

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

APPLICATION FOR PERMIT
To appropriate the public waters of the State of Idaho

1. Name of applicant BRP, INC. DBA GEM LAKE HARBOR Phone 208-529-9797
Mailing address P.O. Box 2563 Idaho Falls, ID 83403
2. Source of water supply SNAKE RIVER which is a tributary of COLUMBIA RIVER
3. Location of point of diversion is Township 02N Range 37E Sec. 35, in the SE $\frac{1}{4}$, SW $\frac{1}{4}$,
NW $\frac{1}{4}$, Govt. Lot _____, B.M., BONNEVILLE County; additional points of diversion, if any: _____

4. Water will be used for the following purposes:

Amount 25.8 for RECREATION purposes from 01/01 to 12/31 (both dates inclusive)
(cfs or acre-feet per annum)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per annum)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per annum)

Amount _____ for _____ purposes from _____ to _____ (both dates inclusive)
(cfs or acre-feet per annum)

5. Total quantity being appropriated is (a) 25.8 and/or (b) _____
cubic feet per second acre-feet per annum

6. Proposed diverting works:

- a. Describe type and size of devices used to divert water from the source: Headgate and culvert divert water from source.
- b. Height of storage dam _____ feet; active reservoir capacity _____ acre-feet; total reservoir capacity _____ acre-feet.
- c. Proposed well diameter is _____ inches; proposed depth of well is _____ feet
- d. Is groundwater with a temperature of greater than 85° degrees being sought? _____
- e. If well is already drilled, when? _____; Drilling firm _____;
Well was drilled for (well owner) _____; Driller Permit No. _____

7. Time required for completion of works and application of water to proposed beneficial use 1 1/2 years (minimum 1 year) **DWB**
8. Description of proposed uses (if irrigation only, go to item 9):
- a. Hydropower; show total feet of head and proposed capacity in kW. N/A
- b. Stockwatering; list number and kind of livestock. N/A
- c. Municipal; show name of municipality. N/A
- d. Domestic; show number of households. N/A
- e. Other; describe fully. New permit is for recreational uses.

9. Description of place of use:

- If water is for irrigation, indicate acreage in each subdivision in the tabulation below.
- If water is used for other purposes, place a symbol of the use (*example: D for Domestic*) in the corresponding place of use below. See instructions for standard symbols.

TWP	RGE	SEC	NE				NW				SW				SE				TOTALS
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
02N	37E	34													R			R	
02N	37E	35							R			R	R						

R = Recreation

Total number of acres to be irrigated _____

10. Describe any other water rights used for the same purposes as described above. Water right permit number 1-7103.

11. a. Who owns the property at the point of diversion? APPLICANT.

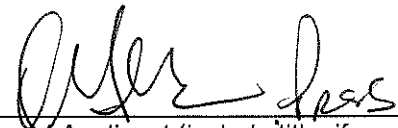
b. Who owns the land to be irrigated or place of use? APPLICANT.

c. If the property is owned by a person other than the applicant, describe the arrangement enabling the applicant to make this filing: N/A

12. Remarks: Applicant seeks a new permit to increase diversion rate established by water right permit number 1-7103, see attached narrative.

13. **MAP OF PROPOSED PROJECT REQUIRED** – Attach an 8 ½ "x 11" map clearly identifying the proposed point of diversion, place of use, section #, township & range. (A photocopy of a USGS 7.5 minute topographic quadrangle map is preferred.)

BE IT KNOWN that the undersigned hereby makes this application for permit to appropriate the public waters of the State of Idaho as herein set forth.


Signature of Applicant (include title, if applicable.)

Received by  Date 9-14-07 Time 4:30 pm Preliminary check by _____
Fee \$ ~~113~~ 1130 Receipted by TG # E033352 Date 9-14-07
Publication prepared by SL Date 10/18 & 10/25/07 Published in Statewide
Publication approved _____ Date _____



**BRP INC. DBA GEM LAKE HARBOR-
NEW PERMIT**

**T.02N R.37E SEC. 34, 35
2004 NAIP AERIAL PHOTO**

0 200 400 800 Feet

BROCKWAY ENGINEERING PLLC
ZL - 9/10/07

Legend

- Proposed POD For New Permit
- sections
- t02n37e



Brockway Engineering
MEMO TO FILE

PROJECT: 962-01-2007

SUBJECT: Hydraulic analysis of headgate & culvert, estimate of capacity
Becko Construction / Permit 01-7103

DATE: August 10, 2007
FROM: C. G. Brockway

The point of diversion for permit 01-07103 consists of a concrete headwall with a canal gate to a 30" steel culvert running 40 feet through an embankment and discharging to the body of water known as Gem Lake Harbor. This feature was an old gravel pit which is now filled with water from the Snake River at the point of diversion. The headgate is located within the pool created by Gem State Dam 3.2 miles downstream.

The measured discharge through the culvert on June 21, 2007 was 10.63 cfs. This measurement was made with a current meter about 0.25 miles downstream of the headgate at a concrete box culvert. Seepage from the lake is assumed to be minimal between the headgate and the measurement point. At the time of the measurement, both the inlet and outlet of the culvert were fully submerged and the surveyed water surface drop was 0.14 feet.

The discharge in the Snake River on June 21, 2007 was 5770 cfs. Data from the USGS streamflow gauge 13057155, located 11.4 miles upstream of Gem Lake Harbor, indicates that the daily flow for the period of record 10/1/1987 through 8/9/2007 had a mean of 5809 cfs and a standard deviation of 4430 cfs. Thus, the 6/21/2007 measurements were made during a period of approximately average flow in the river, and the capacity of the headgate and culvert would be greater at higher river stage. The stage is held relatively constant by the dam, but does fluctuate as evidenced by water marks on the concrete headwall. The apparent normal high water mark (not the extreme high water mark) was measured to be 1.05 feet higher than the water level on 6/21/2007.

Because the culvert is submerged, the hydraulic analysis consists of a straightforward head loss computation and the discharge depends only on the difference in water level from upstream to downstream. As a check of the reasonableness of the flow measurement, a theoretical analysis was performed using Darcy-Weisbach friction with $f = 0.015$, an entrance loss coefficient of 0.5, an exit loss coefficient of 1.0, and a total head loss of 0.14 feet. This analysis yields a theoretical discharge of 11.17 cfs, which is within 5% of the measured discharge.

Since the discharge is a function only of the head loss across the culvert, a calibrated discharge equation can be defined using the measured head loss and flow:

$$Q = K\sqrt{\Delta h}$$

Substituting $\Delta h = 0.14$ and $Q = 10.63$ yields $K = 28.41$. (This equation is equivalent to the Darcy-Weisbach analysis described above with all head loss parameters aggregated into a single coefficient and calibrated to match the observed data).

As noted above, at the normal high river level the elevation at the headgate is estimated to be 1.05 feet greater than on 6/21/07. However, due to backwater from the river affecting the outlet of the lake, the depth downstream of the culvert will also increase. A well-defined high water mark on the box culvert indicates a water level 0.3 feet greater. Therefore, the net head is expected to be $1.05 - 0.3 = 0.75$ feet greater than on 6/21/07, and the net head at this high water condition would be $0.14 + 0.75 = 0.89$ feet.

Using the above equation, the discharge with $\Delta h = 0.89$ feet would be 26.8 cfs. This is the best estimate of the capacity of the diversion works during a normal high water condition in the Snake River.

Existing water right permit 01-07103 allows a diversion rate of 1.0 cfs, so the new permit application should list 25.8 cfs.