

CAPACITY EVALUATION FOR THE BELFAST WATER DISTRICT BELFAST, MAINE



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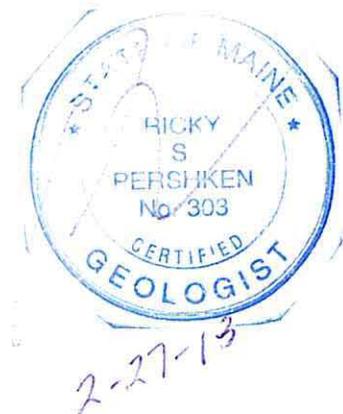


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LIST OF ACRONYMS

- AEH – A.E. Hodsdon Engineers
- BWD – Belfast Water District
- CEH – Caswell, Eichler & Hill
- CFS – Cubic Feet per Second
- FERC – Federal Energy Regulatory Commission
- GPD – Gallons per Day
- GPM – Gallons per Minute
- GPY – Gallons per Year
- MBNA – Maryland Bank National Association
- MG – Million Gallons
- MGY – Million Gallons per Year
- NOAA – National Oceanic and Atmospheric Administration
- NVC – Northport Village Corporation
- OF – Overflow
- PUC – Public Utilities Commission
- TW – Test Well

PURPOSE

The purpose of this report is to evaluate the operational capabilities of the Belfast Water District (BWD) if they allow Nordic Aquafarms to purchase their Little River surface water supply and ground water from BWD in amounts up to 262,800,000 gallons per year (GPY). This equates to 720,000 gallons per day (GPD) and 500 gallons per minute (GPM). The agreement also stipulates that 500 GPM will be the maximum rate delivered to the facility, and that Nordic Aquafarms will purchase a minimum of 100,000,000 gallons per year (or make a payment in lieu of the minimum purchase).

This evaluation will show that BWD has sufficient capacity to operate the Belfast Water District, supply water to North Port Village Corporation by contractual obligation, provide Nordic Aquafarms with up to 720,000 GPD of water and maintain a reserve capacity for future needs.

SOURCES OF INFORMATION

The Belfast Water District (BWD) has extensive documentation regarding their sources of supply and historic water usage. The reports we reviewed to produce this evaluation include;

- Pumping Records from 1969 to 2017
- Booster Pump Station Upgrades, Dirigo Engineering, 2005
- Hydrogeologic Analysis of the 8-inch Test Well (TW) at the TW-18 Site off Curtis Road in Swanville, Maine, W. Bradford Caswell, 2005
- Engineering Plan for Water System Improvements, Wright Pierce, 1979
- Hydrogeologic Evaluation of the Goose River Esker Aquifer, Caswell, Eichler and Hill, Inc. 1989
- Production and Test Well Logs, Well Redevelopment Records, various drillers, 1956 to 2013
- Ground water Modeling of the Smart Road Esker Aquifer, Jacques Whitford Company, 1999.
- Hydrogeologic Analysis of the 18-inch Production Well at the Curtis Road Site in Swanville, Maine, Caswell, 2005
- Update to the 1996 Water System Improvements Study for the Belfast Water District, Wright-Pierce, 2004.
- Belfast Water District Water System Capital Improvement Plan Preliminary Engineering Report, Dirigo Engineering, 2015

In addition, we evaluated precipitation records from the Belfast Station operated by the National Oceanic and Atmospheric Administration (NOAA) from 1960 to 2018, and reviewed the licensing criteria for Goose River Hydro, who operates a series of hydroelectric dams on the Goose River.

BACKGROUND

The Belfast Water Company was established in 1887 with the construction of the lower and upper dam and pump station on the Little River, a new storage reservoir and water mains. In 1913, a sand filtration system was installed at Little River and in 1919 the Belfast Water District was created and they assumed ownership of the assets of the Water Company.

The Little River was the sole source of water until the Smart Road Well was installed in 1956. In 1966, the Jackson Pit well was constructed and began supplying water to the system. The Little River treatment plant was upgraded to include a diatomaceous earth filter in 1963 but the treatment system reportedly was not effective at all times due to the “flashy” nature (highly variable raw water quality) of the Little River source. Currently, the Smart Road Well and the Jackson Pit Well are the sources of supply for the Water District and have been since 1980.

SYSTEM DESCRIPTION

The Belfast Water System consists of approximately 4 miles of transmission main from the Jackson Pit Well to the Smart Road Well and then to Route 1. A pair of river crossings, one 12-inch and one 14-inch diameter, of the Passagassawakeag River provides water to the west side of Belfast where most of the water is used. A 10-inch diameter distribution main extends easterly along Route 1 to the Searsport town line where the Searsport and Belfast water systems are interconnected.

The distribution system is well looped with 12, 10, 8 and 6-inch mains with some 4-inch mains in limited areas. The distribution mains total approximately 39 miles of length. A water system map is included as Exhibit A (Dirigo Engineering, 2015).

The system also contains four welded steel, above ground water storage tanks as indicated in Table No. 1:

<i>Location</i>	<i>Year Built</i>	<i>Capacity Million Gallons (MG)</i>	<i>Overflow (OF) Elev.</i>
Lincolville Ave.	1956	0.5	275
Lincolville Ave.	1988	1.3	275
Crocker Road	1997	0.75	401.5
Back Searsport Rd.	1956	0.5	275/287 ¹

¹Overflow is at 287. An altitude valve limits levels to 275.

The system is mostly one pressure zone with a hydraulic elevation of 275 feet. A small portion of the Back Searsport Road on the east side of Belfast is pressurized by a booster station. The Crocker Road Tank on the east side of Belfast is filled via a booster station located near the Lincolnville Avenue tanks. The Crocker Road high service area includes the former Maryland Bank National Association (MBNA) site and the area that is generally easterly of Route 1.

According to the 2016 PUC report, the Belfast Water District had 2,003 customers with 1,856 meters. In addition to Belfast customers, the BWD supplies water to a portion of Northport Village through a connection at the Northport/Belfast town line. A total of 7,384,000 gallons (14 GPM) was sold to Northport in 2016.

In 2016, a total of 198,951,100 gallons of water was produced with unaccounted for water at 20,751,917 gallons or 10% of the total production. The average daily demand was 543,582 gallons (378 GPM) and maximum day demand was 719,300 gallons (500 GPM).

SURFACE WATER SUPPLY (LITTLE RIVER)

The Little River surface water supply has not been used since 1980 when the Maplewood Poultry Company closed. This surface water supply has remained as an emergency back-up source however; activation would require a boil water order because of the lack of modern water treatment equipment. In 1979, Wright-Pierce concluded that “In general, everything at the Little River Station, including the buildings and equipment, is old, in poor condition and in need of replacement.” The cost for water treatment upgrades was estimated at \$3.1 million dollars (in 1979 dollars).

When Maplewood Poultry Company closed in 1980, a decrease of approximately 155 million gallons per year (MGY) is indicated in the water use records. This consists of an 85 MGY reduction of ground water and reduction of approximately 70 MGY of surface water from the Little River. The closure of Maplewood Poultry drove the decision of the Belfast Water District to not invest further in the Little River Source. Since 1980, the BWD has relied solely on its ground water source from the Goose River Aquifer.

GROUND WATER USE

Ground water use in Belfast has decreased dramatically since 1980 when the District switched completely to their ground water source. Figure No. 1 is a graph of ground water usage in Belfast from 1969 to the present. The graph only shows ground water use – Between 1969 and 1979 the District was also using the Little River surface water source at an average annual rate of about 70 MGY.

**Figure 1. Belfast Water District
Historic Groundwater Production**

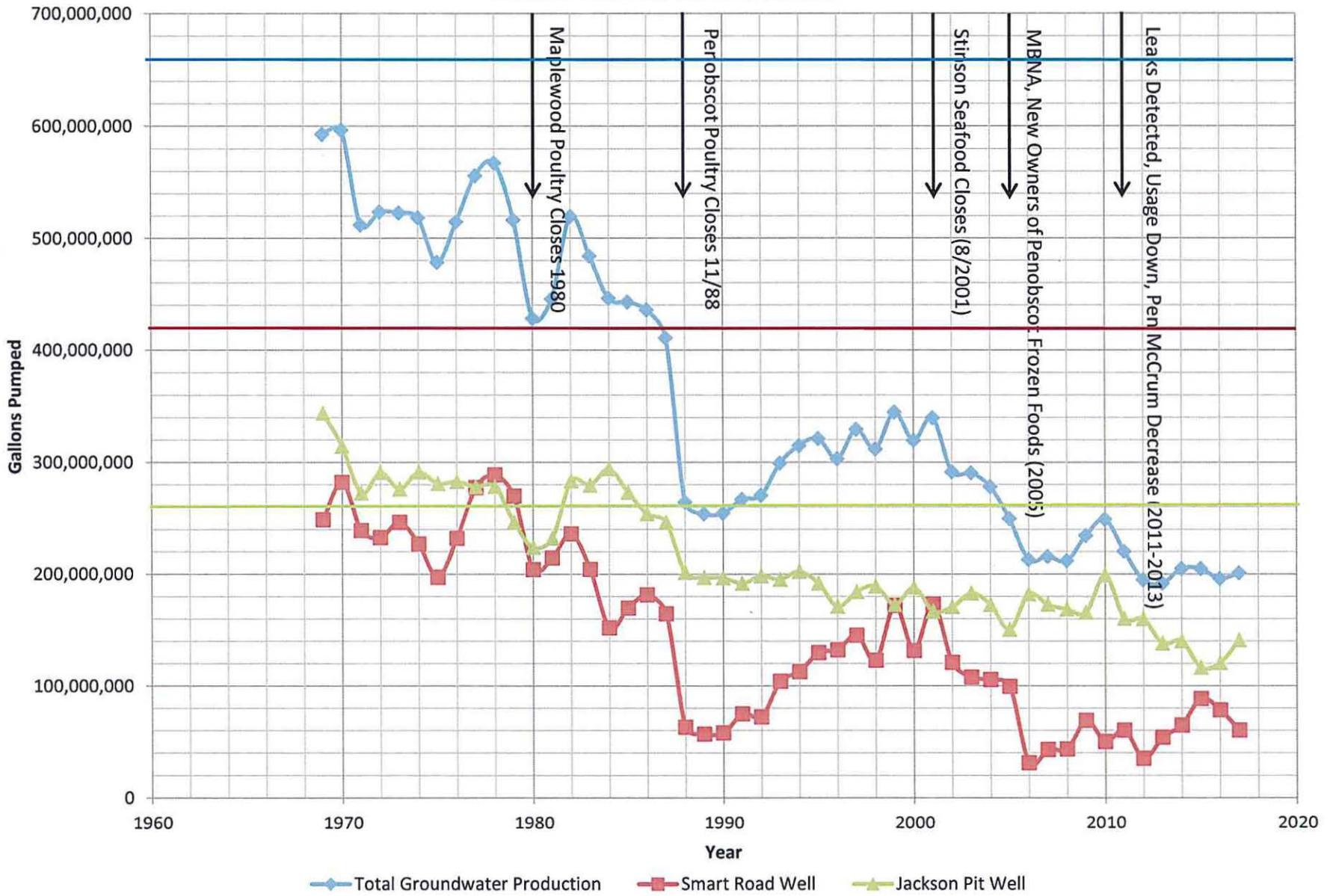


Figure No. 1 indicates that when Maplewood Poultry closed in 1980, ground water production decreased from 536 MGY (1969-1979 average) to 452 MGY (1980-1987 average). Another sharp drop in ground water use occurred in 1988, when Penobscot Poultry closed. Water usage declined from 452 MGY to 262 MGY (1988-1992 average). Subsequently, water use increased to a peak of approximately 345 MGY in 1999 but due to the closing of Stinson Seafood in 2001 and MBNA in 2005 and efforts by BWD staff to locate and repair leaks, the ground water withdrawal in Belfast has been reduced to an average of just under 200 MGY (2013-2017)

In addition to supplying the City of Belfast, the BWD has a contractual obligation to supply up to 22 MGY (42 GPM) to the Northport Village Corporation (NVC). The NVC is currently using approximately 7.4 MGY (14 GPM). The Belfast Water District has no other contractual obligations to supply water.

Population in Belfast has been on a slight increase from 2004 to 2014 but projections by the State of Maine Office of Policy and Management indicate that the population of Belfast is expected to decrease from 6,672 in 2014 to 5,907 by 2034. With negative population change projected, we expect the water usage in Belfast to be stable or slightly declining over the next 15 years (State of Maine Office of Policy and Management, on-line data, 2018).

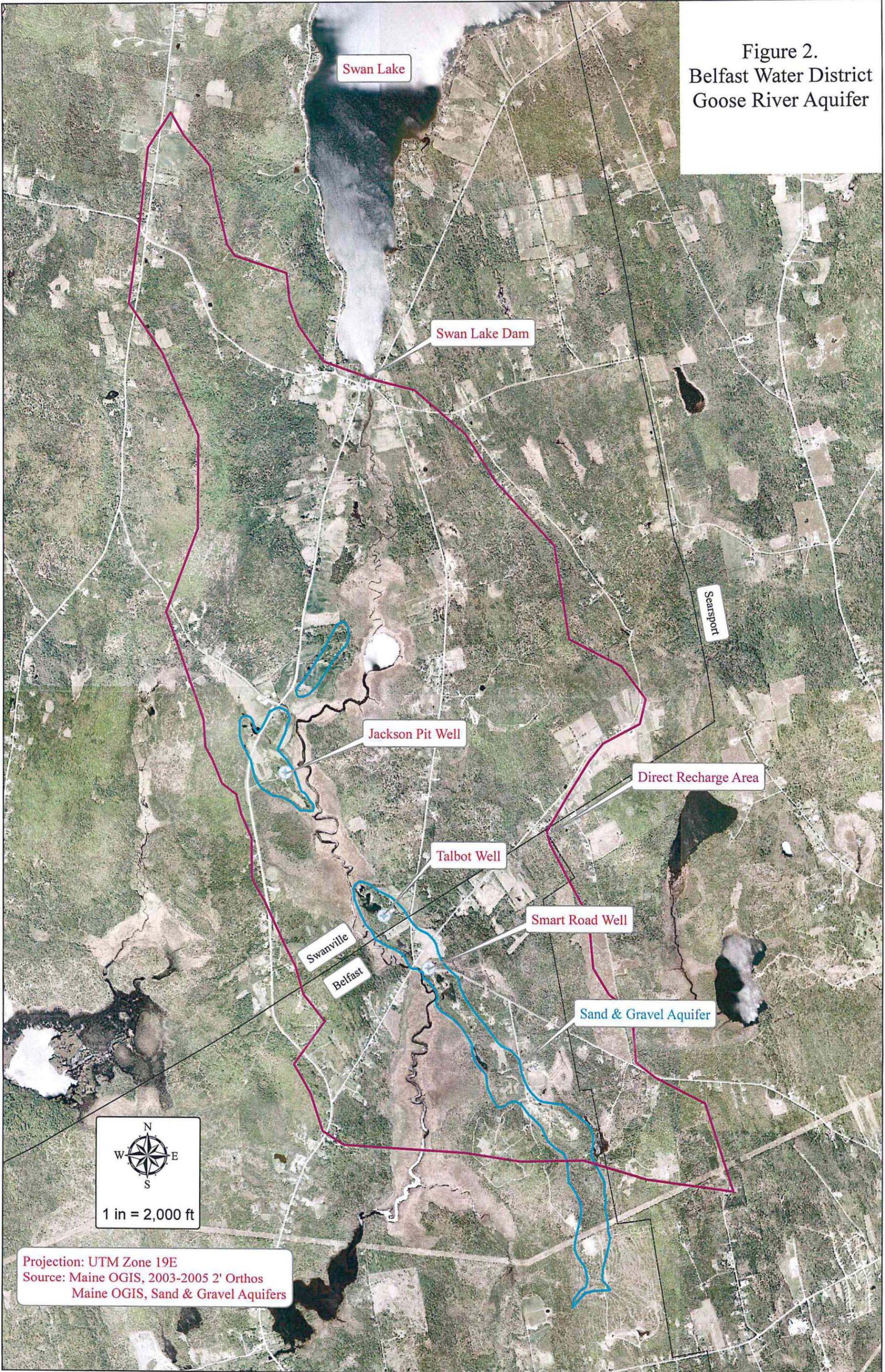
WELLS

The Belfast Water District has been using ground water from the Goose River Esker Aquifer since 1955 when the Smart Road Well was completed (Figure No. 2). The area was further developed with the Jackson Pit Well in 1965. In 1980, faced with huge costs to upgrade the Little River Treatment Plant and a reduction of water use due to poultry processors leaving town, the District mothballed the treatment plant and has relied on the ground water source from these two wells ever since.

JACKSON PIT AND SMART ROAD WELLS

The Jackson Pit Well pumps through an 8-inch diameter cast iron water main cross country to the Smart Road Well Pumping Station. From there, a 14-inch diameter main delivers water from both wells along Smart Road and Swan Lake Avenue to the Back Searsport Road. A 12-inch main continues along Swan Lake Avenue to near Route 1. At that point, the main splits into two river crossings across the Passagassawakeag River. As mentioned previously, one river crossing is 12-inch and one is 14-inch diameter. The river crossings lead to the west side of Belfast and the extensive distribution system where most of the water is consumed.

Figure 2.
Belfast Water District
Goose River Aquifer



N
W E
S
1 in = 2,000 ft

Projection: UTM Zone 19E
Source: Maine OGIS, 2003-2005 2' Orthos
Maine OGIS, Sand & Gravel Aquifers

The BWD currently operates the Jackson Pit Well on a timer at approximately 450 GPM in order to increase pressure along Swan Lake Avenue. The timer is set to run the pump between 5 am and 10 pm. The Smart Road Well is operated intermittently to keep the water storage tanks full. This operation is reflected in the amount of water withdrawn from each well. Even though the Jackson Pit Well has about ½ of the capacity of the Smart Road Well, in the past 10 years, it has supplied over 70% of the total water produced.

Basic information for the existing wells and pumps are in Table No. 2. Information for wells can be found in Exhibit C.

Table No. 2 – Basic Information of Existing Wells & Pumps

Well	Date Installed	Max. Yield (GPM) ¹	Estimated Safe Yield ²	Pump Model	Size of Well	Depth (Feet)	Screen Interval	Static Water (Feet)
Smart Road	1955	1150	800/600	75 HP Goulds 12 RJHC	24" x 18"	44	29-44	6 +/-
Jackson Pit	1965	600	530	50 HP Goulds 10 MC-6	24" x 18"	51	41-51	12 +/-
Talbot	2005	1200	1200/1000	No Pump	18"	66	95 to 80	20 +/-

¹ Capacity of installed well pumps running alone. Assumes 1200 GPM pump will be installed in Talbot Well.

