

2016 North Washington Street, Suite 4 • Twin Falls, Idaho 83301
(208) 736-8543 • Fax (208) 736-8506

Brockway Engineering

Fax

To: Allen Merritt

From: Charles G. Brockway

Fax: (208) 736-3037

Pages: 9

Phone:

Date: 05/26/00

Re: Pomerelle 1999

CC:

☐ **Urgent** ☐ **For Review** ☐ **Please Comment** ☐ **Please Reply**

• **Comments:**

Extent of Brockway Knowledge and Opinion – Pomerelle 1999

August 11, 1999

HISTORY OF WATER DEVELOPMENT

The following is my best understanding of the development of water at the Pomerelle location. The information is based on discussions with Woody Anderson and a review of historical documentation provided by Mr. Anderson.

1964 - 1975

In 1964-65, the Pomerelle day lodge was constructed and a water supply was developed by placing a collector pipe in the Parking Lot Springs. These springs were located in a gully along the northwest side of the present-day parking lot. The collector pipe diverted water to a 1000-gallon concrete tank at the northeast end of the parking lot (the "parking lot tank"). From the parking lot tank, water was pumped with a 2HP pump to the lodge via a buried 2-inch galvanized steel pipe. Both the parking lot tank and the galvanized line are still in use. In addition to the Parking Lot Springs, a small spring known as the Pomerelle Spring or Ski Run Spring was used to supply stockwater or domestic/commercial water. This spring is located approximately 2500 feet southwest of the day lodge.

In conjunction with the development, a 60,000-gallon concrete elevated storage tank was constructed on the hill 1100 feet southwest of the day lodge. A 2-inch line was installed from the lodge to this tank. A 1-inch line from the Pomerelle Spring to this tank was installed, which supplies additional domestic/commercial water.

1975 - present

Andrwood, Inc. purchased the site in 1973. In 1975-76, the following water system improvements were made:

The Parking Lot Springs were culverted and buried and the original collector pipe was removed. The source of water was moved 3200 feet north to Bennett Springs. At this location, a collector pipe and 3HP pump was installed. A 2-inch PVC line was installed from the pump to the parking lot tank. No changes were made to the 2HP pump in the tank or in the 2-inch galvanized line from the tank to the lodge.

This is the same system which is in operation today. The 3HP Bennett Springs pump runs continuously – any excess water spills from the parking lot tank back to the gully and eventually returns to Howell Creek or seeps into the ground. The 2HP pump in the tank delivers water to an iodine disinfection system located in the lodge, and then either directly to the distribution system or to the elevated 60,000-gallon tank. This tank overflows any excess water. The Parking Lot Springs no longer serve as a source of water – the culvert installed in 1975-76 discharges into the gully near the parking lot tank.

FLOW MEASUREMENTS

The measured discharge from the existing Bennett Springs pump on November 20, 1998 was 21.8 gpm, with the pump discharging into the 1000-gallon tank at the bottom of the parking lot. The measurement was made using a 5-gallon bucket and stopwatch. Four readings were taken and averaged. This discharge should not vary seasonally since Bennett Springs can always deliver at least 21.8 gpm via the collector pipe at the pump location.

The measured discharge from Pomerelle Springs on July 27, 1999 was 12.4 gpm using a 5-gallon bucket and stopwatch. Four readings were taken and averaged. This discharge varies seasonally. The July measurement was made during the peak flow period, based on historical observations of the flow variability.

The measured discharge from the Parking Lot Springs on July 27, 1999 was 97 gpm. This measurement was made approximately 10 feet downstream of the culvert which collects most or all of the spring flow. No surface water was entering the culvert at its upstream end near the ski lifts. The flow measurement was made with a pygmy current meter using standard USBR procedures, and was rated "excellent" according to USBR criteria.

The original system (pre-1971) consisted of a collector pipe in the Parking Lot Springs, which discharged to the 1000-gallon tank at the bottom of the parking lot. A booster pump delivered water either to the 60,000-gallon storage tank above the lodge area or directly to the lodge. This pump has periodically been replaced, but according to the best information available, the pump capacity has been substantially the same from pre-1971 to the present. Assuming that the pump which was recently removed from the 1000-gallon tank is substantially the same as the pre-1971 pump, a theoretical calculation was made of the flow rate this pump could deliver. The following data was used:

Length of pipe from 1000-gallon tank to lodge	700 feet (from site plan)
Length of pipe from lodge to 60,000-gallon tank	1100 feet (from site plan)
Diameter of pipe	2 inches
Pipe material	Galvanized steel
Elevation difference from 60,000-gallon tank to 1000-gallon tank	188 feet (surveyed 7/27/99)
Pump curve	Grundfos 16S20-18

System curves were developed for pumping to the 60,000-gallon tank and directly to the lodge, accounting for surveyed elevation differences and friction losses in the supply pipeline. Differences between the two curves reflect friction loss differences only, since a static pressure is maintained at the lodge by the elevated tank.

