

## CHAPTER II

### WOBURN WATER SUPPLY HISTORY

#### INTRODUCTION

This chapter discusses the water supply history of the Town of Woburn. Woburn has had a troubled water supply history. Woburn residents frequently experienced problems with water quality and volume over the years and the city has had to change the location of its wells, its pumping equipment and its sources of supply several times. This chapter will provide only the essential facts in regard to the technological development of the system and focus instead on problems that developed at various times in regard to water quality and adequacy of supply. The report is presented in chronological fashion and is based on available materials from state and city reports, newspapers, and writings about the system. Sources are indicated in the reference notes.

It should be noted that while the Massachusetts State Board of Health (later Department of Health) analyzed the quality of the water in the Woburn system yearly from 1889-1927, (published in their annual reports), as well as afterwards, (but not published in the annual reports), the parameters being utilized for testing during much of this period do not include many of the substances of concern today. The prime concern was bacteria (coliforms as indicators), a limited number of chemical constituents such as nitrogen (nitrates, nitrites, chloride, and ammonia), metals such as iron, and qualities such as hardness, alkalinity, and acidity (ph). Color, turbidity and temperature were also of concern. In addition, tests were performed to indicate the amount of dissolved oxygen (DO) in the water and the biochemical oxygen demand (BOD) of wastes in the water, with the amount of DO being an indication of the extent to which the water was free of oxygen demanding substances. Analysis for many of the hazardous substances commonly tested for today (heavy metals and various types of organics, for instance), were not performed until recently, a result of rapid advancement in the last two decades in the field of environmental chemistry.

#### Initial Construction of the Woburn Centralized Water Supply System

Like many Massachusetts towns, the city of Woburn depended on household wells and pumps for its water supply until the post-Civil War decades. As the town grew, such

sources became increasingly inadequate both in terms of potability and the quantity available for fire fighting. As a result of these problems, between 1871 and 1873 the city of Woburn constructed a centralized water supply system. The system drew on the groundwater in the Horn Pond area for its supplies. The intention had originally been to use Horn Pond water directly but in constructing the pumping engine house an underground source of purer quality than the pond was tapped and substituted for the pond water except in emergency situations.<sup>2</sup> The water was drawn from a so-called "filter-gallery". Later examinations strongly suggested that the water in the filter gallery was drawn from the pond, although filtering greatly improved its quality.<sup>3</sup> The use of driven wells tapping groundwater supplies was common as a source of supply in small towns, although large cities tended to rely primarily on surface sources.<sup>4</sup>

#### The Development of Major Quality Problems and the Construction of New Wells, 1890-1920

By the 1890s, the Woburn system was displaying difficulties, generated primarily, according to the Massachusetts State Board of Health (MSBH), by an increase in consumption. Taste and odor were a problem, as was adequacy of supply.<sup>5</sup> An 1895 examination by the MSBH of Horn Pond reported that it was seriously polluted by tannery and other manufacturing establishments. (Increased settlement around the pond was also a source of pollution.) Tannery wastes had greatly increased the chlorine in the water. The Board also warned of the dangers of drawing water directly from the badly polluted Horn Pond. According to the report, water from the filter gallery, although drawn from the pond, was much purer than the surface water and suitable for drinking.<sup>6</sup>

In 1903, the MSBH analyzed the Woburn water supply at the request of the City Commissioner of Water and Water Supply in order to see if the quality had deteriorated. The MSBH reported that the filtration of the water from Horn Pond was becoming less thorough, as shown by the increase in free ammonia and iron. The MSBH recommended that Woburn seek an additional water supply from another source in order to reduce the draft on the filter gallery. It suggested that such a source could be obtained by constructing another filter gallery or by digging wells near Horn Pond but distant from the existing filter gallery. It also indicated that, "A supply of water can be obtained from the metropolitan water district, and this may be the most economic plan of securing a water supply for the future." It would be almost three-quarters of a

century, however, until the city of Woburn ceased to rely solely on its groundwater for a source of supply and began to fill part of its needs from an extra-local source.<sup>7</sup>