² Estimates for Smart Road and Talbot Well from Jacques Whitford, 1999. Estimate for Jackson pit well derived from 1969 to 1986 average pumping rates. Higher safe yield numbers for Smart Road and Talbot Wells indicate wells operating alone, lower numbers indicate both wells operating together.

As can be seen from the above table, the Smart Road Well by itself has the capacity to meet the current average demand of 543,582 gallons (378 GPM) and the maximum day demand of 719,300 gallons (500 GPM). The Jackson Pit Well, by itself, can also meet current demands but not with much reserve.

TALBOT WELL

The Talbot Well, installed in 2005, has been tested and modeled (Jacques Whitford, 1999) (Caswell, 2005) and has been determined to have a safe yield of 1,200 GPM when operated by itself. The Talbot Well has been shown to interfere with the capacity of the Smart Road Well. The capacity of both wells, operating continuously together, is estimated at 1,600 GPM. Both the Smart Road Well and the Talbot Well could be operated at higher rates for shorter periods of time to meet peak day demand.

With Nordic Aquafarms using water at their maximum contractual rate of 500 GPM, the average demand would increase to 878 GPM (1,264,000 gallons) and the peak day demand would increase to 1,000 GPM (1,440,000). The Jackson Pit Well could not keep up with these demands if there was a failure of the Smart Road Well. It is, therefore, recommended that the Belfast Water District connect the unused Talbot Well to the system. With the Talbot Well on-line, the Water District could continue to meet peak demand with any one of the three wells off-line.

SAFE YIELD

Safe yield can be defined as the amount of water that can be continuously pumped from the aquifer without causing negative effects on the aquifer or adjacent surface water sources. Safe yield is variable as it depends primarily on precipitation which is known to be variable on both a seasonal and year to year basis.

The best available estimate for the safe yield of the Smart Road Well is from the computer modeling of the aquifer (Jacques Whitford, 1999). This ground water model was developed, calibrated and used to run various operational scenarios for the Smart Road and Talbot wells pumping intermittently, continuously, alone and together (Jacques Whitford, 1999). The basis for the calibration of the model was a pumping test run on the Smart Road Well in 1989 (CEH, 1989). The modeling study concluded that the safe yield of the Smart Road Well running by itself is 800 GPM.

The safe yield of the Jackson Pit Well has not been estimated previously. We used an estimate of 530 GPM which is the average rate the well was pumped for the period of 1969 to 1986 when the well was operated nearly continuously.

Using the 800 GPM safe yield capacity as the maximum sustainable yield available from the Smart Road Well and 530 GPM from the Jackson Pit Well allows us to show how it will be possible for BWD to operate reliably and deliver up to 720,000 gallons of water per day to the proposed Nordic Aquafarms facility.

- Safe Yield – 1,915,000 GPD (699 MGY)
- Current Demand – 547,845 GPD (200 MGY)
- Additional NVC Obligation – 40,000 GPD (14.6 MGY)
- Current Reserve Capacity – 1,327,155 GPD (484.4 MGY)

With proposed sale of 262.9 MGY to Nordic Aquafarms, the Belfast Water District will be left with an operating reserve of approximately 221.5 MGY. This is equal to twice their current average daily demand.

With the Talbot Well placed online, the Safe Yield for the three wells combined could increase to an estimated 2,130 GPM or 1,119 MGY. In that case, using the same numbers as above, the Belfast Water District would have a reserve capacity of 641.5 MGY with the proposed sale of 262.8 MGY to Nordic Aquafarms. However, pumping at this rate would require a significant amount of ground water to be induced from the Goose River. This will be discussed more in the next section.

INTERFERENCE CONSIDERATIONS

Well interference can be defined as the amount of drawdown one pumping well causes on another pumping well. In general, the closer the pumping wells are, the greater the interference there will be.

Under the current operational scenario, using the Smart Road Well and the Jackson Pit Well there is not much, if any interference between these wells because they are slightly over 1 mile apart and on opposite sides of the Goose River. Further the testing done in 1989 (CEH, 1989) indicated that the aquifer may be discontinuous between the two wells.

The Talbot Well, however, is located between the Smart Road Well and the Jackson Pit Well. It is on the same side of the river as the Smart Road Well and approximately 1,700 feet north of it. The aquifer has been proven by test drilling and pumping tests to be continuous between the Talbot and Smart Road Wells (CEH, 1989).

The ground water model and report (Jacques Whitford, 1999) conclude that the Talbot and Smart Road wells do interfere with each other and if they were to be pumped together, the well yields from the individual wells would be less than the sum of their capacities when pumping alone.

Subsequently to the ground water model being developed, an 8-inch diameter test well was installed at the Talbot Well site and a 3-day duration pumping test was run at 475 GPM. (Caswell, 2005). This pumping test indicates no interference with the Smart Road Well at that pumping rate and duration.

The 18 inch diameter Talbot Well was also installed in 2005 and a 24-hour pumping test at 1,242 GPM was run on that well (Caswell, 2005). Apparently, the Smart Road Well was operated during the pumping test and produced about 0.7 feet of drawdown in the Talbot Well, proving that the two wells will interfere with each other if pumped at a high enough rate for a sufficient period of time.

There is no information available regarding the potential for interference between the Talbot/Smart Road Wells and the Jackson Pit Well on the other side of Goose River. There may be no interference if the aquifer is discontinuous as suggested by previous investigations. When the Talbot Well is brought on-line, the District should monitor pumping rates and drawdowns to both confirm the magnitude of the modeled interference between the Talbot and Smart Wells and determine, in turn, if they interfere with the Jackson Road Well.

RECHARGE CONSIDERATIONS

The potential sources of recharge to the Goose River Aquifer include:

- Rainfall directly on the sand & gravel directly above the aquifer
- Rainfall on the uplands that drain to the aquifer
- Induced infiltration from Goose River into the aquifer

The conclusions reached by the previous investigators of this aquifer (CEH, 1989, Jacques Whitford, 1999, Caswell, 2005) indicate that a large portion of the water derived from the Goose River Aquifer is from induced infiltration. Induced infiltration can occur when a pumping well lowers the water beneath a stream bed enough to allow the stream water to flow into the aquifer. Most high yield gravel wells in Maine are located in areas that have the potential for induced infiltration, as it assures sustainable yields.

Keith Pooler (personal communication, 2018) indicated that the Water District measures stream flow in the Goose River at the outlet dam on Swan Lake and also at a location downstream of the wells. He reports that under most circumstances, that flow in the Goose River is greater downstream of the wells than it is at the dam. This indicates that most of the time, at current pumping rates, the wells are not deriving much water from induced recharge.

However, this might not be the case as pumping is increased from this aquifer in the future. In order to estimate the available ground water recharge, we delineated the direct recharge area to the aquifer as shown on Figure No. 2. The direct recharge area was truncated at the Swan Lake Dam as most of the ground water recharge in the upper part of the drainage basin will eventually enter Swan Lake and pass by the aquifer as surface water flow in the Goose River.

The direct recharge area to the aquifer comprises approximately 3,888 acres (6 square miles). Of that area, 203 acres is sand and gravel with the remainder being predominantly glacial till and fine grained glacio-marine sediments.

We obtained monthly precipitation records for Belfast Maine from 1960 to 2018 from the National Weather Service, Belfast Station (NOAA, 2018). The records indicate an average annual precipitation of 49.3 inches. On sand & gravel, approximately 50% of annual precipitation will recharge ground water. On glacial till and glacio-marine soils, approximately 15% of annual precipitation will recharge the ground water. This amounts to 24.65 inches of recharge on the sand and gravel and 7.4 inches of recharge on the remaining soils in the direct recharge area. Summing up the amount of available recharge provides an estimate of 876.3 MGY (1,667 GPM) which is actually in excess of the current estimated safe yield of the Smart Road and Jackson Pit wells.

This mass-balance analysis does indicate that if the Talbot Well were brought on-line and the aquifer were pumped by all three wells at the estimated safe yield of 1,119 MGY, a significant amount of water (462 GPM) would need to be induced from the Goose River to maintain that pumping rate.

Flow in the Goose River is controlled at the Swan Lake Dam by the operators, Goose River Hydro. The Federal Energy Regulatory Commission (FERC) license for this facility has a mandatory low flow of 5 cubic feet per second (2,244 GPM). This is the minimum amount of flow that must be released from Swan Lake at all times (FERC, 1980). This indicates that under conditions of maximum pumpage and low flow in the Goose River, 20% of the river flow could be induced into the aquifer.

DROUGHT CONSIDERATIONS

The last condition which should be considered when evaluating the sustainability of a water source is drought conditions. For the purposes of this discussion, we are defining drought as 75% of average annual precipitation. Using that criteria, the precipitation records from 1960 to the present indicate the following drought periods:

- 1964 to 1965
- 1971
- 1978
- 2001

2001 marks the lowest year of precipitation with only 27.16 inches of precipitation (55% of normal) recorded. The drought year mass balance recharge analysis indicates that the available recharge in 2001 amounted to 482.5 MGY (918 GPM). Under those worse case circumstances, pumping at sustained high rates would cause more induced infiltration from the Goose River. Under the maximum estimated sustained yield of 1,110 MGY (2,130 GPM), the wells would need to induce 1,212 GPM from the Goose River or about 54% of required minimum base flow of 2,244 GPM (5 cubic feet per second (CFS)).

CONCLUSION

The information presented in this report indicates that the Belfast Water District has the capacity to supply up to 262.9 MGY of water to Nordic Aquafarms, especially if the Talbot Well is brought on-line as recommended. In addition, the Belfast Water District will maintain an adequate reserve quantity of water for future growth, contractual obligations and emergency situations.

DISCLAIMER

This report relies primarily on the work of others. A.E. Hodsdon Engineers (AEH) did not independently verify this information. Unless there was actual knowledge of incorrect information or it was obvious that certain information was incorrect based on other information obtained or otherwise actually known to AEH, the information presented is presumed accurate.

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APPENDIX

Exhibit A – Water System Map

Exhibit B – Excerpt from PUC Reports and Belfast Water Use Records

Exhibit C – Production Well Information

C1 – Smart Road Well

C2 – Jackson Pit Well

C3 – Talbot Well

Exhibit D – Pumping Test Data

D1 – Smart Road Well Pumping Test Data (Caswell, Eichler & Hill, Inc.
(CEH), 1989)

D2 – Jackson Pit Well Pumping Test Data (R.E. Chapman, 1965)

D3 – Talbot Well Pumping Test Data (Caswell, 2005)



Capacity Evaluation for the Belfast Water District, Belfast, Maine

A. Water System Map



Belfast

Belfast Bay

Northport

CONFIDENTIAL

Legend

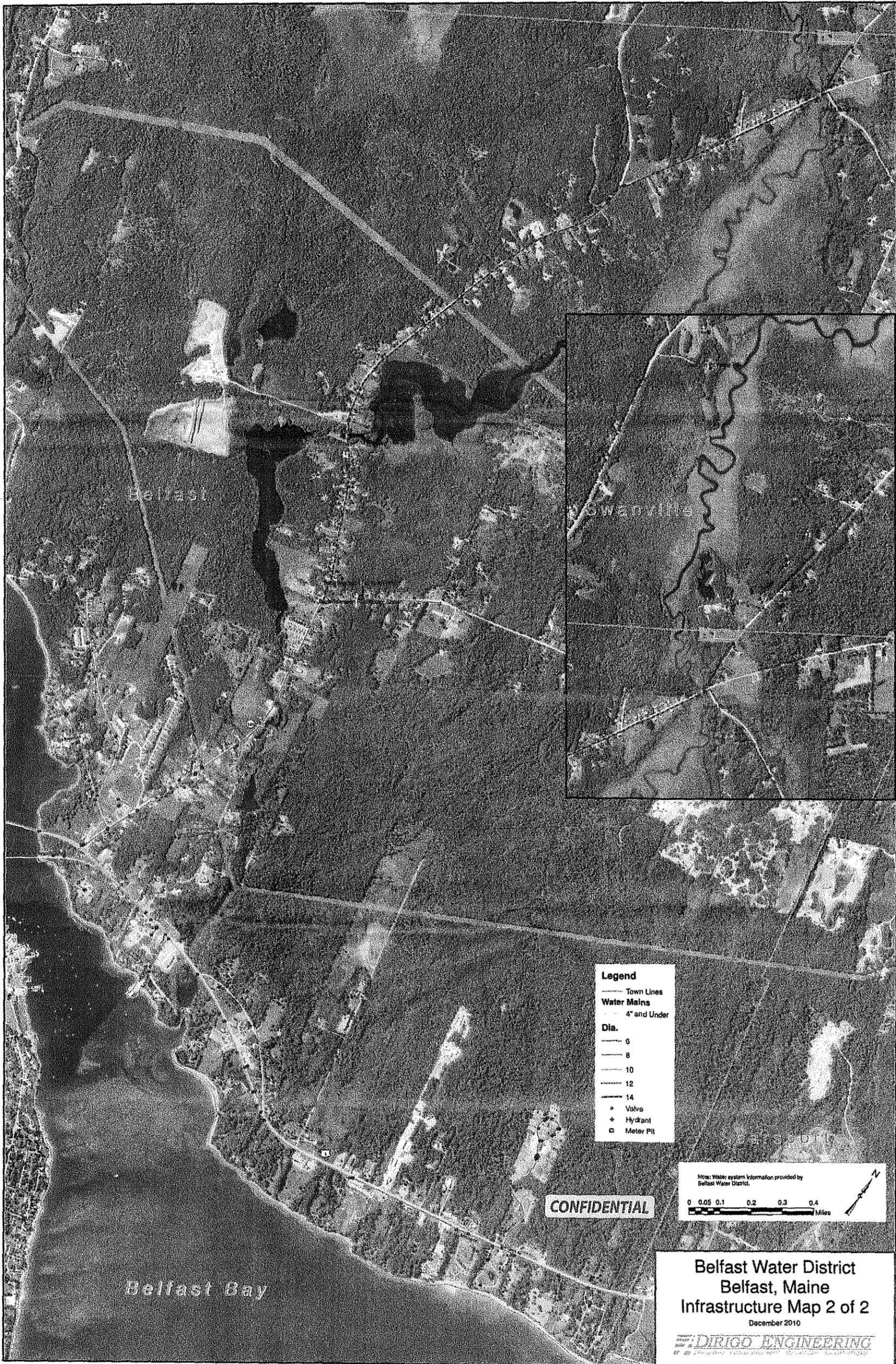
- Town Lines
- Water Mains**
- 4" and Under
- Dia.**
- 6
- 8
- 10
- 12
- 14
- Valve
- ◆ Hydrant
- Meter Pit

Note: Water system information provided by Belfast Water District.

0 0.05 0.1 0.2 0.3 0.4 Miles

Belfast Water District
 Belfast, Maine
 Infrastructure Map 1 of 2
 December 2010

DIRIGO ENGINEERING
 21000 Main Street, Belfast, ME 04911
 Tel: 207-338-1200



Legend

- Town Lines
- Water Mains**
- 4" and Under
- Dia.**
- 6
- 8
- 10
- 12
- 14
- Valve
- + Hydrant
- Meter Pit

Notes: Water system information provided by Belfast Water District.

0 0.05 0.1 0.2 0.3 0.4 Miles

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Belfast Water District
Belfast, Maine
Infrastructure Map 2 of 2
 December 2010

Member of **DIRIGO ENGINEERING**
2000 Main Street, Belfast, Maine 04910

Exhibit

B

Capacity Evaluation for the Belfast Water District, Belfast, Maine

B. Excerpts from PUC Reports and Belfast Water Use Records

TOTAL GALLONS PUMPED PER YEAR

YEAR	TOTAL PUMPED ALL SOURCES	SMART ROAD	JACKSON PIT	LITTLE RIVER STATION		
1969	682,221,860	248,972,160	343,926,400	89,323,300		
1970	680,053,732	282,253,100	314,172,344	83,628,288		
1971	587,394,100	239,218,700	272,525,100	75,650,300		
1972	597,158,600	232,771,700	290,754,000	73,632,900		
1973	588,747,800	246,476,100	276,053,600	66,218,100		
1974	586,561,100	227,078,200	291,145,200	68,337,700		
1975	550,891,900	197,282,000	280,930,400	72,679,500	SMART	2,493,447,900
1976	585,369,800	232,007,400	282,619,500	70,742,900	JACKSON	2,811,220,044
1977	621,786,300	277,595,800	278,292,200	65,898,300		avg 10 yrs in 70's
1978	611,698,800	288,795,500	278,397,200	44,506,100		530,466,794
1979	580,008,300	269,969,400	246,330,500	63,708,400		
1980	435,766,600	204,130,900	223,851,300	7,784,400	(MAPLEWOOD CLOSED)	
1981	446,662,200	214,466,400	232,195,800			
1982	519,439,300	236,056,700	283,382,600			
1983	483,880,900	204,288,900	279,592,000			
1984	446,122,805	152,063,705	294,059,100			
1985	442,616,820	169,528,100	273,088,720			
1986	435,627,300	181,576,200	254,051,100			
1987	410,723,378	164,455,670	246,267,708			
1988	264,444,450	63,095,060	201,349,390		(PENOBSCOT POULTRY CLOSED 11/88)	
1989	253,935,480	56,900,700	197,034,790			
1990	254,528,200	57,951,900	196,576,300			
1991	266,907,500	75,149,200	191,758,300			
1992	270,610,500	72,363,400	198,247,100			
1993	299,340,300	104,131,700	195,208,600			
1994	314,847,300	112,695,200	202,152,100			
1995	321,246,700	129,613,800	191,632,900			
1996	303,158,366	132,276,500	170,881,866			
1997	329,425,900	145,262,800	184,163,100			
1998	311,863,900	122,823,700	189,040,200			
1999	344,555,700	171,973,400	172,582,300			
2000	319,447,900	131,475,700	187,972,200			
2001	339,661,323	172,988,320	166,673,003		(STINSON SEAFOOD CLOSED AUG 01)	
2002	291,411,122	120,859,522	170,551,600		(LEAK DETECTION SURVEY AUG 02)	
2003	290,452,500	107,681,500	182,771,000			
2004	278,214,400	105,729,600	172,484,800			
2005	249,811,800	99,579,400	150,232,400		(MBNA - IRRIG./PEN FROZ FD-NEW OWNERS)	
2006	213,049,000	31,182,900	181,866,100			
2007	215,759,900	43,162,900	172,597,000			
2008	211,904,600	43,570,200	168,334,400		(RECESSION YR & USAGE DECREASED W/OTHER UTILITIES)	
2009	234,517,400	68,990,300	165,527,100			
2010	249,055,800	50,148,000	198,907,800			
2011	220,394,100	60,294,400	160,099,700		(CUSTOMER USAGE DOWN & LEAKS DETECTED)	
2012	194,865,600	35,213,900	159,651,700		(LEAKS DETECTED)	
2013	191,728,200	53,943,900	137,784,300		PEN MCCRUM PRODUCTION DECREASED, IRRIGATION, CONSERVATION	
2014	204,869,385	64,948,100	139,921,285			
2015	204,988,400	88,736,800	116,251,600		SMART	604,568,900
2016	198,951,100	78,438,800	120,512,300		JACKSON	1,507,704,885 avg 10 yrs in 2008-2017
2017	200,999,200	60,284,500	140,714,700			2,112,273,785 211,227,379
	0					
TOTAL	18,137,677,631	6,930,452,737	10,425,114,706	782,110,188		
TOTALS		SMART RD	JACKSON PIT	LITTLE RIVER		