The attached plot shows the system curves with the pump curve overlain. The operating point is near the high end of the pump curve, but the flow rate would be 22 gpm in this condition. This is the best estimate of what the pre-1971 pump could have delivered to the lodge and to the 60,000-gallon tank. Based on the culvert discharge, the Parking Lot Springs were discharging at least 97 gpm on July 27, 1999, which is much more than the 22 gpm that could have been pumped. The system pre-1971 did not collect all of the Parking Lot Spring flow, but this recent measurement provides some evidence that there was probably enough water discharging from the springs to provide the full amount of the claim. The measurement was made at a time near or slightly after the typical peak flow point. Discharge from the Parking Lot Springs will decrease somewhat into the fall, but it is not likely not fall below about 20 to 30 gpm.

JUSTIFICATION FOR DIVERSION RATE

The transfer application filed by the USFS contemplates a diversion rate of 0.06 cfs based on historic beneficial use. A justification is necessary for a year-round diversion rate of 0.06 cfs for commercial use. This component of the water right is the maximum allowable instantaneous rate, and can be justified by the following considerations:

1. During winter months, a continuous flow is necessary to prevent freezing of the delivery system piping. The 2-inch supply pipe from the Bennett Springs pump to the facility is not buried below the frost line. According to Mike Smith of Mike's Pump Service, who is familiar with the Pomerelle system, a soil cover of only 6" to 1' is present along the pipe length from Bennett Springs to the 1000-gallon tank. Therefore, without a continuous flow, the pipe would be subject to freezing from October through May, depending on the climatic conditions. A similar problem may exist with the pre-1971 pipeline from the 1000-gallon tank to the 60,000-gallon tank.
2. Providing a continuous diversion rate and allowing spill to occur from a storage facility provides additional benefits in terms of operation and water quality. A continuously-running pump will require less maintenance than a pump which runs irregularly according to demand. Continuous diversion also provides for turnover of the water in the storage tank, reducing the possibility of stagnation and degradation of water quality.

HISTORIC NON-SNOWMAKING CONSUMPTIVE USE

Some of the water historically used for domestic and commercial purposes has been consumed. The consumptive use of such activities is generally small—available data suggests about 20% of the total volume. Historic average daily water demand based on recorded skier visits and 3.5 gpd / skier is approximately 1100 gpd during a 125-day (average) ski season. During the remaining 240-day off-season, water demand for domestic use and light commercial use is estimated to be 300 gpd average. Based on

these values, total historic annual water demand for non-snowmaking use is estimated to be 209,500 gallons, or 0.64 acre-feet. Of this amount, about 0.13 acre-feet has been consumed.

Historical use has also involved the irrigation of approximately 0.5 acres of turf associated with the domestic residence. This is allowed under domestic use provisions of Idaho law. Based on Allen and Brockway (1983) data, seasonal consumptive use of turf grass at the Pomerelle site is estimated to be 37.4 inches, or 1.56 ac-ft for 0.5 acre of irrigation. The total historical consumptive use is therefore estimated to be $1.56 + 0.13 = 1.69$ ac-ft.

WATERSHED HYDROLOGY

An analysis was made of the projected water usage for snowmaking, and the potential impact on the Howell Creek watershed. The proposed use involves artificial creation of snow using two standard 60-gpm guns. The process will occur over a 75-day period from October 15 through December 31 each year, with approximately 55 days of actual snowmaking occurring within this period for 16 hours per day.

Calculations showing the estimated total water requirement are provided with this letter. A total of 19.4 acre-feet per season will be required for snowmaking. It is proposed to supply this water through a combination of withdrawal from Howell Creek via the existing pump during the snowmaking period, and from on-hill storage filled chiefly from snowmelt in the Spring. An analysis of the timing and magnitude of water uses and the effects on Howell Creek was performed assuming a maximum of 27 gpm can be withdrawn from the creek. 27 gpm withdrawn for 75 days provides 8.9 acre-feet, or about 46% of the total water requirement. The remaining 10.5 ac-ft will be supplied from on-hill storage.

