim which was at ~750 watts. The field examiner did not find a bank of batteries storing the power and there s no significant reservoir for storing water, so any watts generated would need to be used in real-time, as they are generated.

The field examiner did not make a capacity determination and did not recommend a volume. However this piping system also provides water for irrigation (WR 37-1244) and for domestic and stock uses (WR 37-7756). In his report for WR 31-7756 Mr. Martens confirms the existence of 4 mobile homes and recommended a rate of 0.04 cfs for each of them. He also confirmed 25 head of stock and recommended 0.02 cfs for that use. Given that Mr. Mecham has these other, higher priority uses on the same system, careful management would be required to put the water to an additional use for hydropower but I believe Mr. Mecham does that. The field exam photos and

schematics show a butterfly valve and T in place which would enable the flow to be directed to each use in turn. Using the Departments standards for irrigation and stockwater uses, I was able to back-calculate to a remnant volume by subtracting the Departments standards values from a sum of Mr. Mecham's existing decreed and licensed rates. I am recommending that remnant volume for hydropower. Conditions defining a combined use limit will be placed on the license.

The examiner recommended a hydropower use in the irrigation season only (Mar 15 - Nov 1) but didn't provide a justification for that limitation in his report narrative. I understand from my conversations with the right holder that 0.5 cfs is needed at the control box in order to provide sufficient total head to operate the hydro. However, this permit authorizes only 0.3 cfs in the non-irrigation season and that would exclude a beneficial use which required a higher rate.

Place of Use

POU overlap analysis shows Twin Falls Canal Company and Northside Canal Company surface water rights also covering this place-of-use. I believe that the Mechams irrigate their property solely with their own water rights and that the overlap is not correct.

The field examiner placed the turbine in the NWNW of section 27. This is the wrong PLSS address. Additional information provided by the right holder and confirmed by Cindy Yenter (Sr Agent and Basin 130 Watermaster) established the correct place-of-use address in Gov't Lot 1 or the NWSW of section 27. This is the same PLSS location provided on the permit.

The exact place-of-use for this inline hydro was not apparent from the field exam diagram or photos. I created the place-of-use shape based on a contemporary map and diagram of the system which was submitted by right holder.

Mecham property is the final use of this water before it reenters the Snake River.

Calculations

37-1244 and 37-4389 have been decreed in the SRBA at a combined rate 0.714 cfs for an irrigation season of 231 days for 165 cfs or 328.6 AF. Those rights are supplied by the same piping system.

Subtracting a standard volume for the priority uses from the same system during the same season [44 AF (11 ac x 4) for irrigation/stockwater uses] leaves 284.56 AF for hydropower. Rounded to three significant figures is 285 AF and represents the volume I am recommending for this water right.