TOTAL GALLONS PUMPED PER YEAR

YEAR	TOTAL PUMPED ALL SOURCES	SMART ROAD	JACKSON PIT	LITTLE RIVER STATION	SMART RD & J.P.	YEAR
1969	682,221,860	248,972,160	343,926,400	89,323,300	592,898,560	1969
1970	680,053,732	282,253,100	314,172,344	83,628,288	596,425,444	1970
1971	587,394,100	239,218,700	272,525,100	75,650,300	511,743,800	1971
1972	597,158,600	232,771,700	290,754,000	73,632,900	523,525,700	1972
1973	588,747,800	246,476,100	276,053,600	66,218,100	522,529,700	1973
1974	586,561,100	227,078,200	291,145,200	68,337,700	518,223,400	1974
1975	550,891,900	197,282,000	280,930,400	72,679,500	478,212,400	1975
1976	585,369,800	232,007,400	282,619,500	70,742,900	514,626,900	1976
1977	621,786,300	277,595,800	278,292,200	65,898,300	555,888,000	1977
1978	611,698,800	288,795,500	278,397,200	44,506,100	567,192,700	1978
1979	580,008,300	269,969,400	246,330,500	63,708,400	516,299,900	1979
1980	435,766,600	204,130,900	223,851,300	7,784,400 (MAPLEWOOD CLOSED)	427,982,200	1980
1981	446,662,200	214,466,400	232,195,800		446,662,200	1981
1982	519,439,300	236,056,700	283,382,600		519,439,300	1982
1983	483,880,900	204,288,900	279,592,000		483,880,900	1983
1984	446,122,805	152,063,705	294,059,100		446,122,805	1984
1985	442,616,820	169,528,100	273,088,720		442,616,820	1985
1986	435,627,300	181,576,200	254,051,100		435,627,300	1986
1987	410,723,378	164,455,670	246,267,708		410,723,378	1987
1988	264,444,450	63,095,060	201,349,390	(PENOBSCOT POULTRY CLOSED 11/88)	264,444,450	1988
1989	253,935,490	56,900,700	197,034,790		253,935,490	1989
1990	254,528,200	57,951,900	196,576,300		254,528,200	1990
1991	266,907,500	75,149,200	191,758,300		266,907,500	1991
1992	270,610,500	72,363,400	198,247,100		270,610,500	1992
1993	299,340,300	104,131,700	195,208,600		299,340,300	1993
1994	314,847,300	112,695,200	202,152,100		314,847,300	1994
1995	321,246,700	129,613,800	191,632,900		321,246,700	1995
1996	303,158,366	132,276,500	170,881,866		303,158,366	1996
1997	329,425,900	145,262,800	184,163,100		329,425,900	1997
1998	311,863,900	122,823,700	189,040,200		311,863,900	1998
1999	344,555,700	171,973,400	172,582,300		344,555,700	1999
2000	319,447,900	131,475,700	187,972,200		319,447,900	2000
2001	339,661,323	172,988,320	166,673,003	(STINSON SEAFOOD CLOSED AUG 01)	339,661,323	2001
2002	291,411,122	120,859,522	170,551,600	(LEAK DETECTION SURVEY AUG 02)	291,411,122	2002
2003	290,452,500	107,681,500	182,771,000		290,452,500	2003
2004	278,214,400	105,729,600	172,484,800		278,214,400	2004
2005	249,811,800	99,579,400	150,232,400	(MBNA - IRRIG./PEN FROZ FD-NEW OWNERS)	249,811,800	2005
2006	213,049,000	31,182,900	181,866,100		213,049,000	2006
2007	215,759,900	43,162,900	172,597,000		215,759,900	2007
2008	211,904,600	43,570,200	168,334,400	(RECESSION YR & USAGE DECREASED W/OTHER UTILITIES)	211,904,600	2008
2009	234,517,400	68,990,300	165,527,100		234,517,400	2009
2010	249,055,800	50,148,000	198,907,800		249,055,800	2010
2011	220,394,100	60,294,400	160,099,700	(CUSTOMER USAGE DOWN & LEAKS DETECTED)	220,394,100	2011
2012	194,865,600	35,213,900	159,651,700	(LEAKS DETECTED)	194,865,600	2012
2013	191,728,200	53,943,900	137,784,300	PEN MCCRUM PRODUCTION DECREASED, IRRIGAT	191,728,200	2013
2014	204,869,385	64,948,100	139,921,285		204,869,385	2014
2015	204,988,400	88,736,800	116,251,600		204,988,400	2015
2016	198,951,100	78,438,800	120,512,300		198,951,100	2016
2017	200,999,200	60,284,500	140,714,700		200,999,200	2017
2018						2018
2019						2019
2020						2020
TOTAL	18,137,677,631	6,930,452,737	10,425,114,706	782,110,188	17,355,567,443	
TOTALS		SMART RD	JACKSON PIT	LITTLE RIVER		

TOTAL GALLONS PUMPED PER YEAR

YEAR	TOTAL PUMPED ALL SOURCES	SMART ROAD	JACKSON PIT	
1969	592,898,560	248,972,160	343,926,400	
1970	596,425,444	282,253,100	314,172,344	
1971	511,743,800	239,218,700	272,525,100	
1972	523,525,700	232,771,700	290,754,000	
1973	522,529,700	246,476,100	276,053,600	
1974	518,223,400	227,078,200	291,145,200	
1975	478,212,400	197,282,000	280,930,400	
1976	514,626,900	232,007,400	282,619,500	
1977	555,888,000	277,595,800	278,292,200	
1978	567,192,700	288,795,500	278,397,200	
1979	516,299,900	269,969,400	246,330,500	
1980	427,982,200	204,130,900	223,851,300	(MAPLEWOOD CLOSED)
1981	446,662,200	214,466,400	232,195,800	
1982	519,439,300	236,056,700	283,382,600	
1983	483,880,900	204,288,900	279,592,000	
1984	446,122,805	152,063,705	294,059,100	
1985	442,616,820	169,528,100	273,088,720	
1986	435,627,300	181,576,200	254,051,100	
1987	410,723,378	164,455,670	246,267,708	
1988	264,444,450	63,095,060	201,349,390	(PENOBSCOT POULTRY CLOSED 11/88)
1989	253,935,490	56,900,700	197,034,790	
1990	254,528,200	57,951,900	196,576,300	
1991	266,907,500	75,149,200	191,758,300	
1992	270,610,500	72,363,400	198,247,100	
1993	299,340,300	104,131,700	195,208,600	
1994	314,847,300	112,695,200	202,152,100	
1995	321,246,700	129,613,800	191,632,900	
1996	303,156,366	132,276,500	170,881,866	
1997	329,425,900	145,262,800	184,163,100	
1998	311,863,900	122,823,700	189,040,200	
1999	344,555,700	171,973,400	172,582,300	
2000	319,447,900	131,475,700	187,972,200	
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2003	290,452,500	107,681,500	182,771,000	
2004	278,214,400	105,729,600	172,484,800	
2005	249,811,800	99,579,400	150,232,400	(MBNA - IRRIG./PEN FROZ FD-NEW OWNERS)
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2007	215,759,900	43,162,900	172,597,000	
2008	211,904,600	43,570,200	168,334,400	(RECESSION YR & USAGE DECREASED WOTHER UTILITIES)
2009	234,517,400	68,990,300	165,527,100	
2010	249,055,800	50,148,000	198,907,800	
2011	220,394,100	60,294,400	160,099,700	(CUSTOMER USAGE DOWN & LEAKS DETECTED)
2012	194,865,600	35,213,900	159,651,700	(LEAKS DETECTED)
2013	191,728,200	53,943,900	137,784,300	PEN MCCRUM PRODUCTION DECREASED,IRRIGATION,CONSERVATION
2014	204,869,385	64,948,100	139,921,285	
2015	204,988,400	88,736,800	116,251,600	
2016	198,951,100	78,438,800	120,512,300	
2017	200,999,200	60,284,500	140,714,700	
2018				
2019				
2020				
TOTAL	17,355,567,443	6,930,452,737	10,425,114,706	
TOTALS		SMART RD	JACKSON PIT	

WATER PRODUCTION AND CONSUMPTION

1. Show quantities of water produced and purchased and the quantities delivered to consumers and lost or unaccounted for during the year. Where estimates are used, the basis thereof should be set forth in a footnote.

Line Number	Month (a)	Thousand Gallons Delivered to Mains				
		Purchased (b)	Groundwater		Surface Water	
			By Pumping (c)	By Gravity (d)	By Pumping (e)	By Gravity (f)
1	January		13,176,900			
2	February		13,384,300			
3	March		13,621,800			
4	April		13,939,900			
5	May		17,074,100			
6	June		19,841,600			
7	July		21,422,900			
8	August		22,687,500			
9	September		17,698,800			
10	October		16,258,600			
11	November		14,313,800			
12	December		15,530,900			
13	Totals	0	198,951,100	0	0	0

14						THOUSAND GALLONS
15	Total PRODUCTION WATER					198,951,100
16						
17	Total REVENUE WATER (Page W-3, line 20, col. e) or					168,430
18						168,429,397
19	Balance as NON-REVENUE WATER					
20	State Percentage: 15.34%					30,521,703
21	Description and estimated consumption of Non-Revenue Water					
22	Utility Usage-at source/treatment plants: ANALYZERS Jackson Pit & Smart Rd.					1333050
23	Utility Usage-flushing hydrants	Number flushed:	252		209500	
24	Utility Usage-bleeders	Number in use:	1		281850	
25	Utility Usage-meter bench	Number meters tested:	0			
26	Utility Usage-other purposes (specify):					
27	FLUSHING MAINS: ANNUAL MAINTENANCE					227850
28	FLOW TESTS					4500
29	SEWER MAINS/SWEEPING - PUBLIC WORKS					275000
30	Fire Protection	Number of hydrant-using fires:	3		550000	
31	Main Breaks	Number of breaks:	8		3895000	
32	Service Line losses before meters	Number of cases:	9		2567036	
33	Other Non-Revenue uses/losses (specify):					
34	FLUSH WELLS Jackson Pit Station 12,000 and Smart Rd Station 76,000					88000
35	FLUSH MAINS: Front Street Phase II Project: 309,000, Mayo Street: 13,000, Washington Street: 16,000					338000
36	Total Accounted for Non-Revenue Water (Lines 22 through Lines 35)					9769786
37	Unaccounted for Non-Revenue Water					20751917
38	Unaccounted for Non-Revenue Water (State Percentage)					10%
39						
40						
41	System DEMAND Data		Quantity (mgd)	Date		
42	Average Daily Demand:		543582			
43	Maximum Day Demand:		719300	9/23/2016		
44	Peak Hour Demand:		29971			

Remarks Note: Non-revenue water is water that was produced and used but did not produce water revenues; unaccounted for water is a subset of this.

CONSUMER'S METERS

1. Show the requested information concerning consumers' meters in service or in stock during the year.

Line Number	Size, in. (a)	Number of Meters in Service				Number in Stock at End of Year (f)	Number Purchased During Year (g)	Number Condemned or Sold during Year (h)
		Beginning Year (b)	Installed During Year (c)	Removed During Year (d)	End of Year (e)			
1	Owned by Respondent							
2	5/8	1556	284	269	1571	195	430	269
3	3/4	39	3	4	38	3	0	4
4	1	142	35	32	145	10	22	32
5	1 1/2	36	2	2	36	1	2	2
6	2	67	6	6	67	1	4	6
7	3	9	1	1	9	1	2	1
8	4	5	0	0	5	0	0	0
9	6	2	0	0	2	0	0	0
10								
11								
12								
13								
14								
15								
16								
17	Total	1856	331	314	1873	211	459	314
18	Owned by Consumers							
19	3/4	3			3			
20	2	7			7			
21	3	3			3			
22	4	1			1			
23								
24								
25								
26								
27	Total	14			14			

Exhibit

C

Capacity Evaluation for the Belfast Water District, Belfast, Maine

C. Production Well Information

- C1 – Smart Road Well
- C2 – Jackson Pit Well
- C3 – Talbot Well



Capacity Evaluation for the Belfast Water District, Belfast, Maine

C1. Smart Road Well

Belfast Water Department, Belfast, Maine

F. A. Sullivan - 9/12/55 - 9/16/55

24" x 18" gravel
packed well

J. R.
WELL

0-5 clay and sand; 5-20 medium sand; 20-42 coarse gravel;
42-45 dirty gravel; 45 ledge; 15' of 18" (5' of 150 slot
and 10' of 180 slot) Everdur screen exposed. Left in 32'
of 18" pipe, pulled out all 24" pipe.

Bottom of screen set @ 42' from ground level.

Static from top of pipe 2'2".

Pipe above ground 6".

Drawdown 8'2", pumping 1500 gpm from top of pipe.

Added 5' of pipe to top of well after pump test was over,
making total depth of well 47'6".

2984/55

R. E. CHAPMAN CO.
OAKDALE, MASS.

S.R. Well

Name of Driller F.A. SULLIVAN

Names of Helpers O.M. PATTERSON F.G. SULLIVAN

Name & Location CITY OF BELFAST MAINE ON ACORN PROPERTY

Date Started 9/12/55 Date Finished 9/16/55

Date Started Date Finished

Hole No. 24" x 18" #1

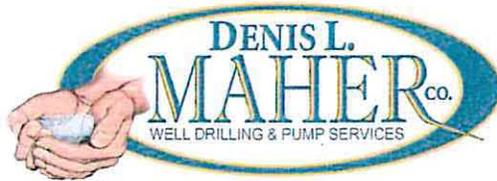
Hole No.

Depth		Classification of	Feet of Screen Exposed	Depth		Classification of	Feet of Screen Exposed
From	To	Material		From	To	Material	
0'	5'	CLAY & SAND	15' OF 18" EUEDUR				
5'	20'	MEDIUM SAND	Size of Screen & Slot 5' OF 150				Size of Screen & Slot
20'	42'	COURSE GRAVEL	10' OF 180				
42'	45'	DIRTY GRAVEL	Screen Left in 15' EUEDUR WITH CONE FITTING & BUSHING				Screen Left in
45'		LEDGE	Screen Pulled Out NO				Screen Pulled Out
			Pipe Left in 32' OF 18"				Pipe Left in
			Pipe Pulled Out ALL 24" PIPE				Pipe Pulled Out
			Remarks				Remarks

Pump Test on Hole No.

Pump Test on Hole No.

Date	Time	Dr. Down	G. P. M.	Static and Other Info.	Date	Time	Dr. Down	G. P. M.	Static and Other Info.
				BOTTOM OF SCREEN SET AT 42' FROM GROUND LEVEL					
				STATIC FROM TOP OF PIPE 2'-2"					
				PIPE ABOVE GROUND 6"					
				D.D. 8'-2" PUMPING 1500 G.P.M. FROM TOP OF PIPE					
				ADDED 5'-0" OF PIPE TO TOP OF WELL AFTER PUMP TEST WAS OVER					
				MAKING TOTAL DEPTH OF WELL 47'-6"					



January 22, 2013

Belfast Water District
285 Northport Avenue
P.O. Box 506
Belfast, ME 04915-0506

Attn: Keith Pooler
Tel: 207-338-1200
Fax: 207-338-0444
keith@belfastwater.org



Smart Rd well

RE: 18" Gravel Well

Keith,

On December 10, 2012 we began the redevelopment of your 18" gravel well. It was tested at the beginning of the project at 674 GPM with a drawdown of 0.6' or a specific capacity of 1123 GPM/ft.

One hundred ten (110) gallons of 22° Baume 35% Muriatic Acid was injected along with 2.5 gallons of NW-220. The acid was neutralized with Soda Ash. A total of 40 machine hours resulted in a 21% increase in specific capacity.

This is an 18" well with an 18" telescope screen with an I.D. of 14.8". The mild steel bolts on the bowl assembly were replaced with stainless steel. The column was replaced along with one shaft coupling. The head shaft was replaced and the combination right angle gear shaft was cut and rethreaded to 37 1/4" for the motor shaft.

Attached is the performance curve and well development record.

If you need anything else please let us know.