To document runoff and base flow patterns in Howell Creek, gauging stations were established at Bennett Road and at Howell Canyon Road. Current-meter measurements at varying flow rates were used to develop rating curves. Staff gauges at the rated sections have been read at least twice per week since May 1997. The attached hydrographs show the discharge at the two locations for May 1997 through October 1998. Nearly identical patterns were observed for the two years: runoff from snowmelt begins in mid-April, peaks in early July, and recesses to the base flow level, which is reached by October or November. The total annual surface runoff volume in 1998 was 2382 ac-ft at Bennett Rd and 4515 ac-ft at Howell Canyon Road. 1998 was an above-average snow year, with the NRCS Howell Canyon SnoTel site indicating a snow water equivalent about 120% of the 1961-90 average for December through May 1998. The snow water equivalent on April 15, 1998, just prior to the beginning of runoff, was 139% of average. Therefore, the average basin runoff yield is likely somewhat less than the 1998 measured volume.

During the snowmaking period, the base flow in Howell Creek is a nearly constant level of 2.0 cfs at Bennett Road and 2.4 cfs at Howell Creek Road. The total average volumetric discharge of the creek during this period is 297.5 and 357.5 ac-ft, respectively. The total water volume withdrawn from the creek for snowmaking (8.9 ac-ft) is 2.5 to 3.0% of the creek discharge during the snowmaking period.

Snowmaking water is withdrawn from the creek, applied to the hill, and is stored on the hill along with the natural snowpack. During the snowmaking process, some of the water is consumptively used. Based on previous studies by Brockway Engineering for the Sun Valley Company and for Bogus Basin, a reasonable average estimate of consumptive use is 10% of the total volume. Thus, of the 19.4 acre-feet used for snowmaking, about 1.94 acre-feet will be consumed, leaving 17.5 acre-feet of snow on the hill above that which falls naturally. This additional snowpack will contribute to runoff in the spring. The attached calculations show that the net effect on surface runoff will be an increase of 7.0 acre-feet. The timing of the runoff will also be altered slightly, since artificial snow is generally denser than natural snow and melts more slowly. The runoff hydrograph will therefore be slightly extended.

