

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES
BENEFICIAL USE FIELD REPORT

A. GENERAL INFORMATION

Permit No: 65-13381
Exam Date: 8/19/2016

1. Current Owner:
US DEPT OF AGRICULTURE FOREST SERVICE 1249 VINNELL WAY STE 200
BOISE ID 83709 (208) 373-4143

2. Accompanied by: Chris Bromley, Brad Wilson, Bogus Basin & Stephaney Kerley
Phone No: 208-587-7830
Address: 3080 Industrial Way Mountain Home, ID 83647
Relationship to Permit Holder:

3. SOURCE:
UNNAMED STREAM

TRIBUTARY:
BOGUS CREEK

B. OVERLAP REVIEW

1. Other water rights with the same place of use: None
2. Other water rights with the same point-of-diversion: None.

C. DIVERSION AND DELIVERY SYSTEM**1. LOCATION OF POINT(S) OF DIVERSION:**

UNNAMED STREAM NE¼SE¼ Sec. 9, Twp 05N, Rge 03E, B.M. BOISE County

Method of Determination: Verified during exam. Satellite imagery and digital PLSS mapping tools used to describe legal description.

2.

PLACE OF USE: COMMERCIAL

Twp	Rge	Sec	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
05N	03E	9													X				

Method of Determination: Verified during exam. Satellite imagery and digital PLSS mapping tools used to describe legal description.

3.

Delivery System Diagram Attached (required). Indicate all major components and distances between components.

X Indicate weir size/pipe as applicable.

Map Attached Showing Location(s) of point(s) of diversion and place(s) of use (required). Scale must be

X 1:24,000 or greater.

X Aerial Photo Attached (required for irrigation of 10+ acres).

X Photo of Diversion and System Attached

4.

Well or Diversion ID No.*	Motor Make	Hp	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calib. Date

2. Measurements: Manning flow through pipe calculator used.**E. FLOW CALCULATIONS**Measured Method: Manning flow equation. X Additional Computation Sheets Attached

Flow calculation based on nozzle selection and pressure submitted by Bogus Basin on July 30, 1993 calculates 85.8 gpm or **0.19 cfs**.

Permit	0.34 cfs combined use limit
B.U. Standard Allowance	No Limit
B. U. Proof Fee	\$100 → 0.21 to 1.00 cfs
Nozzle calculation	0.19 cfs
License Recommendation	0.19 cfs

F. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{IR} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{DR} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{IR} \text{ and } V_{DR} =$$

2. Volume Calculations for Other Uses:

System uses a 10,000 gallon storage tank off the unnamed stream.

$$\text{Max diversion volume} = [\text{Diversion Rate (cfs)}] \times (\text{Days in commercial season}) \times 1.9835 = 0.19 \times 151 \times 1.9835 = 56.9 \text{ af}$$

$$0.19 \text{ cfs} = 122,800 \text{ gpd (storage exempt; 24 hr rule applies)}$$

$$10,000 \text{ gallons} \times 151 \text{ days} = 1,510,000 \text{ gallons} = 4.6 \text{ af}$$

G. NARRATIVE/REMARKS/COMMENTS

The field exam was conducted on August 19, 2016 by agents Patrick Kelly and Rachel Sommer. They were escorted on the property by Chris Bromley, Brad Wilson, Bogus Basin staff members and Stephaney Kerley of the Forest Service. A field exam was conducted on the same visit for permit 65-13382. Permits 65-13381, 65-13382 and 65-13466 are being licensed concurrently.

POD and POU in the NESE QQ is accurately described by the permit. A licensing amendment is not required for this use.

Bogus Basin operates the system for snow making, but ownership is in the name of the Forest Service. Current taxlot data indicates that Boise National Forest owns the land. The Vinnell Way address on the permit will remain on the license. Bogus Basin Rec has an agreement with the Forest Service to operate on their land.

POD was verified in an unnamed stream located near the bottom of Superior Chair (#3). Sand bags are in place to create a small dam diversion where a 6" PVC line is installed. The water line runs approximately 225 ft to a 10,000 gallon storage tank. A fitting is installed on the tank to connect snow making equipment. A Mannings equation through pipe was done

estimating a flow capacity of 3.18 cfs. A diversion to storage or commercial storage use is not being recommended for the license since the 0.19 cfs recommendation can fill the tank in just a matter of hours. The tank falls within the 24 hour rule, and snow making at max diversion can be considered a live water use.