Very truly yours,
Denis L. Maher Company

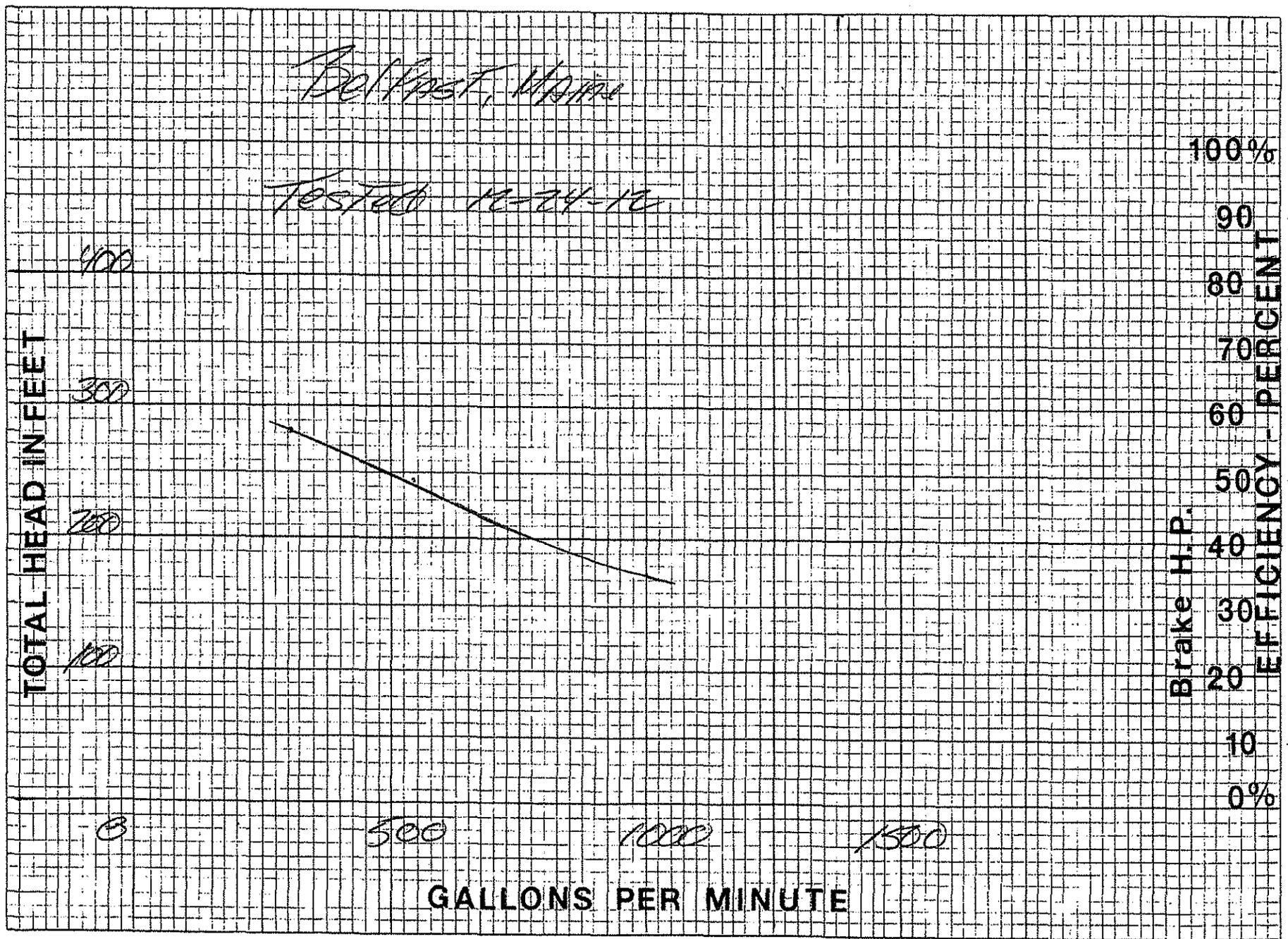
Denis L. Maher
Denis L. Maher
President

USA BlueBook
Get the Best Treatment™

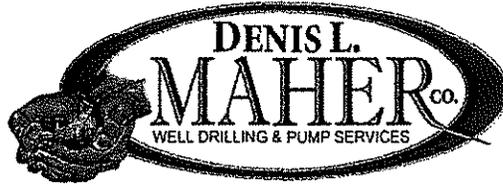
*ONLY time this well
has been rehabbed
since 1957*

Bellport, MA

TESTED 12-24-10



Collds 12A JMU	4.579	5074	881386				75HP US Motor
							5074 J133A-7082185 R092M



WELL REDEVELOPMENT RECORD

Job Name/Number: Belfast, Maine

Date Started: 12/10/17

Owner's Representative: North Peaker

Well Number: 18

Well Size: 18 Depth: 44' Screen Length: 15 Type: TEP

Static Water Level: 0 Static After Treatment: 6

Depth of Well Before: 44 After: 44

Original Specific Capacity: _____ @ _____ GPM

Rating Well Before @ 674 GPM with 0.6' Drawdown
= 1123 GPM/Foot of Drawdown

Chemicals Used: 10 gallon Muriatic Acid 2.5 gallons NV-770

Description of Surge Line: HV can 3 inch 2.7 + 12' 100% sand Ash

Rating Well After @ 680 GPM with 5 Drawdown
= 1360 GPM/Foot of Drawdown

Hours to Mob & Demob (with setup and down): 10

Hours Removing & Resetting Owner's Pump: _____

Type/Condition: _____

Hours Installing and Removing Surge Pump: 4

Hours Adding Chemicals: 1 Hours Surging: 40

Was Pump Reconditioned Before Reinstalling: _____

Remarks: _____

Name of Driller: S. Kelly Name of Helper _____



Capacity Evaluation for the Belfast Water District, Belfast, Maine

C2. Jackson Pit Well

Belfast Water District
Belfast, Maine

Job 2834 F. G. Sullivan
B. Wilson
December 30, 1965

24" x 18" Gravel Packed Well

Depth: 51'

Casing: 44' of 18", 24' of 24" National steel

Screens: 10' of 18" 220 slot Johnson stainless steel

G.P.M. 600

D.D. 2' 7-9-65

864/65'

Jackson PIT

R.E. Chapman Company
 30 North Main Street
 West Boylston, MA 01583

Invoice:

(508) 835-6231

Sold to
 Belfast Water District
 Route 1
 PO Box 506
 Belfast, ME 04915

Ship to
 Jackson Pit Well Rehab
 Route 141
 Belfast, ME

Account	P.O. Num	Ship Via	Ship Date	Terms	Invoice Date	Page
BELFAST				Net 30	06/03/2005	1

Request for payment for providing labor, equipment and materials and supplies as noted below and for performing work operations on the Jackson Pit Well as noted:

Item	Quantity	Description	Unit Price	Extended Price
	1	Item #1: Mobilization/demobilization of equipment, materials and supplies to and from job site, lump sum	2500.00	2,500.00*
	1	Item #2: For 42 hours of on the job time for work operations involved with rehabilitation of the Jackson Pit Well at \$1,600.00 per 8-hour day for labor, equipment, supplies and per diem	8400.00	8,400.00*

USABlueBOOK
 Get the Best Treatment™
Only time S.B. Has been rehabed since 1965

VENDOR #	176
AMOUNT \$	10,900.00
ACCT. NO.	188-20
APPROVAL FOR PAYMENT	[Signature]
DATE PAID	6/3/05
CHECK NO	11371

* means item is non-taxable

Subtotal 10,900.00

Total \$10,900.00

**LOG OF WELL REHABILITATION
R. E. CHAPMAN COMPANY**

Date Started: May 19, 2005

Date Finished: May 27, 2005

Name & Address of Job: Town of Belfast, Maine

Customer's representative in charge of this work: Harry Smith

Well number & location: #1 - Jackson Pit

Well installed originally by: R. E. Chapman Company in 1965

Type of work to be done: Redevelopment

Name of Driller: Chris Johnson

Depth of well: 54' TOP

Length of Screen: 10'

Size of well: 18" x 24"

Original GPM: 425 with 12" feet of drawdown from top of pipe

Original static water level:

Static before treatment: 4.97'

Depth of well before treatment: 54'

Drawdown after treatment: 8'

Capacity of well before treatment: 315 gpm

Specific capacity of well before treatment: 39.37 gpm/ft-DD

Kind of treatment used: Pump and surge, dead surge

Amount of treatment used:

Capacity of well after treatment: 455 gpm

Drawdown after treatment: .87'

Specific capacity of well after treatment: 522.98 gpm/ft-DD

Static water level after treatment: 4.85'

Type and condition of pump: Very good

Hours moving to and from job:

Hours removing and resetting pump: 4 hours

Hours surging and installing and removing surge pump: 24 hours

Condition of well on completion of work: Very good

Was pump reconditioned before reinstalling: Hung from calfline and reinstalled

Remarks: Good access - 15' roof hatch is 6' - 7' from edge of building, but had to take down fence around pump station

Signature of driller: Chris Johnson

**Town of Belfast
Jackson Pit Well
Clean Rehabilitation
Work Activities
May, 2005**

By R. E. Chapman Company

Date	Work Activities	Hours
Thursday May 19, 2005	Mobilize and arrive at Belfast job site at 1:30 PM Started to dismantle existing vertical turbine pump for removal, set up rig - stopped at 4:30 PM Note: Problem with chemical feed buildup in pipeline from pump station - could not fully close shutoff valve to isolate pump station - District personnel to correct problem for Monday AM	3
Monday May 23, 2005	Arrived on site at 10:30 AM, finish unbolting and removing pumping equipment from well, installed surge development apparatus in the well - stopped at 5:00 PM	6.5
Tuesday May 24, 2005	Arrived on site at 6:30 AM, initial rating on well SWL = 4.97' PWL = 12.97' DD = 8' Pumping Rate = 315 gpm Specific Capacity = 39.4 gpm/ft-DD Pump and surge development operations on well and rate well in PM SWL = 4.97' PWL = 6.98' DD = 2.01' Pumping Rate = 380 gpm Specific Capacity = 189.05 gpm/ft-DD (480% IMPROVEMENT!!) Stopped at 5:30 PM	11.0
Wednesday May 25, 2005	Arrived on site at 7:00 AM, decided no need to utilize chemicals - continue pumping and surging development operations on well - rate well SWL = 4.85' PWL = 5.72' DD = 0.87' Pumping Rate = 440 gpm Specific Capacity = 523 gpm/ft-DD (1300% IMPROVEMENT!!) Stopped at 5:30 PM	10.5

**Town of Belfast
Jackson Pit Well
Clean Rehabilitation
Work Activities
May, 2005**

By R. E. Chapman Company

Date	Work Activities	Hours
Thursday May 26, 2005	Arrived on site at 7:00 AM, remove surge development apparatus from well - reinstall vertical turbine pump into well, clean up project area until 3:00 PM	8.0
Tuesday May 30, 2005	Knock-down drill rig, load up and move off site	3.0
	Total	42 hours



Capacity Evaluation for the Belfast Water District, Belfast, Maine

C3. Talbot Well

SAND ANALYSIS

R. E. CHAPMAN CO.
30 North Main St.

West Boylston, MA 01583-1126

Customer's Name BELFAST WATER DISTRICT

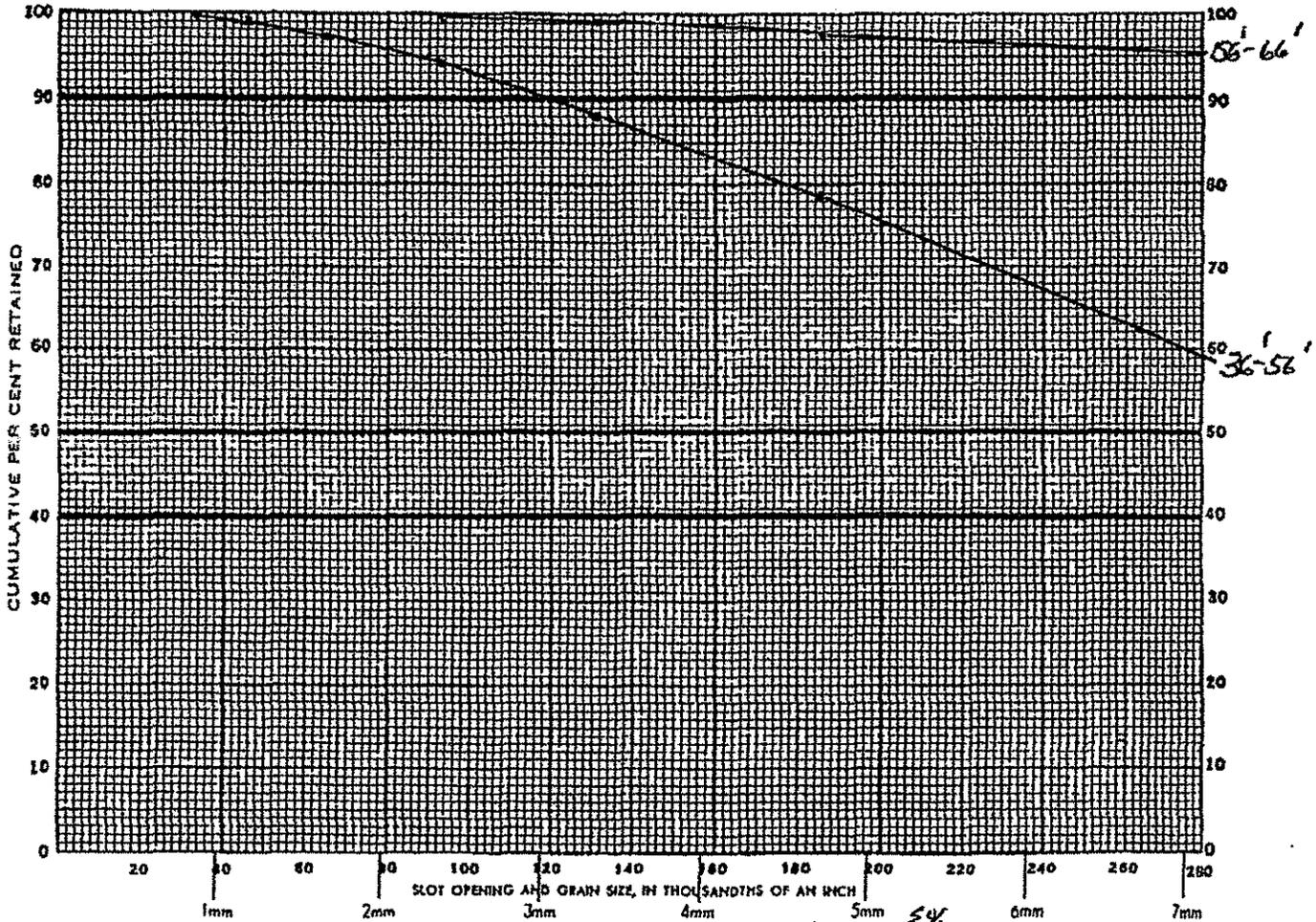
Town BELFAST State ME Date OCT 5, 2005

Well Location OFF CURTIS ROAD

Type of Well 18" NAT. DEVELOPED WELL

Depth of Sample 36"-56", 56"-66"

Sample taken by CHRIS JOHNSON, DRIVER R.E. CHAPMAN CO.



Sieve Openings	Cumulative Per Cent Retained	
	36-56	56-66
.263	62.3	96.5
.185	78.5	97.5
.131	88.0	98.0
.093	94.0	99.0
.065	97.5	
.046	99.0	
.033	99.5	
.023		
.016		
.012		
.008		
.006		
.004		
Dust		

Gravel Pack Recommended 81.3%
56-66" = 525'
371 91.5%

Slot Opening Recommended _____

Recommended Screen Dia. _____ in. Length _____ ft.

Type Screen _____ Metal _____

By W.A.

CONSTRUCTION RECORD

WELL OWNER Belfast Water District

Belfast, Maine

WELL NO. 18" off Curtis Road

Date October 26, 2005

Left casing 5' above ground as directed by Kieth (Water Supt)

CASING DETAILS

Length 60.09' (including 5' AGL) ft.

Diameter 18 in.

Kind Sch. 40 Steel

SCREEN DETAILS

Add on 3.5' to 2½" obs. well casing at completion of project

Make Johnson

Length 10.25' (13.80' with riser) ft.

Diameter 18" telescope in.

Slot size .375/.500 slot

Metal Stainless Steel

SCREEN FITTINGS

Top Rubber packer welded

Bottom Plate Bottom

PUMP TEST (Reference Point approx. 2' AGL)

Static level 20.39' (before adding 3' of casing) ft.

Rate 1242 g.p.m.

Draw down 22.15 ft.

Hours pumped 24 hrs.

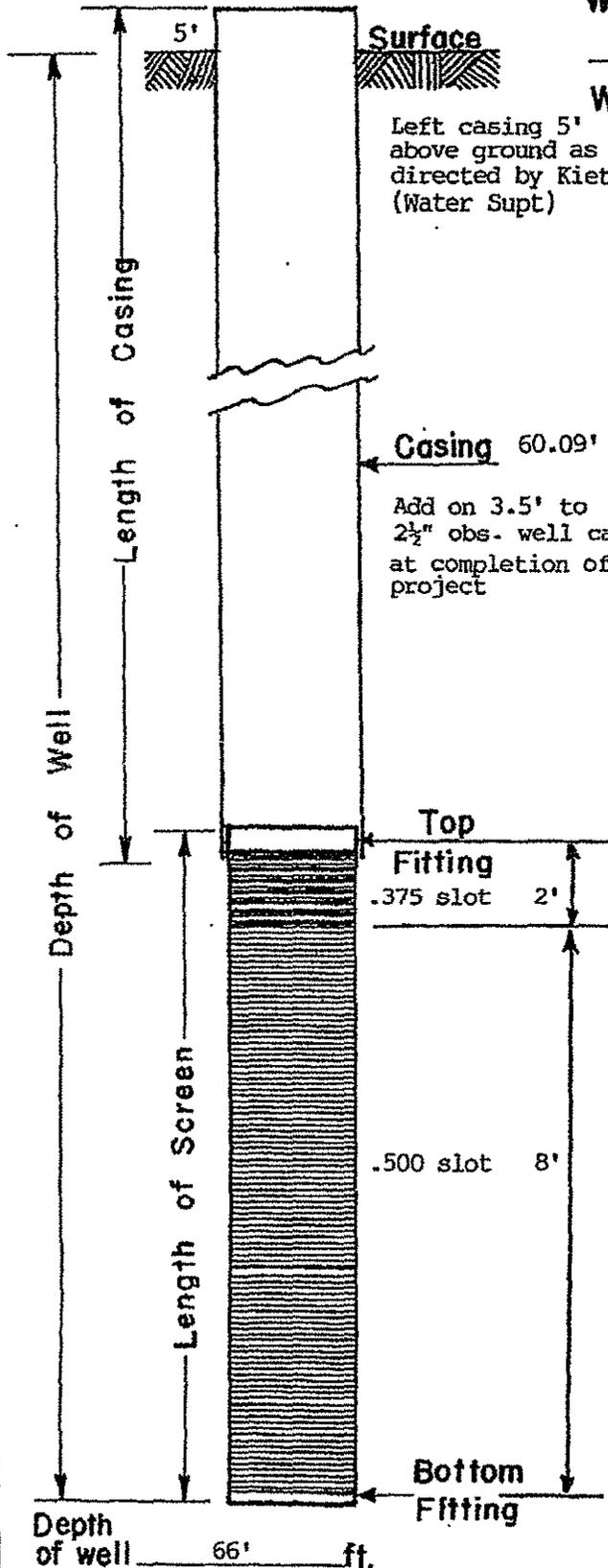
ARTIFICIALLY GRAVEL TREATED

Yes _____ No X

Thickness _____ in.