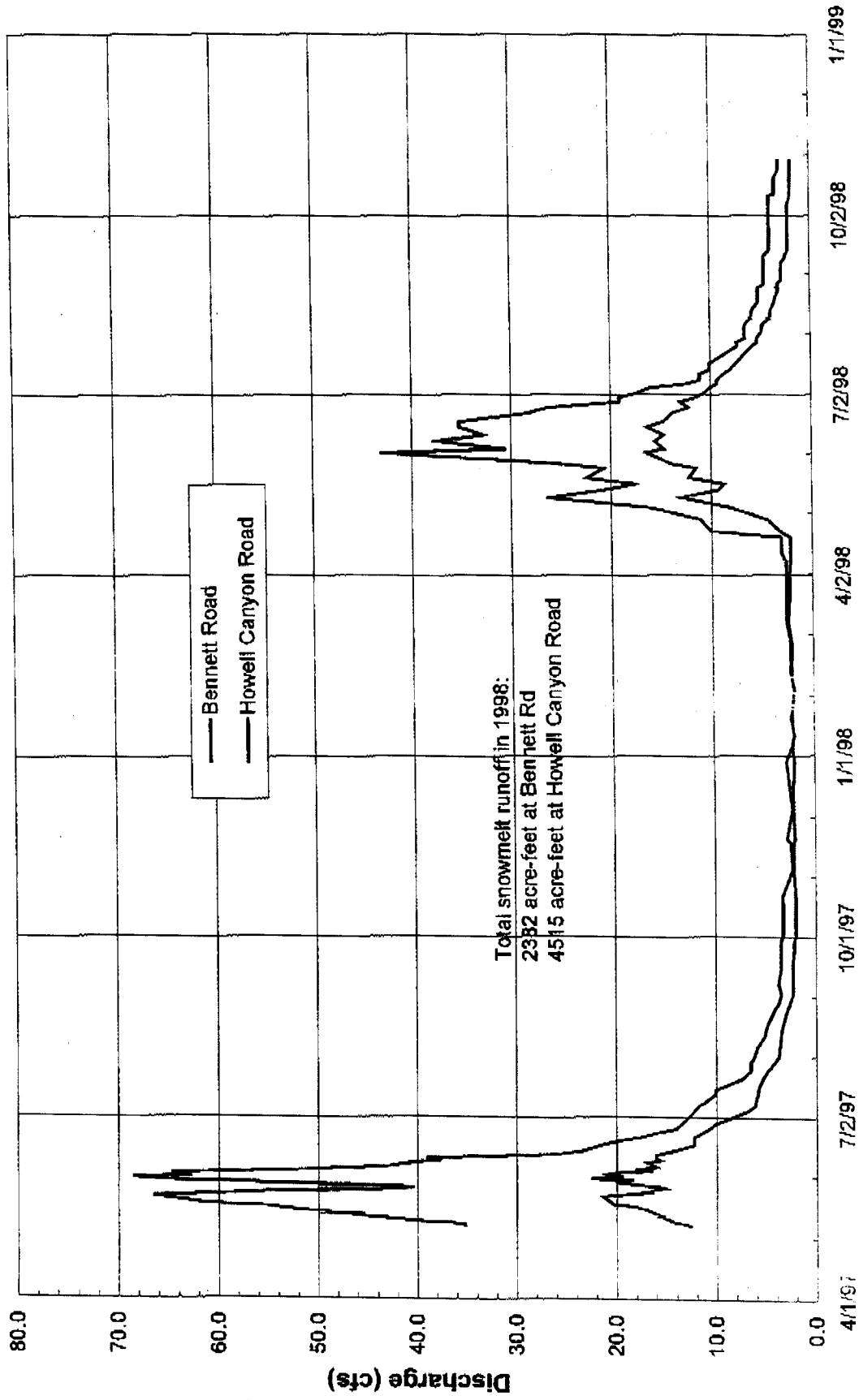
EFFECT ON EXISTING WATER RIGHTS

As shown, the net annual effect of the proposed snowmaking on the Howell Creek drainage will be a decrease of 1.94 acre-feet due to consumptive use. This is a very small percentage of the annual basin runoff. The total volume withdrawn for snowmaking is about 2.5 to 3.0% of the creek discharge during the proposed snowmaking period. If any overflow back to the creek occurs, the net decrease in creek discharge will be less.

Irrigation rights do exist on Howell Creek south of Albion. These rights will not be affected by the proposed snowmaking since the authorized period of use for irrigation does not overlap the proposed snowmaking period. The irrigation rights may in fact benefit slightly from the augmented and extended runoff as described above. The only other known water right on Howell Creek with a period of use corresponding to the proposed snowmaking period is 45-07642, a license for hydropower use. However, condition No. 7 on this license explicitly states that the right shall be junior and subordinate to all non-hydropower rights, whatever the priority and whenever they were initiated.

HOWELL CREEK DISCHARGE 1997 AND 1998

Channel sections rated 5/97 - 9/97 by Brockway Engineering



WATER BALANCE ANALYSIS FOR PROPOSED SNOWMAKING AT THE POMERELLE SKI AREA

Brockway Engineering, PLLC 3/1/99

27 gpm max pumping from Howell Creek during snowmaking period
Assume no spill back to creek during snowmaking (all water stored on hill)
New earthen storage reservoir filled with Spring snowmelt

Snowmaking period	10/15 - 12/31
Total days in period	75
No. of days of snowmaking	55
Number of snowmaking guns	2
Output of guns	60 gpm
Operating hours / day	16 hrs/day
Volume of water required for snowmaking	19.4 acre-feet
Average daily demand of guns	115200 gpd
Average flow rate to guns	80 gpm

During snowmaking period:

	Bennet Rd	Howell Rd	
Howell Creek average flow	2.0	2.4 cfs	
Total creek volumetric discharge	297.5	357.0 acre-feet	
Pumping rate	27	27 gpm or	0.06 cfs
Volume pumped from creek for snowmaking	8.9	8.9 acre-feet	
Percent of total discharge	3.0%	2.5%	
Estimated consumptive use percentage	10.0%		
Total annual consumptive use	1.94	ac-ft	

Howell Creek average discharge volumes:

	Bennet Rd	Howell Rd
Estimated average annual surface runoff	2050	3930 ac-ft (measured at rated section)
Estimated average base flow discharge	830	1000 ac-ft (210 days)
Estimated average annual discharge	2880	4760 ac-ft

SUMMARY

Total applied to hill 10/15 - 12/31	19.45 ac-ft
Taken from creek during 10/15 - 12/31	8.95 ac-ft (27 gpm for 75 days)
Spring runoff stored	10.50 ac-ft (total required minus creek pumpage)
Lost to consumptive use	1.94 ac-ft
Volume which melts and contributes to runoff	17.50 ac-ft
NET EFFECT ON SPRING / SUMMER RUNOFF	7.01 ac-ft
NET EFFECT ON CREEK FROM 10/15 TO 12/31	-8.95 ac-ft
NET EFFECT ON ANNUAL BASIS	-1.94 ac-ft