A max diversion of 0.19 cfs is being recommended based on calculations submitted to the department by Bogus Basin staff in 1993. Nozzles rated at a specific rate at certain pressures were used to quantify a max flow of 85.8 gpm, or 0.19 cfs. This represents the most accurate information available. A combined use limit with 65-13382 will be carried over to license limiting both uses to 0.34 cfs.

As with the snow making use from Bogus Creek, identifying an accurate annual volume is difficult to assign. There are no diversion records associated with the unnamed stream diversion. Identifying a volume that would fulfill a dry season in line with Beneficial Use Examination Rule 35.01.j should be considered. But identifying that volume with no data to quantify such a limit is problematic at best.

At the time of the exam, Bogus staff indicated that the tank fills and empties regularly throughout the season. Water flow through the unnamed stream is not known and may not provide adequate flow at times when snow making is needed. The department also does not have information to suggest how quickly the tank fills from the source during the colder months when water may be limited. However it is reasonable to assume that the tank could fill within a 24 hour period. And in a severe drought year, the snow making use could average out to one tank per day. In a 151 day season, this totals 1,510,000 gallons or 4.6 af.

Have conditions of permit approval been met? ☒ Yes ☐ No

H. RECOMMENDATIONS

1. Recommended Amounts

<u>BENEFICIAL USE</u>	<u>PERIOD OF USE</u>	<u>DIVERSION RATE</u>	<u>ANNUAL VOLUME</u>
COMMERCIAL	11/01 to 03/31	0.19 CFS	4.6 AF
	<u>Totals:</u>	0.19 CFS	4.6 AF

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☒ None
☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☐ Other

I. AUTHENTICATION

Field Examiner's Name Patrick Kelly Date 10-6-2016
 Reviewer _____ Date _____

RECEIVED

JUL 30 1993

Department of Water Resources
Western Regional Office

Bogus Basin Ski Resort
2405 Bogus Basin Road
Boise, Idaho 83702

July 23, 1993

Dave Tuthill *DAT*
State of Idaho
Department of Water Resources
3735 Airport Way
Boise, Idaho 83705

Dave:

Enclosed you will find information pertaining to the foreseen water consumption of Bogus Basin's current snowmaking system. At present it is understood that due to our minimal water usage in snowmaking (less than 90 g.p.m.) we are not required to install a water measurement port, but only furnish the enclosed data.

Due to the nature of our pump, a maximum of 250 p.s.i. was developed only by restricting the snowgun's discharge nozzle configuration with a resultant 63.9 g.p.m. Conversely we attained a maximum of 85.8 g.p.m. with the minimum 150 p.s.i. allowable operating pressure.

Sincerely,

D.J. Kuenl
Darlene J. Kuenl
Snowmaking Supervisor

MICROFILMED

NOV 09 1995

Nozzle Selection and Installation (cont)

Each individual nozzle is labeled and color coded for your convenience.

Nozzle	Color	Orifice Diameter (inches)
Number 5	White	.0625
Number 6	Red	.0938
Number 8	Black	.1250
Number 10	Blue	.1563
Number 14	Green	.2188
Number 16	Yellow	.2500

$$Q_2 = Q_1 \sqrt{\frac{P_2}{P_1}}$$

Where: Q_1 = G.P.M. chart pressure
 Q_2 = G.P.M. new pressure
 P_1 = chart pressure
 P_2 = new pressure

Nozzle flows at various pressures are as follows:

There are 18 nozzles, 10 can be closed

Nozzle #/Flow in Gallons Per Minute

Pressure (PSI)	5	6	8	10	14	16
150	2.1	2.6	5.3	7.9	15	20
200	2.4	3.2	6.1	9.3	17	24
300	2.9	3.7	7.4	11.4	21	29
400	3.3	4.2	8.46	13.0	24	33
500	3.7	4.9	9.5	14.6	27	38

250 p.s.i.

Nozzle #	Amount	Flow
# 5	5	2.9
# 6	11	3.7
# 8	2	7.4

$$(1260/300) = k$$

$$(\cancel{1260} \cdot 9129) = k$$

$$(k)$$

250 P.S.I.

= 63.9 G.P.M.

150 p.s.i.