Size of gravel _____

DRILLER Chris Johnson - R. E. Chapman Company





Capacity Evaluation for the Belfast Water District, Belfast, Maine

D. Pumping Test Data

- D1 – Smart Road Well Pumping Test Data (CEH, 1989)
- D2 – Jackson Pit Well Pumping Test Data (R.E. Chapman, 1965)
- D3 – Talbot Well Pumping Test Data (Caswell, 2005)



Capacity Evaluation for the Belfast Water District, Belfast, Maine

D1. Smart Road Well Pumping Test (CEH, 1989)

Title: BELFAST WATER DISTRICT SMART ROAD PUMPING TEST PUMPING WELL

Start time: 11.00 (hr.mm) Static water level: 8.35 feet

=====

Day	Time	TSPB (min)	Feet Inches	Feet	Drawdown
		0		8.45	0.10
1	11.01	1		8.75	0.40
1	11.02	2		8.77	0.42
1	11.03	3		8.82	0.47
1	11.04	4		8.86	0.51
1	11.05	5		8.89	0.54
1	11.06	6		8.91	0.56
1	11.07	7		8.97	0.62
1	11.08	8		8.98	0.63
1	11.09	9		9.00	0.65
1	11.10	10		9.02	0.67
1	11.12	12		9.05	0.70
1	11.14	14		9.06	0.71
1	11.16	16		9.09	0.74
1	11.18	18		9.10	0.75
1	11.20	20		9.12	0.77
1	11.25	25		9.18	0.83
1	11.30	30		9.23	0.88
1	11.35	35		9.25	0.90
1	11.40	40		9.30	0.95
1	11.45	45		9.31	0.96
1	11.50	50		9.35	1.00
1	12.00	60		9.39	1.04
1	12.15	75		9.45	1.10
1	12.30	90		9.52	1.17
1	13.00	120		9.62	1.27
1	14.00	180		9.78	1.43
1	16.00	300		9.98	1.63
1	18.00	420		10.12	1.77
1	20.00	540		10.27	1.92
1	22.00	660		10.40	2.05
1	24.00	780		10.49	2.14
2	2.00	900		10.60	2.25
2	4.00	1020		10.71	2.36
2	6.00	1140		10.80	2.45
2	8.00	1260		10.98	2.63
2	10.00	1380		11.17	2.82
2	12.00	1500		11.23	2.88
2	14.00	1620		11.32	2.97
2	16.00	1740		11.38	3.03
2	18.00	1860		11.44	3.09
2	20.00	1980		11.49	3.14
2	22.00	2100		11.56	3.21
2	24.00	2220		11.61	3.26
3	2.00	2340		11.67	3.32

Title: BELFAST WATER DISTRICT SMART ROAD PUMPING TEST PUMPING WELL

Start time: 11.00 (hr.mm) Static water level: 8.35 feet

=====

Day	Time	TSPB (min)	Feet Inches	Feet	Drawdown
3	4.00	2460		11.74	3.39
3	6.00	2580		11.81	3.46
3	8.00	2700		11.85	3.50
3	10.00	2820		12.05	3.70
3	12.00	2940		12.13	3.78
3	14.00	3060		12.20	3.85
3	16.00	3180		12.24	3.89
3	18.00	3300		12.28	3.93
3	20.00	3420		12.37	4.02
3	22.00	3540		12.39	4.04
3	24.00	3660		12.43	4.08
4	2.00	3780		12.47	4.12
4	4.00	3900		12.53	4.18
4	6.00	4020		12.58	4.23
4	8.00	4140		12.62	4.27
4	11.00	4320		12.75	4.40
4	11.01	4321		11.73	3.38
4	11.02	4322		11.67	3.32
4	11.03	4323		11.64	3.29
4	11.04	4324		11.60	3.25
4	11.05	4325		11.58	3.23
4	11.06	4326		11.56	3.21
4	11.07	4327		11.53	3.18
4	11.08	4328		11.50	3.15
4	11.09	4329		11.48	3.13
4	11.10	4330		11.47	3.12
4	11.12	4332		11.44	3.09
4	11.14	4334		11.38	3.03
4	11.16	4336		11.35	3.00
4	11.18	4338		11.29	2.94
4	11.20	4340		11.26	2.91
4	11.25	4345		11.21	2.86
4	11.30	4350		11.15	2.80
4	11.35	4355		11.13	2.78
4	11.40	4360		11.08	2.73
4	11.45	4365		11.04	2.69
4	11.50	4370		11.01	2.66
4	12.00	4380		10.96	2.61
4	12.15	4395		10.88	2.53
4	12.30	4410		10.83	2.48
4	13.00	4440		10.74	2.39
4	14.00	4500		10.57	2.22
4	16.00	4620		10.44	2.09
4	18.00	4740		10.18	1.83
4	20.00	4860		9.80	1.45

Title: BELFAST WATER DISTRICT SMART ROAD PUMPING TEST PUMPING WELL

Start time: 11.00 (hr.mm) Static water level: 8.35 feet

=====

Day	Time	TSPB (min)	Feet Inches	Feet	Drawdown
5	8.00	5580		9.60	1.25
5	12.00	5820		9.49	1.14
5	16.00	6060		9.38	1.03
5	20.00	6300		9.27	0.92
6	8.00	7020		9.10	0.75
6	12.00	7260		9.05	0.70
6	16.00	7500		9.03	0.68

Caswell, Eichler and Hill, Inc.
 Pump Test Results
 Recovery Data

Title: BELFAST WATER DISTRICT SMART ROAD PUMPING TEST PUMPING WELL

Start time: 11.00 (hr.mm) Stop time: 4320 minutes (TSPB)
 Static water level: 8.35 feet

=====							Residual
Day	Time	TSPB (min)	TSPS (min)	t/t'	Feet Inches	Feet	Drawdown
4	11.01	4321	1	4321.00		11.73	3.38
4	11.02	4322	2	2161.00		11.67	3.32
4	11.03	4323	3	1441.00		11.64	3.29
4	11.04	4324	4	1081.00		11.60	3.25
4	11.05	4325	5	865.00		11.58	3.23
4	11.06	4326	6	721.00		11.56	3.21
4	11.07	4327	7	618.14		11.53	3.18
4	11.08	4328	8	541.00		11.50	3.15
4	11.09	4329	9	481.00		11.48	3.13
4	11.10	4330	10	433.00		11.47	3.12
4	11.12	4332	12	361.00		11.44	3.09
4	11.14	4334	14	309.57		11.38	3.03
4	11.16	4336	16	271.00		11.35	3.00
4	11.18	4338	18	241.00		11.29	2.94
4	11.20	4340	20	217.00		11.26	2.91
4	11.25	4345	25	173.80		11.21	2.86
4	11.30	4350	30	145.00		11.15	2.80
4	11.35	4355	35	124.43		11.13	2.78
4	11.40	4360	40	109.00		11.08	2.73
4	11.45	4365	45	97.00		11.04	2.69
4	11.50	4370	50	87.40		11.01	2.66
4	12.00	4380	60	73.00		10.96	2.61
4	12.15	4395	75	58.60		10.88	2.53
4	12.30	4410	90	49.00		10.83	2.48
4	13.00	4440	120	37.00		10.74	2.39
4	14.00	4500	180	25.00		10.57	2.22
4	16.00	4620	300	15.40		10.44	2.09
4	18.00	4740	420	11.29		10.18	1.83
4	20.00	4860	540	9.00		9.80	1.45
5	8.00	5580	1260	4.43		9.60	1.25
5	12.00	5820	1500	3.88		9.49	1.14
5	16.00	6060	1740	3.48		9.38	1.03
5	20.00	6300	1980	3.18		9.27	0.92
6	8.00	7020	2700	2.60		9.10	0.75
6	12.00	7260	2940	2.47		9.05	0.70



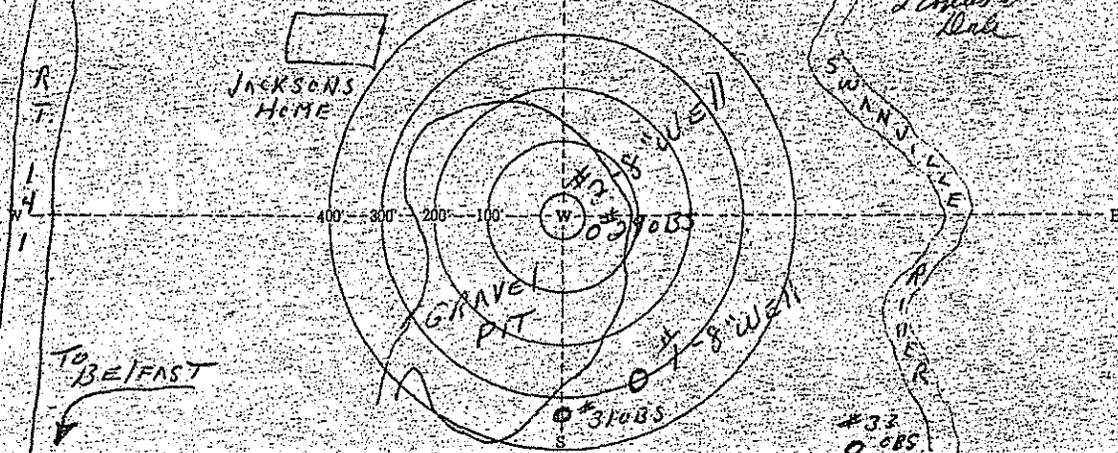
Capacity Evaluation for the Belfast Water District, Belfast, Maine

D2. Jackson Pit Well Pumping Test Data (R.E. Chapman, 1965)

CUSTOMER

TOWN BELFAST
 STREET RT 141 SWANVILLE STATE MAINE
 OWNER OF PROPERTY JACKSONS PIT
 OPERATORS F. G. SULLIVAN & B. WILSON
 SIZE & TYPE OF PUMP 6" SUCTION + 8" ADAPTOR
 DISCHARGE LINE Size 6" in. Length 200 feet
 ORIFICE PIPE 8" in. SIZE ORIFICE PLATE 6" in.
 DESCRIPTION OF WELL BEING PUMPED. 8" TEST WELL #2
 LENGTH OF DUNKER ON TAPE in. ADD TO READINGS (When you make read.)
 LENGTH OF ALTITUDE LINE FROM CENTER OF GAUGE ft. in.

PLAN OF WELL FIELD



ALL MEASUREMENTS TO BE MADE FROM TOP OF CASINGS

<p>Measurement Diagram</p>	Observation Wells Information					
	FINISHED WELL NO. <u>#2 TEST WELL</u>	No. <u>29</u>	No. <u>31</u>	No. <u>1-WELL</u>	No. <u>33</u>	No.
DEPTH OF WELL <u>46'</u>	Depth <u>45'</u>	Depth	Depth <u>80'</u>	Depth	Depth	Depth
TOP OF PIPE ABOVE GROUND <u>3'-5"</u>	Pipe AG <u>13"</u>	Pipe AG <u>1'</u>	Pipe AG <u>2'</u>	Pipe AG <u>3"</u>	Pipe AG	Pipe AG
STATIC READING <u>11'-8 1/2"</u>	Static <u>9'-6"</u>	Static <u>23'-8"</u>	Static <u>18'</u>	Static <u>22'-11 1/2"</u>	Static	Static

START TEST 8:00 AM

START PUMP TEST READINGS BELOW THIS LINE

AIR-LINE

Date, Weather and Sample Taken	Time	Water Temperature	All Gauge Reading	Tape Meas't in Well	Orifice Head in Inches	GPM	Water Level	Water Level	Water Level	Water Level	Water Level
<u>10 Nov-65</u>	<u>8:30 AM</u>			<u>14'-11 1/2"</u>	<u>35 1/4"</u>	<u>950</u>	<u>9'-10 3/4"</u>	<u>23'-0"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>9:00</u>			<u>15'-2 1/2"</u>	<u>35 1/4"</u>		<u>10'-4"</u>	<u>23'-8"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>10:00</u>			<u>15'-4 3/4"</u>	<u>35 1/4"</u>		<u>10'-8"</u>	<u>23'-7 3/4"</u>	<u>18'</u>	<u>22'-11 1/2"</u>	
	<u>11:00</u>			<u>15'-7 1/4"</u>	<u>35 1/4"</u>		<u>10'-9"</u>	<u>23'-7 1/4"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>12:00</u>			<u>15'-7"</u>	<u>35 1/4"</u>		<u>11'-"</u>	<u>23'-7 3/4"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>1:00 PM</u>			<u>15'-9"</u>	<u>35 1/4"</u>		<u>11'-2 1/4"</u>	<u>23'-7 3/4"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>2:00</u>			<u>16'-1 1/2"</u>	<u>35 1/4"</u>		<u>11'-4 1/2"</u>	<u>23'-8"</u>	<u>18'</u>	<u>22'-11"</u>	
	<u>3:00</u>			<u>16'-3"</u>	<u>35 1/4"</u>		<u>11'-6"</u>	<u>23'-8 1/2"</u>	<u>18'</u>	<u>22'-11 1/2"</u>	
	<u>4:00</u>			<u>16'-4"</u>	<u>35 1/4"</u>		<u>11'-8"</u>	<u>23'-8 1/2"</u>	<u>18'</u>	<u>22'-11 1/2"</u>	

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TEST

CUSTOMER

Turner ab Balliston, Mass

NO. *2*

TEL WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	All Gauge Reading	Tape Meas't in Well	Office Head in Inches	GPM	#29 Water Level	#31 Water Level	#1 Water Level	#33 Water Level	Water Level	Water Level
	5:00 PM			16'-5"	35 1/4	950	11'-9"	23'-8 3/4"	18'	22'-11 5/8"		
	6:00 PM			16'-6 1/2"	"	"	11'-10 1/2"	23'-8 1/2"	18'	22'-11 1/2"		
	7:00 PM			16'-7 1/2"	"	"	12'-11 1/2"	23'-8 3/4"	18'	22'-11 1/2"		
	8:00 PM			16'-8 3/4"	"	"	12'-11"	23'-8 3/4"	18'	22'-11 1/2"		
	9:00 PM			16'-10"	"	"	12'-12"	23'-9"	18'	22'-11 3/4"		
	10:00 PM			16'-11"	"	"	12'-12 1/2"	23'-9 1/4"	18'	22'-11 3/4"		
	11:00 PM			16'-11 1/2"	"	"	12'-12 3/4"	23'-9 1/4"	18'	22'-11 3/4"		
	12:00 PM			17'-1"	"	"	12'-12 1/2"	23'-9 1/2"	18'	23'-1"		
<i>Nov 12 65</i>	1:00 AM			17'-3"	"	"	12'-12 5/8"	23'-9 1/2"	18'	23'-1/4"		
	2:00 AM			17'-5"	"	"	12'-12 7/8"	23'-9 1/2"	18'	23'-1/2"		
	3:00 AM			17'-7"	"	"	12'-12 8 1/2"	23'-9 1/2"	18'	23'-3/4"		
	4:00 AM			17'-7"	"	"	12'-12 9"	23'-10"	18'	23'-3/4"		
	5:00 AM			17'-7"	"	"	12'-12 9 1/4"	23'-10 1/2"	18'	23'-3/4"		
	6:00 AM			17'-7"	"	"	12'-12 9 1/2"	23'-11"	18'	23'-11"		
	7:00 AM			17'-7"	"	"	12'-12 9 1/2"	23'-11 1/4"	18'	23'-1 1/4"		
	8:00 AM			17'-7"	"	"	12'-12 9 1/2"	23'-11 1/2"	18'	23'-1 1/2"		
	9:00 AM			17'-7"	"	"	12'-12 10"	23'-11 1/2"	18'	23'-1 1/2"		
	10:00 AM			17'-7"	"	"	12'-12 11"	23'-11 1/2"	18'	23'-1 3/4"		
	11:00 AM			17'-7"	"	"	12'-12 11"	23'-11 1/2"	18'	23'-2"		
	12:00 Noon			17'-7"	"	"	12'-12 11"	23'-11 1/2"	18'	23'-2"		
	1:00 PM			17'-7 1/2"	35 1/4	950	12'-11 1/2"	23'-11 1/2"	18'	23'-2"		
<i>12 Nov 65</i>	2:00 PM			17'-8"	35 1/4	950	12'-11 1/4"	23'-11 1/4"	18'	23'-2"		
	3:00 PM			17'-8 1/2"	35 1/4	950	12'-11 1/2"	23'-11 1/2"	18'	23'-2"		
	4:00 PM			17'-9"	35 1/4	950	12'-11 3/4"	23'-11 1/2"	18'	23'-2 1/4"		
<i>cloudy</i>	5:00 PM			17'-10"	35 1/4	950	13'-1"	23'-11 1/2"	18'	23'-2 1/4"		
	6:00 PM			17'-10 1/2"	35 1/4	950	13'-1 1/4"	23'-11 1/2"	18'	23'-2 1/4"		
	7:00 PM			17'-11"	35 1/4	950	13'-1 1/2"	23'-11 1/2"	18'	23'-2 1/4"		
	8:00 PM			17'-11 1/2"	35 1/4	950	13'-1"	23'-11 1/2"	18'	23'-2 1/4"		
	9:00 PM			17'-11 3/4"	35 1/4	950	13'-1 1/2"	24'-0"	18'	23'-2 1/4"		
	10:00 PM			18'-3/4"	35 1/4	950	13'-2"	24'-3/4"	18'-3"	23'-2 1/2"		
	11:00 PM			18'-1 1/4"	35 1/4	950	13'-2 1/2"	24'-1 1/2"	18'-3"	23'-2 3/4"		

