Mr. Barbour's Report.

Some time ago the town council employed Mr. Barbour a well known municipal engineer of Boston to look over our conditions in Woodstock and make out a report on the relative cost of running our water and light system by steam and electricity. Following is Mr. Barbour's report.

To the Honourable Council of the Town of Woodstock, N. B.

GENTLEMEN,—I have given your problem such consideration as the limited time allowed me will permit and beg leave to submit the following statement of my conclusions:

The whole problem rests on the character of the fire service and the degrees of reliability of this service with which your town will be satisfied.

The present investigation has been precipitated by the possibility of obtaining electric power from the works of the Woodstock Electric Power Company, which are nearing completion. At the same time it is understood that members of your board have realized, for some time, the inadequacy and lack of actual protection furnished by the present plant.

Present pumping plant consists of two boilers, one of thirty five (35) H. P. and the other of forty-five (45) H. P., and two pumps, one a double compound vertical engine and the other a single compound engine. The double engine has a capacity of about 9.5 gallons per revolution and the single engine a capacity of one half this amount. The normal speed of the double engine is about fifty (50) revolutions or a discharge of four hundred and seventy-five gallons per minute. In emergencies these engines, together, are capable of reaching a discharge as high as one thousand (1000) gallons per minute, but in such case the entire plant is driven far beyond its safe capacity and is without an auxiliary to rely on in case of accident. In normal operation the engines move and strain to dangerous degree and an accident to the rame would seem liable at any time. That such accident has not already occurred is due to the lightness of construction and the resulting elasticity.

The standpipe is too low and too small to be of much value in fire service. With its limited capacity of two hundred and forty thousand (240,000) gallons it does little more than equalize the hourly comsumption and relieve the pumps during the period of maximum load in electric lighting. If its storage capacity were increased there would be greater difficulty from ice formation in periods of low temperature, and it may be concluded that additional storage—if provided—must be obtained by the construction of a reservoir at suitable elevation. If this should be done all the water would have to be pumped against the elevation of the reservoir, or the fire pressure, thus greatly increasing the daily work over that now necessary. It should be emphasized that the present pumping system entails an extremely low cost of maintenance because of the relative low lift of the pumps. It should be shown with equal force that if the cost is low the fire service is correspondingly poor. To better the service a reservoir is required or else direct pumping with the standpipe cut out during fire demand.

There is no question but that the present boilers and the pumping plant are both inadequate in capacity and reliability and that even though you may conclude not to increase this pressure by the construction of a reservoir or by the adoption of direct service, an auxiliary apparatus should be provided to fall back on in case of accident.

The provision of a reservoir, of not less than five hundred thousand (500,000) gallons capacity, at an elevation of one hundred to one hundred and twenty (100-120) feet above the top of the present standpipe, is the ideal solution of the present difficult from the standpoint of fire service. An examination of the topography has shown that such an elevation can be obtained twenty-eight hundred (2800) feet from the Houlton Road. From this point a twelve inch (12") main to Gertrude Street and a ten inch (10") to Main Street would have to be laid. The total cost of the reservoir and pipe lines would be between twenty thousand and twenty-five thousand dollars ($20,000 and $25,000)

With this addition to the system nine (9) streams, with sixty (60) pounds pressure at hydrant, would be available at the corner of Main and Connell Streets without engines. But with such a reservior all water would have to be pumped against the high preassure and the yearly cost, including interest of addition to works and of pumping the water with the present pumping plant, would be about five thouaands dollars ($5,000.). With a reservoir it would pay to install a new pump. plant because of its higher efficiency and the consequent saving in fuel.

To summarize the cost of the different schemes possible;

Present yearly cost of operating plant,	$ 2,400.00
First cost of reservoir and pipe lines,	20,000.00
Yearly cost of operating works with reservoir and present plant	5,000.00
First cost of new steam pumping plant and improvement in station	15,000.00
Yearly cost of operating works with reservoir and new steam plant	4,200.00
First cost of gas producer plant and improvement in station	20,000.00
Yearly cost of operating works with reservoir and gas producer	3,700.00

The preceding figures of yearly cost include interest on first cost of reservoir and improved pumping plant in each case.

The resulting fire service would be very different from that now available and should have an influence in reducing insurance rates. It is apparent, however, that under any of the above schemes the yearly cost is at least fifty percent (50) in excess of what it has been in the past.

The cheapest method of obtaining adequate fire services is by installing new pumps in duplicate, with a combined capacity sufficient to meet the fire demands under direct pressure, with the stsndpipe cut out. It cannot be too strongly emphasized that the present standpipe, which is half empty each morning and then holds about one hundred twenty thousand (120,000) gallons, is of practically no value in fire protection and is so low that in order to develop the desired number of streams with the desired pressure in the business district, it must be cut out of the system. Otherwise the water from new pumps, of sufficient capacity, would overflow the top of the standpipe.