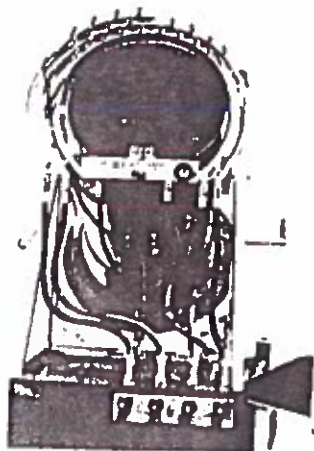
Nozzle #	Amount	Flow
# 16	2	2.0
# 14	2	1.5
# 10	2	2.9

150 P.S.I.

= 85.8 G.P.M.

Breakthrough from SMI!

SILENTSTORM SNOWMAKER



SMI's SilentStorm introduces many technical advances that result in significantly increased snow production, reduced noise levels, greater throw, flexibility and reduced operating costs. Silent because it's QUIET. Storm because its snow production equals or exceeds any snowmaker on the market today.

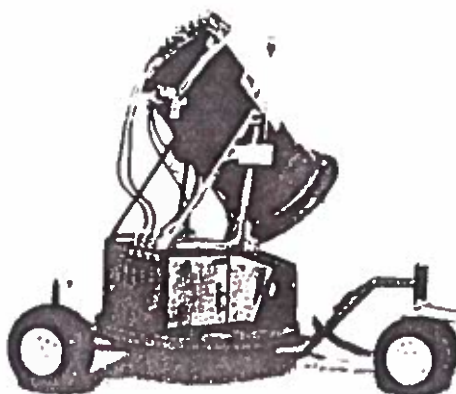
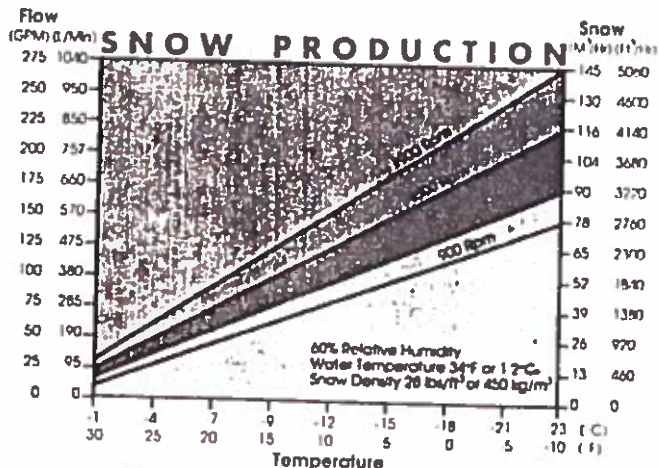
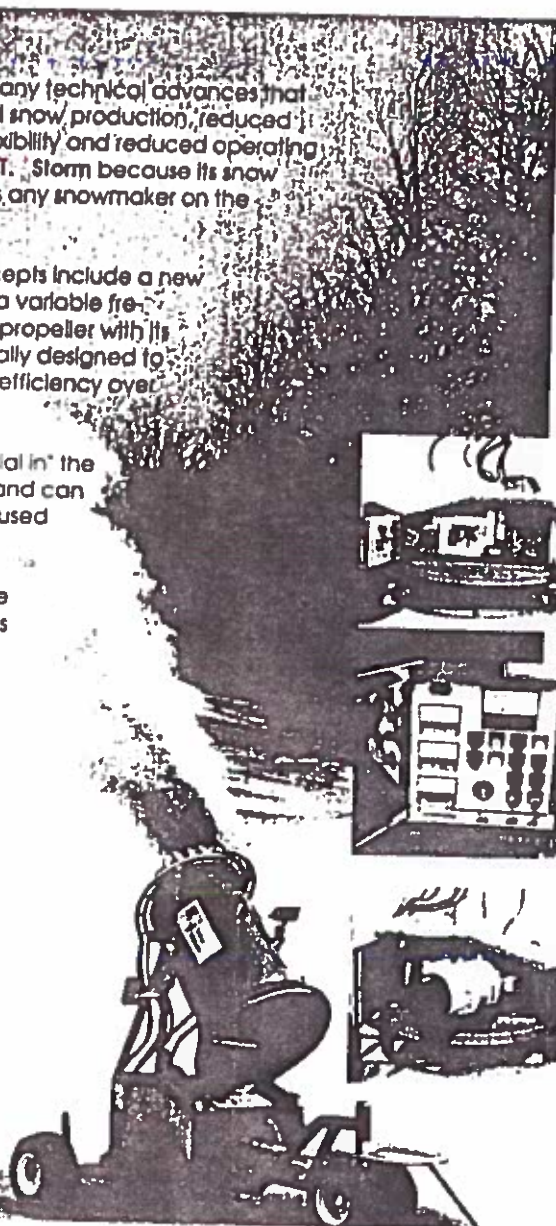
The revolutionary design concepts include a new high efficiency propeller and a variable frequency drive on the fan. The propeller with its skewed leading edge is specially designed to produce more air to increase efficiency over 45%.