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TESTS 1965

CUSTOMER TOWN OF BELFAST, ME

NO. 3

TEL. WEST BOYLSTON Temple 5-3727

#2 WELL START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	Air Gauge Reading	Tape Meas't in Well	Orifice Head in Inches	GPM	#29 Water Level	#31 Water Level	#1 WELL Water Level	#33 Water Level	Water Level	Water Level
		STATIC		11-8 1/2"		STATIC	9'-6"	23'-8"	18'-2"	22'-11 1/2"		
13 Nov 65	12 PM			18'-1 1/2"	35 1/4"	950	13'-3"	24'-2"	18'-3"	23'-2 1/4"		
	1 AM			18'-1 1/2"	35 1/4"	950	13'-3 1/2"	24'-2 1/4"	18'-3"	23'-3"		
	2 AM			18'-1 3/4"	35 1/4"	950	13'-4"	24'-2 1/2"	18'-3"	23'-3"		
	3 AM			18'-2"	35 1/4"	950	13'-5"	24'-2 3/4"	18'-3"	23'-3 1/4"		
	4 AM			18'-2 1/2"	35 1/4"	950	13'-6"	24'-3"	18'-3"	23'-3 1/4"		
	5 AM			18'-2 1/2"	35 1/4"	950	13'-6 1/2"	24'-3 1/4"	18'-3"	23'-3 1/2"		
(LIGHT RAIN)	6 AM			18'-2 3/4"	35 1/4"	950	13'-7"	24'-3 1/2"	18'-3"	23'-3 1/2"		
	7 AM			18'-2 3/4"	35 1/4"	950	13'-8"	24'-3 3/4"	18'-3"	23'-3 3/4"		
	8 AM			18'-3"	35 1/4"	950	13'-9"	24'-4"	18'-3"	23'-4"		
	9 AM			18'-3 1/4"	35 1/4"	950	13'-10"	24'-4 1/2"	18'-6"	23'-4 1/4"		
	10 AM			18'-3 1/2"	35 1/4"	950	13'-11"	24'-5"	18'-6"	23'-4 1/2"		
	11 AM			18'-4"	35 1/4"	950	14'-1"	24'-5 1/2"	18'-6"	23'-5"		
	12 Noon			18'-4 1/2"	35 1/4"	950	14'-1 1/2"	24'-6"	18'-6"	23'-5 1/2"		
	1 PM			18'-5"	35 1/4"	950	14'-1 1/2"	24'-6 1/2"	18'-6"	23'-6"		
	2:			18'-5 1/2"	35 1/4"	950	14'-2"	24'-7"	18'-6"	23'-6 1/2"		
	3:			18'-6"	35 1/4"	950	14'-2 1/2"	24'-7 1/2"	18'-6"	23'-6 3/4"		
	4:			18'-7"	35 1/4"	950	14'-4"	24'-8"	18'-6"	23'-7 1/4"		
	5:			18'-8"	35 1/4"	950	14'-4 1/4"	24'-8 1/2"	18'-6"	23'-7 1/4"		
- Rain -	6:			18'-9"	35 1/4"	950	14'-4 1/2"	24'-9"	18'-6"	23'-8 1/4"		
	7:			18'-10"	35 1/4"	950	14'-4 3/4"	24'-9 1/2"	18'-6"	23'-8 3/4"		
	8:			18'-11"	35 1/4"	950	14'-5"	24'-10"	18'-6"	23'-9 1/4"		
	9:			19'-1"	35 1/4"	950	14'-5 1/2"	24'-9 3/4"	18'-9"	23'-9 1/4"		
	10:			19'-1 1/4"	35 1/4"	950	14'-6"	24'-9 1/2"	18'-9"	23'-9 1/4"		
	11:			19'-1 1/4"	35 1/4"	950	14'-6 1/2"	24'-9 1/4"	18'-7"	23'-9 1/4"		
	12: Mid			19'-1 1/2"	35 1/4"	950	14'-7"	24'-9"	19'	23'-9 1/2"		
Nov. 14-65	1 AM			19'-1 1/2"	35 1/4"	950	14'-7 1/2"	24'-8 3/4"	19'	23'-9 1/2"		
	2 AM			19'-3/4"	35 1/4"	950	14'-8"	24'-8 1/2"	19'	23'-9 1/2"		
Hard Rain	3 AM			19'-3/4"	35 1/4"	950	14'-8 1/4"	24'-8 1/4"	19'	23'-9 3/4"		
	4 AM			19'-1 1/4"	35 1/4"	950	14'-8 1/2"	24'-8 1/4"	19'	23'-9 3/4"		
	5 AM			19'-1 1/4"	35 1/4"	950	14'-9"	24'-8"	19'	23'-9 3/4"		

CUSTOMER

Town of Belfast Me

R. E. CHAPMAN CO., OAKDALE, MASS.

NO # 4

LOG OF PUMP TEST

TEL WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	All Gauge Reading	Tape Measure in Well	Orifice Head in Inches	GPM	#29 Water Level	#31 Water Level	#1 Water Level	#33 Water Level	Water Level	Water Level	
		Static		11' 8 1/2"		Static	9' 6"	23' 8"	18'	22' 11 1/2"			
FAIR	6: Am			19' 2"	35 1/4	950	14' 9"	24' 8"	19'	23' 9 1/2"			
	7: Am			19' 3"	35 1/4	950	14' 9 1/4"	24' 8 1/4"	19'	23' 9 3/4"			
	8: Am			19' 4"	35 1/4	950	14' 9 3/4"	24' 9"	19'	23' 10 1/2"			
	9: Am			19' 5"	35 1/4	950	14' 10"	24' 9 1/2"	19'	23' 11"			
	10: Am			19' 6"	35 1/4	950	14' 10 1/4"	24' 9 1/2"	19'	23' 11 1/4"			
	11: Am			19' 7"	35 1/4	950	14' 10 1/2"	24' 9 3/4"	19'	23' 11 1/2"			
	- COLD -	12: Noon			19' 8"	35 1/4	950	14' 11"	24' 10"	19'	23' 11 3/4"		
		1: Pm			19' 9"	35 1/4	950	14' 11 1/4"	24' 10 1/4"	19'	24'		
		2: Pm			19' 10"	35 1/4	950	14' 11 1/2"	24' 10 1/2"	19'	24' 1/4"		
		3: Pm			19' 11"	35 1/4	950	15'	24' 11 1/2"	19'	24' 1/2"		
		4: Pm			20'	35 1/4	950	15' 2"	24' 11 3/4"	19'	24' 3/4"		
	5: Pm			20' 1"	35 1/4	950	15' 2 1/2"	25'	19'	24' 1"			
	6: Pm			20' 1 1/4"	35 1/4	950	15' 3 3/4"	24' 11 3/4"	19'	24' 1 1/4"			
	7: Pm			20' 1 1/2"	35 1/4	950	15' 3 1/2"	24' 11 1/2"	19'	24' 1 1/2"			
	8: Pm			20' 2"	35 1/4	950	15' 3 1/2"	24' 11 3/4"	19'	24' 1 1/2"			
	9: Pm			20' 2 1/2"	35 1/4	950	15' 3 1/2"	24' 11 1/2"	19'	24' 1 1/2"			
	10: Pm			20' 2 3/4"	35 1/4	950	15' 3 1/2"	24' 11 3/4"	19'	24' 1 1/4"			
	11: Pm			20' 3"	35 1/4	950	15' 3 1/2"	25'	19'	24' 1 1/2"			
	12: Pm			20' 3"	35 1/4	950	15' 4"	25' 1/4"	19'	24' 1 3/4"			
Nov 15 1965	1: Am			20' 3"	35 1/4	950	15' 4 1/2"	25' 1/2"	19'	24' 2"			
	2: Am			20' 3"	35 1/4	950	15' 5"	25' 3/4"	19'	24' 2 1/4"			
	3: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1"	19'	24' 2 1/2"			
	4: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1 1/4"	19'	24' 2 3/4"			
	5: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1 1/2"	19'	24' 2 3/4"			
	6: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1 1/2"	19'	24' 2 3/4"			
	7: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1 1/2"	19'	24' 3"			
	8: Am			20' 3"	36 1/4	950	15' 5 1/2"	25' 1 1/2"	19'	24' 3 1/4"			
Cloudy & Cold	9: Am			20' 3"	35 1/4	950	15' 5 1/2"	25' 1 3/4"	19'	24' 3 1/2"			
	10: AM			20' 3"	35 1/4	950	15' 5 1/2"	25' 2"	19'	24' 3 3/4"			
	11: AM			20' 3"	35 1/4	950	15' 6"	25' 2 1/4"	19'	24' 3 3/4"			

DEC 31 1955

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TEST

CUSTOMER TOWN OF BELFAST, ME.

NO. 5

TEL. WEST BOYLSTON TEmple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather, and Sample Taken	Time	Water Temperature	Air Gauge Reading	Tape Meas't in Well	Orifice Head in Inches	GPM	#27 Water Level	#31 Water Level	#1 WELL Water Level	#33 Water Level	#10 WELL Water Level	Water Level
			STATIC	11' 8 1/2"								#1 Well
15 Nov 65	12 Noon	46°		20' 3 1/2"	35 1/4"	950	15' 6 1/4"	25' 2 1/4"	19'	24' 4"		GPM
	1: PM			20' 4"	35 1/4"	950	15' 7"	25' 3"	19'	24' 4 1/4"		
	2: PM			20' 4"	35 1/4"	950	15' 7 1/4"	25' 3 1/4"	19'	24' 4 1/4"		
CLEAR + COLD	2: PM		START PUMPING	#1 8" WELL INTO TOWN SYSTEM AT APPROX 400 GPM								
	3: PM	46°		20' 5"	35 1/4"	950	15' 7 1/2"	25' 9"	50'	24' 5"	1700	
	4: PM			20' 5"	35 1/4"	950	15' 8"	25' 10"	50'	24' 5 1/2"	1700	
	5: PM			20' 5 1/4"	35 1/4"	950	15' 8 1/2"	25' 11"	50' 6"	24' 8"		
	6: PM			20' 5 1/4"	35 1/4"	950	15' 9"	26' 1 1/4"	50' 6"	24' 9 1/4"		
	7: PM			20' 5 1/2"	35 1/4"	950	15' 9 1/4"	26' 1 1/2"	50' 6"	24' 9 3/4"		
	8: PM	46°		20' 5 1/2"	35 1/4"	950	15' 9 1/2"	26' 2 1/2"	50' 6"	24' 10"		
	9: PM			20' 5 3/4"	35 1/4"	950	15' 10"	26' 3"	51'	24' 10 1/2"	1700	425 GPM
	10: PM			20' 5 3/4"	35 1/4"	950	15' 10 1/2"	26' 3 1/2"	51' 6"	24' 11 1/2"		
	11: PM			20' 6"	35 1/4"	950	15' 11"	26' 4"	46'	25'	1500	350 GPM
	12: PM			20' 6"	35 1/4"	950	15' 11 1/2"	26' 4 1/2"	46'	25' 7 1/4"	1500 RPM	
16 Nov 65	1: AM			20' 7"	35 1/4"	950	16'	26' 5"	46'	25' 7 1/2"		
	2: AM			20' 8"	35 1/4"	950	16' 1/2"	26' 5 1/2"	46'	25' 8 1/2"		
	3: AM			20' 9"	35 1/4"	950	16' 1"	26' 6"	46'	25' 9 1/2"		
	4: AM			20' 10"	35 1/4"	950	16' 1 1/2"	26' 6 1/2"	46'	25' 9 1/4"		
Rain and	5: AM			20' 11"	35 1/4"	950	16' 2"	26' 7"	46'	25' 9 1/2"		
Snow 5:30 AM	6: AM			21'	35 1/4"	950	16' 2 1/2"	26' 7 1/2"	46'	25' 9 1/2"	1500	350 GPM
ALL SNOW AT 6:00	7: AM			21' 1/2"	35 1/4"	950	16' 3"	26' 8"	46'	25' 9 3/4"		
SNOW MELTING TO	8: AM			21' 1"	35 1/4"	950	16' 3 1/2"	26' 8 1/2"	46'	25' 9"		
RAIN AT 8:30 AM	9: AM			21' 1 1/2"	35 1/4"	950	16' 3 3/4"	26' 9"	46'	25' 9 1/2"		
	10: AM			21' 2"	35 1/4"	950	16' 4"	26' 9 1/2"	46'	25' 9 1/2"		
CUT BACK TO	11: AM			19' 5 1/2"	35 1/4"	950	16' 4 1/2"	26' 10"	46'	25' 9 1/2"		
LOCAL PER MIN.	12: AM			19' 5 1/2"	14 1/4"	600	16' 1 1/4"	26' 10 1/2"	46'	25' 7 1/4"	1500	350 GPM
	1: PM			19' 3"	14 1/4"	600	16'	26' 10 3/4"	46'	25' 8 1/4"		
RAIN	2: PM	46°		19' 1/2"	14 1/4"	600	15' 10"	26' 11"	46'	25' 8 1/4"		
MODERATE RAIN	3: PM			18' 11 3/4"	14 1/4"	600	15' 9"	26' 11 1/2"	46'	25' 9 1/4"		
"	4: PM			18' 11 1/2"	14 1/4"	600	15' 8"	27'	47'	25' 10"	1500	350 GPM

R. E. CHAPMAN CO., OAKDALE, MASS.

DEC 31 1965
LOG OF PUMP TEST

CUSTOMER TOWN OF BELFAST, ME.

NO. 6

TEL WEST BOYLSTON Temple 5-3727

# 2 Well START PUMP TEST READINGS BELOW THIS LINE												# 1 Well GPM	
Date, Weather and Sample Taken	Time	Water Temperature	Alt. Gauge Reading	Type Meas't in Well	Orifice Head in. Inches	GPM	# 29 Water Level	# 31 Water Level	# 1 Well Water Level	# 53 Water Level	R.P.M. Water Level	Water Level	
			STATIC	11'-8 1/2"		STATICS	9'-6"	23'-8"	18'	22'-11 1/2"		APPROX	
16 Nov 65	5 PM			18'-11 3/4"	14 1/4"	600	15'-7 3/4"	27'-1/2"	47'-	25'-10 1/4"	1500	350 GPM	
RAIN	6 PM	46°		18'-11 1/2"	14 1/4"	600	15'-7 1/2"	27'-1"	47'-	25'-10 1/2"	1500	350	
	7 PM			18'-11 1/4"	14 1/4"	600	15'-7 1/4"	27'-1 1/2"	47'-6"	25'-10 3/4"	"	"	
	8 PM			18'-11"	14 1/4"	600	15'-7 1/4"	27'-2"	47'-6"	25'-11"	"	"	
	9 PM			18'-10 1/2"	14 1/4"	600	15'-7"	27'-2 1/4"	47'-6"	25'-11 1/4"	"	"	
	10 PM	46°		18'-10"	14 1/4"	600	15'-7"	27'-2 1/2"	47'-6"	25'-11 3/4"	"	"	
Cloudy - Misty	11 PM			18'-9 3/4"	14 1/4"	600	15'-7"	27'-2 3/4"	47'-6"	26'-	"	"	
	12 PM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-3"	47'-6"	26'-1/2"	1500 RPM	350 GPM	
17 Nov 65	1 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-3 1/4"	47'-6"	26'-3/4"	"	"	
	2 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-3 1/2"	47'-6"	26'-1"	"	"	
Fog - WARM	3 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-3 3/4"	47'-6"	26'-1 1/4"	"	"	
	4 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-4"	47'-6"	26'-1 1/2"	"	"	
	5 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-4 1/4"	47'-6"	26'-1 3/4"	"	"	
	6 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-4 1/2"	47'-6"	26'-2"	1500 RPM	350 GPM	
	7 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-4 3/4"	47'-6"	26'-2 1/4"	"	"	
	8 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-5"	47'-6"	26'-2 1/2"	"	"	
MODERATE TO HEAVY RAIN	9 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-5 1/4"	48'	26'-2 3/4"	"	"	
	10 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-5 3/4"	48'	26'-3 1/4"	"	"	
	11 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-6 1/4"	48'	26'-3 3/4"	"	"	
	12 AM			18'-8 1/2"	14 1/4"	600	15'-7"	27'-6 3/4"	48'-0"	26'-4"	1500 RPM	350 GPM	
17 Nov 65	1 PM			18'-8 1/2"	14 1/4"	600	15'-7 1/4"	27'-7"	48'	26'-4 1/4"	"	"	
	2 PM	46°		18'-8 1/2"	14 1/4"	600	15'-7 1/4"	27'-7 1/4"	48'	26'-4 1/2"	"	"	
	3 PM			18'-8 3/4"	14 1/4"	600	15'-7 1/4"	27'-7 1/2"	48'	26'-4 3/4"	"	"	
RAIN MODERATE	4 PM			18'-8 3/4"	14 1/4"	600	15'-7 1/4"	27'-7 3/4"	48'	26'-5"	"	"	
	5 PM			18'-8 3/4"	14 1/4"	600	15'-7 1/4"	27'-8"	48'	26'-5 1/4"	"	"	
	6 PM			18'-9"	14 1/4"	600	15'-7 1/4"	27'-8 1/4"	48'	26'-5 1/2"	1500	350 GPM	
Cloudy - Cold	7 PM			18'-9"	14 1/4"	600	15'-7 1/2"	27'-8 1/2"	48'	26'-5 3/4"	"	"	
	8 PM	46°		18'-9 1/4"	14 1/4"	600	15'-7 3/4"	27'-8 1/2"	48'	26'-6"	"	"	
	9 PM			18'-9 1/4"	14 1/4"	600	15'-7 3/4"	27'-8 1/2"	48'	26'-6 1/4"	"	"	
	10 PM			18'-9 1/4"	14 1/4"	600	15'-8"	27'-8 3/4"	48'	26'-6 1/4"	"	"	

DEC 31 1965

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TEST

CUSTOMER TOWN OF BEFAST, ME.

NO. 7

TEL WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE												
Date, Weather and Sample Taken	Time	Water Temperature	Alt. Gauge Reading	#29 Well in Well	Orifice Head in Inches	GPM	#29 Water Level	#31 Water Level	#16 Well Water Level	#33 Water Level	#1 Well GPM	Water Level
			STATIC	11'-8 1/2"		STATIC	9'-6"	23'-8"	18'	22'-11 1/2"	00	
17 Nov 65	11:PM			18'-9 1/2"	14 1/4"	600	15'-8"	27'-8 3/4"	48'	26'-6 1/2"	350 GPM	
	12:PM	46°		18'-9 1/2"	14 1/4"	600	15'-8"	27'-9"	48'	26'-7"		
18 Nov 65	1:AM			18'-9 1/2"	14 1/4"	600	15'-8"	27'-9"	48'	26'-7"		
	2:AM			18'-9 1/2"	14 1/4"	600	15'-8"	27'-9"	48'	26'-7"		
CLOUD + COLD	3:AM			18'-9 1/2"	14 1/4"	600	15'-8"	27'-9 3/4"	48'	26'-7"		
	4:AM			18'-9 1/2"	14 1/4"	600	15'-8"	27'-9 1/2"	48'	26'-7"		
	5:AM			18'-9 1/2"	14 1/4"	600	15'-8 1/4"	27'-9 3/4"	48'	26'-7 1/4"		
CLOUD + COLD	6:AM			18'-9 1/2"	14 1/4"	600	15'-8 1/2"	27'-10"	48'	26'-7 1/2"		
	7:AM			18'-9 3/4"	14 1/4"	600	15'-8 3/4"	27'-10 1/4"	48'	26'-7 3/4"		
	8:AM			18'-10"	14 1/4"	600	15'-9 1/4"	27'-10 1/2"	48'	26'-8"	350 GPM	
SNOW, LIGHT	9:AM			18'-10 1/2"	14 1/4"	600	15'-9 1/2"	27'-10 3/4"	48'	26'-8 1/2"		
	10:AM			18'-10 3/4"	14 1/4"	600	15'-9 3/4"	27'-11"	48'	26'-8 3/4"		
	11:AM			18'-11"	14 1/2"	600	15'-9 3/4"	27'-11 1/4"	48'	26'-9"		
	12:NOON	46°		18'-11 1/4"	14 1/2"	600	15'-9 3/4"	27'-11 1/4"	48'	26'-9 1/4"		
CLEAR + COLD	1:PM			18'-11 1/2"	14 1/2"	600	15'-10"	27'-11 3/4"	48'	26'-9 1/2"		
	2:PM			18'-11 3/4"	14 1/2"	600	15'-10"	27'-11 3/4"	48'	26'-9 3/4"		
	3:PM			18'-11 3/4"	14 1/2"	600	15'-10"	27'-11 3/4"	48'	26'-9 3/4"		
	4:PM			18'-11 3/4"	14 1/2"	600	15'-10"	27'-11 3/4"	48'	26'-9 3/4"	350 GPM	
	5:PM			18'-11 3/4"	14 1/2"	600	15'-10"	27'-11 3/4"	48'	26'-9 3/4"		
18 Nov 65	6:PM	46°		18'-11 3/4"	14 1/2"	600	15'-10"	28'	48'	26'-9 3/4"		
	7:PM			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-9 3/4"		
	8:PM			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-10"		
	9:PM			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-10"		
	10:PM			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-10 1/4"	350 GPM	
SNOW + COLD	11:PM			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-10 1/4"		
	12:NIGHT			19'	14 1/2"	600	15'-10 1/4"	28'	48'	26'-10 1/4"		
19 Nov 65	1:AM			19'	14 1/2"	600	15'-10 1/2"	28'-1/4"	48'	26'-10 1/2"		
	2:AM			19'	14 1/2"	600	15'-10 1/2"	28'-1/4"	48'	26'-10 1/2"		
CLEAR + COLD	3:AM			19'	14 1/2"	600	15'-10 1/2"	28'-1/4"	48'	26'-10 1/2"		
	4:AM			19'	14 1/2"	600	15'-10 1/2"	28'-1/4"	48'	26'-10 1/2"		

DEC 31 1965

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TEST

CUSTOMER TOWN OF BELFAST, ME.