8-11-99

Performance Curves

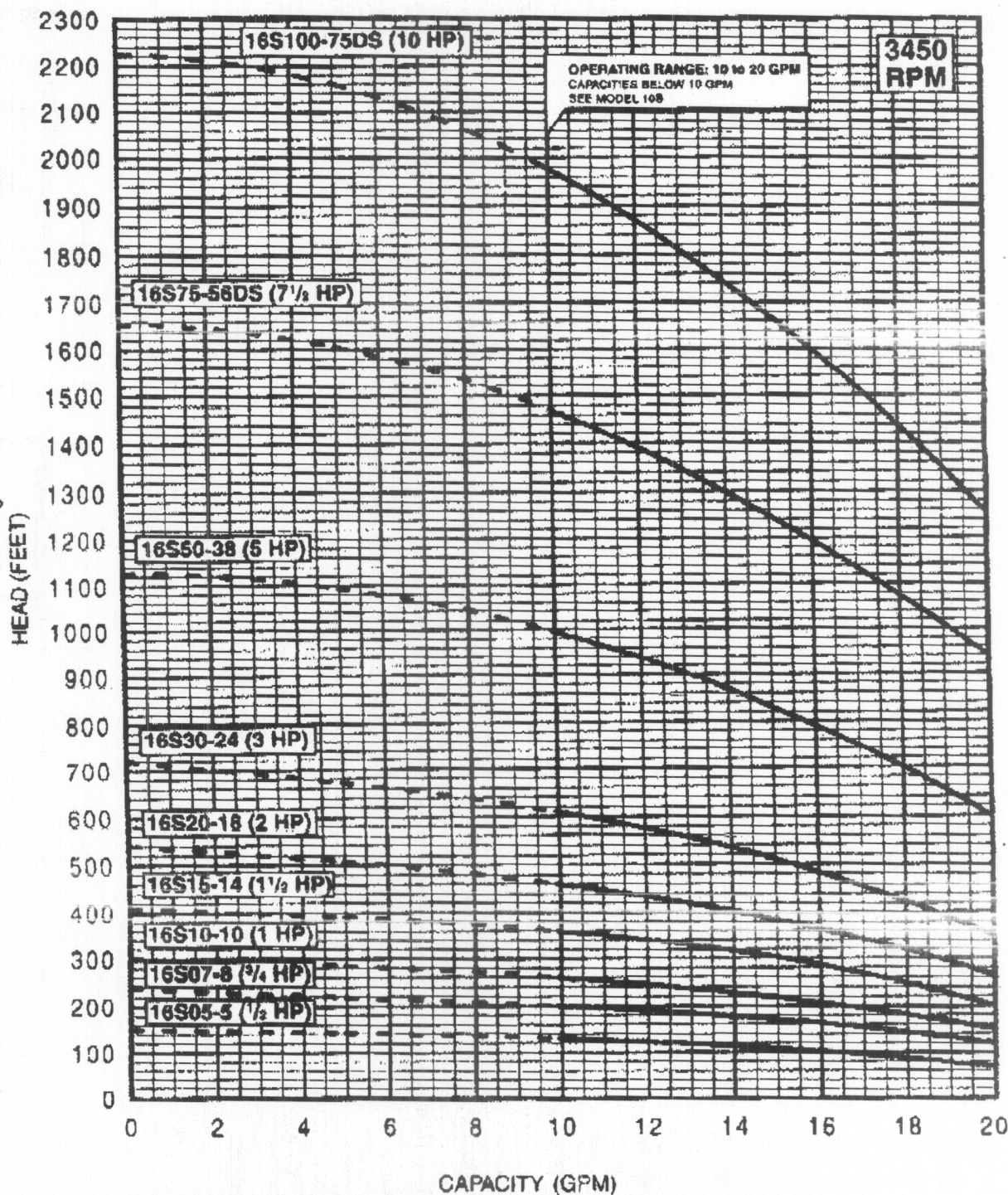
16 GPM

Model 16S

FLOW RANGE: 10 -20 GPM

OUTLET SIZE: 1 1/4" NPT

NOMINAL DIA. 4"



SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE
4" MOTOR STANDARD, 5 -5 HP/3450 RPM.
6" MOTOR STANDARD, 7.5 -10HP/3450 RPM.

Performance conforms to ISO 2548 Annex
@ 2 ft. min. submergence.

GRUNDFOS

JAP# 436-8506 3-8

208-678-8997
From Mike's Pump Service 2690 Fairmont Dr. Burlington, VT 05403