The Variable Frequency Drive allows ultimate flexibility. The VFD lets you "dial in" the fan speed from 900 RPM to 1900 RPM. Low speed (900 RPM) is very quiet and can be used on narrow trails or windy nights to limit throw. High speed can be used in open areas for maximum snow production. You can "dial in" the proper throw and noise level for the different locations on your mountains. Trail width, chairlift lines, and condominium locations are conditions that can be easily accommodated. The machine can now be used in various locations and conditions.

The SilentStorm has a special air intake, a long barrel, multiple nucleators and over 35,000 CFM (1000CMM). The manifold design advances the patented Boyne and Highland snowmaking concepts to increase snow production significantly in all temperature/humidity conditions. The SilentStorm uses one to twelve nucleators and offers a simplified step valving system for easy use. A customized heating system is included. Flood and trouble lights are standard.

The machine is well packaged on a 360° turntable that is easy to use. A triangular-shaped four wheel carriage allows easy mobility and quick set up and shutdown.

The SilentStorm is high production, energy efficient, portable, flexible and quiet. It is one of the world's quietest snowmakers. The combination of low capital cost, low operating cost, variable throw, and low noise makes the SilentStorm the most flexible snowmaker and the best investment in snowmaking you will ever make.



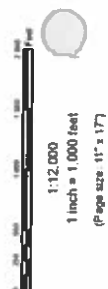
Snow Makers

Snow Machines, Inc.
1512 N. Rockwell Drive
Midland, MI 48640
(517) 631-6091
Toll Free North America
1-800-448-6090
Fax 517-631-3162

SEP 21 1992



Snowmaking Hydrant
Water Tank Storage
1 1/2 in. Water Line
5 in. Water Line
Parking Lot
SSH Area Boundary
Nordic Trails
Section Line
Lifts
Stream
Buildings
Freestyle Terrain Area
Runs
Road
Lagoon



Manning's Equation Calculator for Flow Rate in a Circular Conduit Flowing Full

READ ME

S =	0.1556	ft/ft
n =	0.009	Manning's coefficient
d =	6.0	pipe diameter (inches)
D =	0.50	pipe diameter (feet)
r =	0.25	pipe radius (feet)
A =	0.20	area (ft ²)
WP =	1.57	wetted perimeter (ft)
R =	0.13	hydraulic radius (ft)
Q =	3.18	flow rate (CFS)

Channel Slope

Slope Options

☐ Manual Entry

☒ Slope Calculator

Slope Calculator

Rise = feet
Run = feet
Slope, S = ft/ft

Pipe Material, (n):

plastic (pvc, abs)

Pipe Diameter (inches)

6 inches

Water Right No.: 65-13381
Reviewer: Patrick Kelly
Date of Review: 8/19/2016

Manning's Equation (1), is an empirical formula that solves for velocity (v) in a open channel under uniform flow. The continuity equation (2) when combined with equation (1) allows for the computation of the flow rate (Q) in an open channel under uniform flow.

In equations (1) and (3), n refers to Manning's Coefficient of Roughness and can be found in tabulated form for many open channel types. R is the hydraulic radius of the open channel and is equal to the area of the open channel divided by the wetted perimeter, $R = A/P$. S is the slope of the energy grade line which is often assumed to be equal to the slope of the channel.

Because Manning's Equation is empirical the units are not arbitrary. To obtain a velocity in ft/s and a flow rate in ft³/s, area must be reported in ft², hydraulic radius must be reported in ft, and S must be reported in ft/ft. Manning's Coefficient of Roughness is a unitless constant.

$$(1) \quad v = 1.49 \left(\frac{1}{n} \right) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$

$$(2) \quad Q = vA$$

$$(3) \quad Q = 1.49 \left(\frac{1}{n} \right) (A) \left(R^{\frac{2}{3}} \right) \sqrt{S}$$



POD:
Unnamed Stream

Sand bags in stream pool water that enters 6" PVC line.



10,000 gallon storage tank.

Wood box keeps pipe fitting free from snow during season. Snow making equipment connects to tank at this point.