NO. 8

TEL. WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	All. Gauge Reading	#29 Water Level	Orifice Head in Inches	GPM	#29 Water Level	#31 Water Level	#1 WELL Water Level	#33 Water Level	#1 WELL GPM	Water Level
			STATIC	11'-8 1/2"		STATICS	9'-6"	23'-8"	18'	22'-11 1/2"	00	
19 Nov. 65	5 AM			19'-1/4"	14 1/4"	600	15'-10 1/4"	28'-1/2"	48'	26'-10 1/4"	350 GPM	
	6 AM			19'-1/4"	14 1/4"	600	15'-10 1/4"	28'-1/2"	48'	26'-10 1/4"		
	7 AM			19'-1/4"	14 1/4"	600	15'-10 1/4"	28'-1/2"	48'	26'-10 1/4"		
	8 AM	46°		19'-1/4"	14 1/4"	600	15'-10 1/4"	28'-1/2"	48'	26'-11"		
	9 AM			19'-1/4"	14 1/4"	600	15'-11"	28'-3/4"	48'	26'-11"		
CLEAR + COLD	10 AM			19'-1/4"	14 1/4"	600	15'-11"	28'-1"	48'	26'-11 1/4"		
	11 AM			19'-1/4"	14 1/4"	600	15'-11"	28'-1"	48'	26'-11 1/4"		
	12 Noon			19'-1/4"	14 1/4"	600	15'-11 1/4"	28'-1"	47'-6"	26'-11 1/2"		
19 Nov 65	1 PM			19'-1/4"	14 1/4"	600	15'-11 1/4"	28'-1"	47'-6"	26'-11 1/2"		
	2 PM	46°		19'-1/4"	14 1/4"	600	15'-11 1/4"	28'-1 1/4"	47'-6"	26'-11 1/4"		
	3 PM		STOP PUMP CHECK OIL + SERVICE						47'-6"	27'		
	4 PM			19'-2"	14 1/4"	600	16'-"	28'-2 3/4"	47'-6"	27'		
	5 PM			19'-2"	14 1/4"	600	16'-1/4"	28'-2 1/4"	47'-6"	27'-1/4"		
	6 PM			19'-2 1/4"	14 1/4"	600	16'-1/2"	28'-2 1/4"	47'	27'-1/2"		
	7 PM			19'-2 1/4"	14 1/4"	600	16'-1/2"	28'-2 3/4"	47'	27'-3/4"	350 GPM	
	8 PM			19'-2 1/4"	14 1/4"	600	16'-1/2"	28'-3"	47'	27'-1"		
	9 PM			19'-2 1/4"	14 1/4"	600	16'-1/2"	28'-3"	47'	27'-1 1/4"		
CLEAR + COLD	10 PM	46°		19'-2 1/4"	14 1/4"	600	16'-3/4"	28'-3"	47'	27'-1 1/2"		
	11 PM			19'-2 1/4"	14 1/4"	600	16'-3/4"	28'-3 1/4"	47'	27'-1 3/4"		
	12 PM			19'-2 1/4"	14 1/4"	600	16'-1"	28'-3 1/4"	47'	27'-2"		
20 Nov 65	1 AM			19'-2 1/4"	14 1/4"	600	16'-1"	28'-3 1/4"	47'	27'-2 1/4"	350 GPM	
	2 AM			19'-2 1/2"	14 1/4"	600	16'-1"	28'-3 3/4"	47'	27'-2 1/2"		
	3 AM			19'-2 1/4"	14 1/4"	600	16'-1"	28'-4"	47'	27'-2 3/4"		
	4 AM			19'-2 1/4"	14 1/4"	600	16'-1"	28'-4 1/4"	47'	27'-2 3/4"		
	5 AM			19'-2 1/4"	14 1/4"	600	16'-1 1/4"	28'-4 3/4"	47'	27'-2 3/4"		
CLEAR + COLD	6 AM			19'-2 1/4"	14 1/4"	600	16'-1 1/2"	28'-5 1/4"	47'	27'-3"		
	7 AM			19'-2 1/4"	14 1/4"	600	16'-1 3/4"	28'-5"	47'	27'-3 1/4"	350 GPM	
	8 AM			19'-2 1/4"	14 1/4"	600	16'-2"	28'-5 1/4"	47'	27'-3 1/2"		
	9 AM			19'-2 1/4"	14 1/4"	600	16'-2 1/4"	28'-5 1/2"	47'	27'-3 3/4"		
	10 AM			19'-2 1/4"	14 1/4"	600	16'-2 1/2"	28'-5 1/2"	47'	27'-3 3/4"		

R. E. CHAPMAN CO., OAKDALE, MASS.

LOG OF PUMP TEST

DEC 31

CUSTOMER *Town of Balford, Mass.*

NO. 9

TEL. WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	Alt. Gauge Reading	Tap Measure 2 Hr. Vols	Orifice Head in Inches	GPM	# 29 Water Level	# 31 Water Level	# 1 WELL Water Level	# 29 Water Level	# 1 WELL 6 PM Water Level	Water Level	
			STATIC	11'-8 1/2"	STATIC		9'-6"	23'-8"	18'-1"	22'-11 1/2"	00		
20 Nov. 65	11 AM	46°		19'-2 1/4"	14 1/4"	600	16'-2 1/2"	28'-5 3/4"	47'	27'-3 1/2"	350	11 AM	
CLEAR - COLD	12 Noon			19'-2 1/4"	14 1/4"	600	16'-2 1/2"	28'-5 3/4"	47'	27'-3 3/4"	"		
	1 PM			19'-2 1/4"	14 1/4"	600	16'-2 3/4"	28'-5 3/4"	47'	27'-4"	"		
	2 PM			19'-2 1/4"	14 1/4"	600	16'-3"	28'-6"	47'	27'-4 1/4"	"		
	3 PM	46°		19'-2 1/4"	14 1/4"	600	16'-3"	28'-6 1/4"	47'	27'-4 1/4"	"		
	3 PM			STOPPED PUMP & CHECKED ON WATER							27'-4 1/4"	"	
	4 PM			19'-2 1/4"	14 1/4"	600	16'-3 1/4"	28'-6 1/2"	47'	27'-4 1/2"	350	4 PM	
	5 PM			19'-2 1/2"	14-1/4"	600	16'-3 1/2"	28'-6 1/2"	47'	27'-4 3/4"			
	6 PM			19'-2 1/2"	14-1/4"	600	16'-3 3/4"	28'-6 1/2"	47'	27'-5 1/4"			
	7 PM			19'-2 1/2"	14-1/4"	600	16'-3 3/4"	28'-6 1/2"	47'	27'-5 1/4"			
	8 PM			19'-2 1/2"	14-1/4"	600	16'-4"	28'-6 1/2"	47'	27'-5 1/2"			
	9 PM			19'-2 3/4"	14-1/4"	600	16'-4 1/4"	28'-6 3/4"	47'	27'-5 3/4"			
	10 PM			19'-2 3/4"	14-1/4"	600	16'-4 1/4"	28'-6 3/4"	47'	27'-5 3/4"			
	11 PM			19'-2 3/4"	14-1/4"	600	16'-4 1/2"	28'-6 3/4"	47'	27'-6"			
	12 PM			19'-2 3/4"	14-1/4"	600	16'-4 1/2"	28'-6 3/4"	47'	27'-6"			
31 Nov 65	1 AM			19'-2 3/4"	14-1/4"	600	16'-4 1/2"	28'-6 3/4"	47'	27'-6"			
	2 AM			19'-3"	14-1/4"	600	16'-4 1/4"	28'-6 3/4"	47'	27'-6 1/4"			
	3 AM			19'-3 1/4"	14 1/4"	600	16'-4 3/4"	28'-7"	47'	27'-6 1/4"			
	4 AM			19'-3 1/4"	14 1/4"	600	16'-4 3/4"	28'-7"	47'	27'-6 1/4"			
Rain with snow	5 AM			19'-3 1/4"	14 1/4"	600	16'-5"	28'-7"	47'	27'-6 1/4"			
	6 AM			19'-3 1/4"	14 1/4"	600	16'-5"	28'-7 1/4"	47'	27'-6 1/2"			
	7 AM			19'-3 1/4"	14 1/4"	600	16'-5"	28'-7 1/4"	47'	27'-6 1/2"			
	8 AM			19'-3 1/4"	14 1/4"	600	16'-5 1/4"	28'-7 1/4"	47'	27'-6 3/4"			
	9 AM			19'-3 1/4"	14 1/4"	600	16'-5 1/4"	28'-7 1/4"	47'	27'-6 3/4"			
	10 AM			19'-3 1/2"	14 1/4"	600	16'-5 1/4"	28'-7 1/2"	47'	27'-6 3/4"			
	11 AM			19'-3 1/2"	14 1/4"	600	16'-5 1/4"	28'-7 1/2"	47'	27'-6 3/4"			
	12 PM			19'-3 3/4"	14 1/4"	600	16'-5 3/4"	28'-7 1/2"	47'	27'-6 3/4"			
	1 PM			19'-3 3/4"	14 1/4"	600	16'-5 3/4"	28'-7 1/2"	47'	27'-6 3/4"			
	2 PM			19'-3 3/4"	14 1/4"	600	16'-6"	28'-8"	47'	27'-7"			

CUSTOMER

R. E. CHAPMAN CO., OAKDALE, MASS.

NO. 10

LOG OF PUMP TEST
DEC 21 1965
TEL WEST BOYLSTON Temple 5-3727

START PUMP TEST READINGS BELOW THIS LINE.

Date, Weather and Sample Taken	Time	Water Temperature	Alt. Gauge Reading	Tape Meas't. in Well	Orifice Head in. Inches	GPM	29 Water Level	31 Water Level	Water Level	33 Water Level	Water Level	Water Level
			Static	11-5 1/2"			9'-1 1/2"	23'-8"	14" well	22'-11 1/2"	350 GPM	
	3 PM			19'-4 1/2"	14-1/4"	600	16'-6"	28'-8"	47'	27'-9 1/2"		
	4 PM			19'-4"	14 1/4"	600	16'-6"	28'-8"	47'	27'-9 1/2"		
Nov 21-65	5 PM			19'-4 1/2"	14 1/4"	600	16'-6 1/2"	28'-8 1/4"	47'	27'-7 1/4"		
Adm. light	6 PM	46°		19'-4 1/2"	14 1/4"	600	16'-6 1/2"	28'-8 1/4"	47'	27'-7 1/4"		
	7 PM			19'-4 1/2"	14 1/4"	600	16'-6 1/2"	28'-8 1/4"	47'	27'-7 1/2"		
Cloudy	8 PM			19'-4 1/2"	14 1/4"	600	16'-6 1/2"	28'-8 1/4"	47'	27'-7 1/2"		
	9 PM			19'-4 3/4"	14 1/4"	600	16'-6 3/4"	28'-8 1/2"	47'	27'-7 1/2"		
	10 PM			19'-5"	14 1/4"	600	16'-6 3/4"	28'-8 1/2"	47'	27'-7 1/2"		
	11 PM			19'-5 1/4"	14 1/4"	600	16'-6 3/4"	28'-8 3/4"	47'	27'-7 3/4"		
	12 P.M.	46°		19'-5 1/2"	14 1/4"	600	16'-7"	28'-9"	47'	27'-7 3/4"	350 GPM	
CLOUDY &	1 AM			19'-5 3/4"	14 1/4"	600	16'-7"	28'-9 1/4"	47'	27'-8"		
MISTY	2 AM			19'-6"	14 1/4"	600	16'-7 1/4"	28'-9 1/2"	47'	27'-8"		
Nov. 22, 1965	3 AM			19'-6 1/4"	14 1/4"	600	16'-7 1/2"	28'-9 3/4"	47'	27'-8 1/2"		
	4 AM			19'-6 1/2"	14 1/4"	600	16'-7 3/4"	28'-10"	47'	27'-8 3/4"		
LIGHT RAIN	5 AM			19'-6 3/4"	14 1/4"	600	16'-7 3/4"	28'-10 1/4"	47'	27'-8 3/4"		
	6 AM	46°		19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-8 3/4"		
	7 AM			19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-8 3/4"		
LIGHT RAIN	8 AM			19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-8 3/4"		
	9 AM			19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-9"		
CLOUDY & COLD	10 AM			19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-9 1/4"		
	11 AM			19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-9 1/2"		
LIGHT NOON	12 AM	46°		19'-7"	14 1/4"	600	16'-8"	28'-11"	47'	27'-9 3/4"	350 GPM	
RAIN	1 PM			19'-7"	14 1/4"	600	16'-8 1/4"	28'-11 1/4"	47'	27'-9 3/4"		
	2 PM			19'-7"	14 1/4"	600	16'-8 1/2"	28'-11 1/2"	47'	27'-9 3/4"		
	3 PM			19'-7"	14 1/4"	600	16'-8 3/4"	28'-11 3/4"	47'	27'-9 3/4"		
	4 PM			19'-7"	14 1/4"	600	16'-8 3/4"	28'-11 3/4"	47'	27'-9 3/4"		
	5 PM			19'-7"	14 1/4"	600	16'-9"	28'-11 3/4"	47'	27'-10"		
	6 PM	46°		19'-7"	14 1/4"	600	16'-9"	28'-11 3/4"	47'	27'-10"		
MODERATE RAIN	7 PM			19'-7"	14 1/4"	600	16'-9"	28'-11 3/4"	47'	27'-10"		
	8 PM			19'-7"	14 1/4"	600	16'-9"	29'	47'	27'-10 1/4"		

R. E. CHAPMAN CO., OAKDALE, MASS.

DEC 31 1965
LOG OF PUMP TEST

CUSTOMER TOWN OF BELFAST, ME.

NO. 11

TEL. WEST BOYLSTON TEmple 5-3727

START PUMP TEST READINGS BELOW THIS LINE

Date, Weather and Sample Taken	Time	Water Temperature	Alt. Gauge Reading	Tabo Meas'nt in Well	Orifice Head in Inches	GPM	#29 Water Level	#31 Water Level	#1 WELL Water Level	#33 Water Level	#1 WELL GPM	Water Level
			STATIC	11' 8 1/2"		STATIC	9' 6"	23' 8"	18'	22' 1 1/2"		
22 Nov 65	9 PM	46°	19'	19' 7"	14 1/2"	600	16' 9"	29'	47'	27' 10 3/4"	350 GPM	
	10 PM			19' 7"	14 1/2"	600	16' 9"	29'	47'	27' 10 1/2"	"	
LIGHT RAIN	11 PM			19' 7"	14 1/2"	600	16' 9 1/4"	29'	47'	27' 10 3/8"	"	
	12 PM			19' 7"	14 1/2"	600	16' 9 1/4"	29' 1/4"	47'	27' 10 1/4"	"	
23 Nov 65	1 AM			19' 7"	14 1/2"	600	16' 9 1/4"	29' 1/4"	47'	27' 10 1/4"	"	
	2 AM			19' 7"	14 1/2"	600	16' 9 1/4"	29' 1/2"	47'	27' 10 1/4"	"	
Snow	3 AM	46°		19' 7"	14 1/2"	600	16' 9 1/2"	29' 1/2"	47'	27' 11"	350 GPM	
	4 AM			19' 7"	14 1/2"	600	16' 9 1/2"	29' 1/2"	47'	27' 11 1/4"	"	
	5 AM			19' 7"	14 1/2"	600	16' 9 1/2"	29' 3/4"	47'	27' 11 1/2"	"	
LIGHT	6 AM			19' 7"	14 1/2"	600	16' 9 1/2"	29' 3/4"	47'	27' 11 1/2"	"	
Snow	7 AM	46°		19' 7"	14 1/2"	600	16' 9 1/2"	29' 1"	47'	27' 11 3/4"	"	
			SPOP			PUMP TEST						START RECOVERY READINGS
	7:01 AM			18' 8 1/2"	00	000	16' 9 1/4"				350 GPM	
	7:03 AM			18' 7 1/2"			16' 8 1/4"	29' 1/2"	47'	27' 11"	"	
	7:05 AM			18' 5 1/2"			16' 7 1/4"	29' 1/4"	47'	27' 10 3/4"	"	
	7:15 AM			18' 4 1/2"			16' 5 3/4"	29' 1/4"	47'	27' 10 3/4"	"	
	7:30 AM			18' 2 1/2"			16' 3 1/2"	29' 1/4"	47'	27' 10 3/4"	"	
	8: AM			18' 2"			16' 2 3/4"	29' 1/4"	47'	27' 10 3/4"	"	
Snow → RAIN	8:30 AM			18' 1 1/4"			16' 2"	29' 1/4"	47'	27' 10 3/4"	350 GPM	
	9 AM			18' 1/2"			16' 1 1/4"	29' 1/4"	47'	27' 10 3/4"	"	
	10: AM		8" TEST				16'	29' 1/4"	47'	27' 10 3/8"	"	
	11:30 AM						15' 8"	29' 1/4"	47'	27' 10 1/4"	"	
	2: PM						15' 5"	29' 1/4"	47'	27' 10 1/4"	"	
24 Nov 65	7 AM						13' 1 1/4"	29'	47'	27' 10 3/4"	"	



Capacity Evaluation for the Belfast Water District, Belfast, Maine

D3. Talbot Well Pumping Test Data (Caswell, 2005)