Each pump should be of one million (1,000,000) gallons normal capacity with ability to stand a somewhat higher rate during fires. To develop sixty (60) pounds pressure at Connell Street with (8) streams, the engines must be of seventy-five (75) horse power each. The present engines are developing an efficiency equal to twenty-eight million (28,000,000) foot pounds per hundred (100) pounds of good bituminous coal. With new engine the coal or wood consumption could be cut down fifty (50) per cent. With these engines and a new boiler—first cost, including improvement in pumping station estimated at $25,000.00—the yearly cost of pumping the water with the same pressure as at present, except during fire service when the standpipe would be cut out and a pressure sufficient to furnish sixty (60) pounds when sixteen hundred (1600) gallons per minute are being thrown on the fire, would be thirty-four hundred dollars ($3400.00); including interest on new investment and yearly maintenance of plant. This is the cheapest method which can be devised of furnishing adequate fire service.

Gas producers are not adapted for direct pressure in fire service such as just described, and it is questionable whether electric power, in the necessary amount for such emergency service, can be obtained. As pointed out the required work in water pumping during maximum fire demand, under direct pressure, will be about 125 horse power, requiring, after allowing for efficiency of power pumps and motors, a current capacity of, approximately, 250 horse power. It is at once apparent that the electric company could not afford to set aside such a percentage of their total capacity and guarantee its availability for emergency service at any price which the Town could afford to pay.

It therefore follows that the use of electric power is only justified in connection with a storage reservoir, under which conditions the demand would be uniform and continuous. In such case the capacity of motors must be about fifty-five (55) H. P. each. Allowing for the lesser first cost and lack of attendance of electric equipment, in comparing this with the cost of a new steam plant it appears that in order to justify the utilization of electric power it must be purchased for about one cent (1c) per kilowatt hour. Otherwise it would be cheaper to continue the use of steam. This is because of the relatively low labor cost and the combination of pumping and electric lighting plants.

If electric current can be obtained for the above mentioned sum, it is worthy of serious consideration. As to the reliability of the electric plant as developed there appears to be no reason to mistrust the dam. As to the capacity during the season of minimum stream flow this all depends upon the available storage in the lakes on the water shed. With five hundred(500) square miles of land surface and the possibility of lowering Drew's Lake six (6) feet each season, as stated by Mr. Carvell, together with the storage at the dam, a continuous power capacity of five hundred (500) horse power throughout the year is assured. If, however, the storage in the lakes is not controlled, the available horse power during the dry season will not be much more than one-half (½) of the above amount.

In the improvement of the pumping station the construction of a water-tight concrete pump room at once suggest itself. The floor of this room would be placed at such an elevation as to provide a reasonable suction lift and its walls would be carried to an elevation above maximum high water, thus nullifying the danger of flooding the machinery, which now exists.

As to the electric lighting problem, it would appear that with new boilers, carrying one hundred (100) pounds pressure, the present engine would be of ample capacity to furnish the desired number of lights. Whether or not the dynamo is capable, you can best obtain the necessary information from the makers.

The question of purchasing power for electric lighting depends on whether you continue to pump by steam power. The combined service is so economical that it is questionable whether anything could be saved over the present arrangement.

Possibly a saving of two hundred to two hundred and fifty dollars ($200 to $250) per year might be made in the present yearly cost of fuel by the installation of meters but to effect this saving it would necessitate the expenditure of at least twice this amount per year in the installation and maintenance of the meters, so that it is readily apparant that a metered service is not the proper solution of your problem.

Finally, the provision of a reservoir with new steam plant or electric equipment, if power can be purchased at about one cent (1c) per kilowatt hour, is the most desirable solution of you problem. If the first cost is prohibited then direct pumping by steam is the remaining alternative.

You will, perhaps, appreciate the fact that your problem involves too many factors to be finally settled in all details in the time which your committee expect me to put on it. However, I believe that, in a general way, the above statement gives you the desired information.

Yours respectfully,
F. A. BARBOUR.

Boston, Mass., July 19th, 1906.

A Memphis (Mo.) man has discovered a new way to get rid of mosquitoes. He says to rub alum on your face and hands. When the mosquito takes a bite, it puckers his buzzer so it can't sting. It sits down in a damp place, tries to dig the pucker loose, catches its death of cold, and dies of pneumonia.—Minneapolis 'Journal.'

Some of the restaurants for workmen in Paris are conducted strictly on hygienis principles. Even the napkins are not put into rings and allowed to touch, but are put into marked pigeonholes, and each laborer gets his own on entering

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Probate Court, County of Carleton, Province of New Brunswick.

To the Sheriff of the County of Carleton or any Constable of the said County,—GREETING:

WHEREAS Margaret Guest, of the Parish of Kent, in the County of Carleton, wife of William Guest, hath by her Petition prayed that Letters of Administration of the estate and effects of Patrick Haley, who died on or about the Ninetn day of June, in the year of our Lord, one thousand nine hundred and six, at the Town of Woodstock, in the said County of Carleton, may be granted to her.

You are therefore required to cite the heirs, creditors, next of kin of the said Patrick Haley, deceased, and all others whom it may concern, to appear before the Judge of Probate for the County of Carleton, at a Court of Probate to be held in and for the County of Carleton at the office of the said Judge of Probate in the said Town of Woodstock, in said County of Carleton, on Thursday the 30th day of August next, at two of the clock in the afternoon, to show cause (if any) why Letters of Administration of the said estate should not be granted to the said Margaret Guest as prayed for by her.

Given under my hand and the Seal of the said Probate Court this 26th day of June, A. D., 1906.

(Signed) CHARLES APPLEBY,
Judge of Probate for the County of Carleton.
JAMES McMANUS,
Registrar of Probate for the County of Carleton.