TABLE 2: SUMMARY OF DRAWDOWN DATA FOR THE 18-INCH WELL						
BELFAST WATER DISTRICT						
BELFAST, MAINE						
Oct-05						
Date and Time	Elapsed Time	Feet to Water				
		18-inch	TW-18	TW-5	TW-7	TW-16
	minutes					
Oct 25, 2005: 8:00 AM						
8:30	0	0	0	0	0	0
8:30:30	0.5	0.18	0.04			
8:31	1	0.18	0.1			
8:32	2	0.22	0.17			
8:33	3	0.23	0.11			
8:34	4	0.24	0.12			
8:35	5	0.25	0.14			
8:36	6	0.28	0.14			
8:37	7	0.28	0.14			
8:38	8	0.3	0.15			
8:39	9	0.3	0.16			
8:40	10	0.33	0.18			
8:50	20	0.4	0.26			
9:00	30	0.47	0.32			
9:10	40	0.5	0.44			
9:20	50	0.57	0.39			
9:30	60	0.59	0.5			
9:40	70	0.63	0.5			
9:50	80	0.65	0.55			
10:00	90	0.69	0.53			
10:10	100	0.73	0.6			
10:20	110	0.75	0.6			
10:30	120	0.76	0.66	0.4	0	0
2:30	360	1.13	0.93	0.68	-0.07	0.04
6:30	600	1.79	1.12	0.87	-0.1	0.1
10:30	840	1.42	1.31	0.97	-0.14	0.31
Oct 26, 2005: 2:30						
6:30	1320	1.64	1.49	1.08	-0.2	0.67
8:30	1440	1.76	1.53	1.36	-0.35	0.88
8:50	1460	1.76	1.53	1.36	-0.35	0.88
8:50:30	1460.5	1.58	1.56			
8:51	1461	1.58	1.57			
8:52	1462	1.58	1.57			
8:53	1463	1.58	1.56			
8:54	1464	1.58	1.56			
8:55	1465	1.58	1.55			
8:56	1466	1.57	1.53			
8:57	1467	1.56	1.49			
8:58	1468	1.51	1.46			
8:59	1469	1.51	1.45			
9:00	1470	1.48	1.43			
9:10	1480	1.4	1.39			
9:20	1490	1.28	1.32			
9:30	1500	1.28	1.24			
9:40	1510	1.2	1.2			
9:50	1520	1.17	1.2			
10:00	1530	1.15	1.2			
11:00	1590	0.9	0.88	0.98		0.75

TABLE 1: SUMMARY OF ONE-DAY, CONSTANT-RATE PUMPING TEST DATA FOR THE 18-INCH WELL

BELFAST WATER DISTRICT								
BELFAST, MAINE								
Oct-05								
Date and Time	Elapsed Time	18-inch	TW-18	Feet to Water			Pumping Rate	Rainfall
	minutes			TW-5	TW-7	TW-16	gpm	inches
Oct 25, 2005: 8:00 AM							0	rain
8:30	0	20.39	16.89	22.51	0.83	1.17	0	rain
8:30:30	0.5	20.57	16.93				1242	rain
8:31	1	20.57	16.99				1242	rain
8:32	2	20.61	17.06				1242	rain
8:33	3	20.62	17				1242	rain
8:34	4	20.63	17.01				1242	rain
8:35	5	20.64	17.03				1242	rain
8:36	6	20.67	17.03				1242	rain
8:37	7	20.67	17.03				1242	rain
8:38	8	20.69	17.04				1242	rain
8:39	9	20.69	17.05				1242	rain
8:40	10	20.72	17.07				1242	rain
8:50	20	20.79	17.15				1242	rain
9:00	30	20.86	17.21				1242	rain
9:10	40	20.89	17.33				1242	rain
9:20	50	20.96	17.28				1242	rain
9:30	60	20.98	17.39				1242	rain
9:40	70	21.02	17.39				1242	rain
9:50	80	21.04	17.44				1242	rain
10:00	90	21.08	17.42				1242	rain
10:10	100	21.12	17.49				1242	rain
10:20	110	21.14	17.49				1242	rain
10:30	120	21.15	17.55	22.91	0.83	1.17	1242	rain
2:30	360	21.52	17.82	23.19	0.76	1.21	1242	rain
6:30	600	22.18	18.01	23.38	0.73	1.27	1242	rain
10:30	840	21.81	18.2	23.48	0.69	1.48	1242	rain
Oct 26, 2005: 2:30	1080	21.93	18.32	23.49	0.62	1.6	1242	rain
6:30	1320	22.03	18.38	23.59	0.63	1.84	1242	rain
8:30	1440	22.15	18.42	23.87	0.48	2.05	1242	rain
8:50	1460	22.15	18.42	23.87	0.48	2.05	1242	rain
8:50:30	1460.5	21.97	18.45				0	rain
8:51	1461	21.97	18.46				0	rain
8:52	1462	21.97	18.46				0	rain
8:53	1463	21.97	18.45				0	rain
8:54	1464	21.97	18.45				0	rain
8:55	1465	21.97	18.44				0	rain
8:56	1466	21.96	18.42				0	rain
8:57	1467	21.95	18.38				0	rain
8:58	1468	21.9	18.35				0	rain
8:59	1469	21.9	18.34				0	rain
9:00	1470	21.87	18.32				0	rain
9:10	1480	21.79	18.28				0	rain
9:20	1490	21.67	18.21				0	rain
9:30	1500	21.67	18.13				0	rain
9:40	1510	21.59	18.09				0	rain
9:50	1520	21.56	18.09				0	rain
10:00	1530	21.54	18.09				0	rain
11:00	1590	21.29	17.77	23.49		1.92	0	2.13

TABLE 1: SUMMARY OF THREE-DAY, CONSTANT-RATE PUMPING TEST DATA AT CURTIS ROAD WELL SITE

BELFAST WATER DISTRICT									
BELFAST, MAINE									
Jun-05									
Date and Time	Elapsed Time	8-inch	TW-18	Feet to Water			TW-1	Pumping Rate	Rainfall
	minutes			TW-7	TW-5	TW-16		gpm	inches
June 14, 2005: 9:30	0	20.81	17.44	1.72	23.43	2.24	4.86	0	
9:30:30	0.5	23.8						475	
9:31	1	23.7	17.9					475	
9:32	2	23.7	17.89					475	
9:33	3	23.71	17.87					475	
9:34	4	23.71	17.87					475	
9:35	5	23.7	17.88					475	
9:36	6	23.71	17.88					475	
9:37	7	23.71	17.89					475	
9:38	8	23.71	17.89					475	
9:39	9	23.71	17.89					475	
9:40	10	23.72	17.9					475	
9:50	20	23.75	17.93					475	
10:00	30	23.77	17.96					475	
10:10	40	23.75	17.97					475	
10:20	50	23.8	18					475	
10:30	60	23.82	18.01					475	
10:40	70	23.84	18.02					475	
10:50	80	23.86	18.04					475	
11:00	90	23.86	18.05					475	
11:10	100	23.88	18.07					475	
11:20	110	23.88	18.06					475	
11:30	120	23.88	18.07	1.75	23.43	2.27	4.74	475	
12:30	180	23.92	18.07	1.75	23.44	2.26	4.72	475	
14:00	270	23.95	18.12	1.75	23.49	2.33	4.89	475	
16:00	390	24.02	18.18	1.75	23.75	2.36	4.65	475	
20:00	630	24.07	18.22		23.82	2.39	4.59	475	0.06
24:00:00	870	24.19	18.34		23.88	2.41	4.65	475	
June 15, 2005: 4:00	1110	24.28	18.39		23.97	2.49	4.51	475	
8:00	1350	24.29	18.46	1.79	24.01	2.53	4.5	475	0.05
12:00	1590	24.25	18.51		24.06	2.56	4.47	475	
16:00	1830	24.38	18.55	1.81	24.17	2.57	4.45	475	
20:00	2070	24.43	18.6		24.15	2.6	4.45	475	

Date and Time	Elapsed Time	Feet to Water					Pumping Rate	Rainfall
		8-inch	TW-18	TW-7	TW-5	TW-16		
	minutes						gpm	inches
24:00:00	2310	24.48	18.64		24.18	2.63	4.43	475
June 16, 2005: 4:00	2550	24.51	18.68		24.23	2.66	4.39	475
8:00	2790	24.53	18.71	1.85	24.26	2.71	4.38	475
12:00	3030	24.54	18.76		24.29	2.72	4.38	475
16:00	3270	24.58	18.79	1.89	24.33	2.75	4.36	475
20:00	3510	24.63	18.82	1.9	24.34	2.69	5.16	475
24:00:00	3750	24.68	18.85		24.36	2.85	5.31	475
June 17, 2005: 4:00	3990	24.71	18.88		24.39	3	5.12	475
8:00	4230	24.79	18.92	1.95	24.52	2.99	4.77	475
9:15	4305	24.78	19.01		24.54	3	4.73	475
9:30	4320	24.78	19.01					475
9:30:30	4320.5		18.63					0
9:31	4321	21.97	18.59					
9:32	4322	21.95	18.57					
9:33	4323	21.94	18.56					
9:34	4324	21.93	18.55					
9:35	4325	21.91	18.55					
9:36	4326	21.92	18.55					
9:37	4327	21.89	18.54					
9:38	4328	21.89	18.54					
9:39	4329	21.9	18.53					
9:40	4330	21.89	18.53					
9:50	4340	21.84	18.49					
10:00	4350	21.85	18.46					
10:10	4360	21.82	18.44					
10:20	4370	21.8	18.42					
10:30	4380	21.77	18.4					
10:40	4390	21.75	18.39					
10:50	4400	21.74	18.38					
11:00	4410	21.71	18.36					
11:10	4420	21.7	18.35					
11:20	4430	21.71	18.34					
11:30	4440	21.7	18.33	1.95	24.33	2.88	4.67	
17:00	4830	21.5	18.1	1.92	24.08	2.67	4.5	
June 18, 2005: 8:30	5760	21.25	17.85	1.88	23.88	2.5	4.38	
15:30	6180	21.21	17.81	1.88	23.83	2.42	4.33	
June 19, 2005: 7:30	7140	21.04	17.64	1.88	23.71	2.29	4.33	
18:00	7770	21.04	17.64	1.88	23.71	2.24	5.21	

TABLE 2: SUMMARY OF DRAWDOWN DATA AT CURTIS ROAD WELL SITE							
BELFAST WATER DISTRICT							
BELFAST, MAINE							
Jun-05							
Date and Time	Elapsed Time	Feet of Drawdown					
		8-inch	TW-18	TW-7	TW-5	TW-16	TW-1
	minutes						
June 14, 2005: 9:30	0	0	0	0	0	0	0
9:30:30	0.5	2.99					
9:31	1	2.89	0.46				
9:32	2	2.89	0.45				
9:33	3	2.9	0.43				
9:34	4	2.9	0.43				
9:35	5	2.89	0.44				
9:36	6	2.9	0.44				
9:37	7	2.9	0.45				
9:38	8	2.9	0.45				
9:39	9	2.9	0.45				
9:40	10	2.91	0.46				
9:50	20	2.94	0.49				
10:00	30	2.96	0.52				
10:10	40	2.94	0.53				
10:20	50	2.99	0.56				
10:30	60	3.01	0.57				
10:40	70	3.03	0.58				
10:50	80	3.05	0.6				
11:00	90	3.05	0.61				
11:10	100	3.07	0.63				
11:20	110	3.07	0.62				
11:30	120	3.07	0.63	0.03	0	0.03	-0.12
12:30	180	3.11	0.63	0.03	0.01	0.02	-0.14
14:00	270	3.14	0.68	0.03	0.06	0.09	0.03
16:00	390	3.21	0.74	0.03	0.32	0.12	-0.21
20:00	630	3.26	0.78		0.39	0.15	-0.27
24:00:00	870	3.38	0.9		0.45	0.17	-0.21
June 15, 2005: 4:00	1110	3.47	0.95		0.54	0.25	-0.35
8:00	1350	3.48	1.02	0.07	0.58	0.29	-0.36
12:00	1590	3.44	1.07		0.63	0.32	-0.39
16:00	1830	3.57	1.11	0.09	0.74	0.33	-0.41
20:00	2070	3.62	1.16		0.72	0.36	-0.41

Date and Time	Elapsed Time	Feet of Drawdown					
		8-inch	TW-18	TW-7	TW-5	TW-16	TW-1
	minutes						
24:00:00	2310	3.67	1.2		0.75	0.39	-0.43
June 16, 2005: 4:00	2550	3.7	1.24		0.8	0.42	-0.47
8:00	2790	3.72	1.27	0.13	0.83	0.47	-0.48
12:00	3030	3.73	1.32		0.86	0.48	-0.48
16:00	3270	3.77	1.35	0.17	0.9	0.51	-0.5
20:00	3510	3.82	1.38	0.18	0.91	0.45	0.3
24:00:00	3750	3.87	1.41		0.93	0.61	0.45
June 17, 2005: 4:00	3990	3.9	1.44		0.96	0.76	0.26
8:00	4230	3.98	1.48	0.23	1.09	0.75	-0.09
9:15	4305	3.97	1.57		1.11	0.76	-0.13
9:30	4320	3.97	1.57				
9:30:30	4320.5	1.19	1.19				
9:31	4321	1.16	1.15				
9:32	4322	1.14	1.13				
9:33	4323	1.13	1.12				
9:34	4324	1.12	1.11				
9:35	4325	1.1	1.11				
9:36	4326	1.11	1.11				
9:37	4327	1.08	1.1				
9:38	4328	1.08	1.1				
9:39	4329	1.09	1.09				
9:40	4330	1.08	1.09				
9:50	4340	1.03	1.05				
10:00	4350	1.04	1.02				
10:10	4360	1.01	1				
10:20	4370	0.99	0.98				
10:30	4380	0.96	0.96				
10:40	4390	0.94	0.95				
10:50	4400	0.93	0.94				
11:00	4410	0.9	0.92				
11:10	4420	0.89	0.91				
11:20	4430	0.9	0.9				
11:30	4440	0.89	0.89	0.23	0.9	0.64	-0.19
17:00	4830	0.69	0.66	0.2	0.65	0.43	-0.36
June 18, 2005: 8:30	5760	0.44	0.41	0.16	0.45	0.26	-0.48
15:30	6180	0.4	0.37	0.16	0.4	0.18	-0.53
June 19, 2005: 7:30	7140	0.23	0.2	0.16	0.28	0.05	-0.53
18:00	7770	0.23	0.2	0.16	0.28	0	0.35

TABLE 3: SUMMARY OF RECOVER DATA AT CURTIS ROAD WELL SITE									
BELFAST WATER DISTRICT									
BELFAST, MAINE									
Jun-05									
T1 = Time Since Pumping Began	T2 = Time Since Pumping Ended	T1 / T2	Feet of Drawdown					TW-16	TW-1
			8-inch	TW-18	TW-7	TW-5			
minutes	minutes								
4320.5	0.5	8641	1.19	1.19					
4321	1	4321	1.16	1.15					
4322	2	2161	1.14	1.13					
4323	3	1441	1.13	1.12					
4324	4	1081	1.12	1.11					
4325	5	865	1.1	1.11					
4326	6	721	1.11	1.11					
4327	7	618	1.08	1.1					
4328	8	541	1.08	1.1					
4329	9	481	1.09	1.09					
4330	10	433	1.08	1.09					
4340	20	217	1.03	1.05					
4350	30	145	1.04	1.02					
4360	40	109	1.01	1					
4370	50	87	0.99	0.98					
4380	60	73	0.96	0.96					
4390	90	49	0.94	0.95					
4400	100	44	0.93	0.94					
4410	110	40	0.9	0.92					
4420	120	37	0.89	0.91					
4430	130	34	0.9	0.9					
4440	140	32	0.89	0.89	0.23	0.9	0.64	-0.19	
4830	530	9	0.69	0.66	0.2	0.65	0.43	-0.36	
5760	1460	4	0.44	0.41	0.16	0.45	0.26	-0.48	
6180	1880	3	0.4	0.37	0.16	0.4	0.18	-0.53	
7140	2840	3	0.23	0.2	0.16	0.28	0.05	-0.53	
7770	3470	2	0.23	0.2	0.16	0.28	0	0.35	

Date and Time	Elapsed Time	Feet to Water						Pumping Rate	Rainfall	
		8-inch	TW-18	TW-7	TW-5	TW-16	TW-1			
	minutes							gpm	inches	
	24:00:00	2310	24.48	18.64		24.18	2.63	4.43	475	
June 16, 2005: 4:00	2550	24.51	18.68		24.23	2.66	4.39	475	0.04	
8:00	2790	24.53	18.71	1.85	24.26	2.71	4.38	475		
12:00	3030	24.54	18.76		24.29	2.72	4.38	475		
16:00	3270	24.58	18.79	1.89	24.33	2.75	4.36	475		
20:00	3510	24.63	18.82	1.9	24.34	2.69	5.16	475		
24:00:00	3750	24.68	18.85		24.36	2.85	5.31	475		
June 17, 2005: 4:00	3990	24.71	18.88		24.39	3	5.12	475		
8:00	4230	24.79	18.92	1.95	24.52	2.99	4.77	475	0.05	
9:15	4305	24.78	19.01		24.54	3	4.73	475		
9:30	4320	24.78	19.01					475		
9:30:30	4320.5	22	18.63					0		
9:31	4321	21.97	18.59							
9:32	4322	21.95	18.57							
9:33	4323	21.94	18.56							
9:34	4324	21.93	18.55							
9:35	4325	21.91	18.55							
9:36	4326	21.92	18.55							
9:37	4327	21.89	18.54							
9:38	4328	21.89	18.54							
9:39	4329	21.9	18.53							
9:40	4330	21.89	18.53							
9:50	4340	21.84	18.49							
10:00	4350	21.85	18.46							
10:10	4360	21.82	18.44							
10:20	4370	21.8	18.42							
10:30	4380	21.77	18.4							
10:40	4390	21.75	18.39							
10:50	4400	21.74	18.38							
11:00	4410	21.71	18.36							
11:10	4420	21.7	18.35							
11:20	4430	21.71	18.34							
11:30	4440	21.7	18.33	1.95	24.33	2.88	4.67			
17:00	4830	21.5	18.1	1.92	24.08	2.67	4.5			
June 18, 2005: 8:30	5760	21.25	17.85	1.88	23.88	2.5	4.38			
15:30	6180	21.21	17.81	1.88	23.83	2.42	4.33			
June 19, 2005: 7:30	7140	21.04	17.64	1.88	23.71	2.29	4.33			
18:00	7770	21.04	17.64	1.88	23.71	2.24	5.21			

TABLE 4: DISTANCE-DRAWDOWN DATA FOR THE CURTIS ROAD SITE		
BELFAST WATER DISTRICT		
BELFAST, MAINE		
Jun-05		
WELL	RADIAL DISTANCE IN FEET	DRAWDOWN IN FEET
8-inch	0.33	3.97
TW-18	2	1.57
TW-7	667	0.23
TW-5	381	1.11
TW-16	1,143	0.76