In the years from 1906-1908, problems concerning the quality and quantity of the water supply became more pressing. Because of reductions in the flow from the filter gallery, the city began to draw water directly from Horn Pond into its system for potable purposes. In 1906, the MSBH warned that Horn Pond Brook and its tributaries in Woburn was "The most seriously polluted stream in the water-shed of the Mystic River above Upper Mystic Lake."<sup>8</sup> The pollution was caused by tannery wastes that entered streams that ran beneath factories or through factory yards as well as by human wastes. In 1907, the MSBH reacted to the city's continued use of Horn Pond water by warning that "it was not safe to drink this water unless it has previously been boiled for at least fifteen minutes."<sup>9</sup>

In search of a solution to its water supply problems, in 1908 Woburn submitted plans to the MSBH for a new well (a "suction well") to be located in the Horn Pond area southwest of the old filter-gallery and for a group of tubular wells on the west side of Horn Pond. The MSBH approved of this plan to take water from the uninhabited western shore of the pond and also recommended that the city provide a covered reservoir as a means to prevent deterioration of the water and of avoiding "the offensive taste and odor which have been the source of much complaint for many years."<sup>10</sup> Again, this was a suggestion that would be made to the city by engineering consultants and the MSDH throughout the twentieth century. Woburn constructed its new well in 1908 and equipped it with a Platt pump. The well was located a few feet south of the old pumping station. Another 50 new 2 1/2-inch wells were dug in the Sucker Brook Valley on the west shore of Horn Pond. The MSBH analysis of water quality from the new source indicated a much higher quality than the water in Horn Pond.<sup>11</sup>

#### Deterioration of the Water Supply in the 1920s and Construction of a Third Set of Wells

In the early 1920s the Woburn water system again developed problems. In the summer of 1923, the city's reservoir was extremely low due to dry summer conditions, again necessitating drawing raw water from Horn Pond. The Woburn Health Department warned citizens to boil their drinking water if the "unsanitary" Horn Pond water was utilized.<sup>12</sup> The Woburn Superintendent of Public Works argued, however, that the Health Department advisory was unnecessary. He charged that the Board

of Health was motivated by a desire to tie Woburn into the Metropolitan System, as it had been advised to do by the MSBH. He maintained that pollution in the pond could be dealt with by chlorination or by filtration at a much cheaper cost than membership in the Metropolitan system.<sup>13</sup>

On Sept. 7, 1923, the MSBH wrote the Woburn Board of Health warning that Horn Pond was "a most objectionable source from which to take water for water supply purposes" and that the water would have to be boiled if it was fed into the city's distribution system. The MSBH recommended that a temporary supply be sought from the neighboring towns of Stoneham and Winchester.<sup>14</sup> Faced by this warning, the City Council appointed a special committee to investigate the water situation and to make recommendations for improvements. After its investigation, the committee reported that "Conditions at the reservoir...are a disgrace to the city and a menace to the health of the community."<sup>15</sup> Dependence on Horn Pond water, however, continued with as much as half of the total amount pumped occasionally coming directly from the pond.<sup>16</sup>

In October, 1923, in order to deal with the possible health dangers stemming from use of the Horn Pond water, the city installed a chlorinator at the pumping station.<sup>17</sup> During the summer of 1924, this resulted in taste problems, and the Woburn Board of Health received 87 complaints about the drinking water.<sup>18</sup> One Woburn resident wrote to the Massachusetts House Ways and Means Committee, then investigating the question of the Woburn sewer, that from July through September, 1924, when the Horn Pond water was being utilized, "the City of Woburn had no water fit for human consumption." He added, "some chemicals were put into the water to kill the bacteria, which was the cause of much sickness. The more a person drank of the water, the thirstier he would get, so that a person's energy was greatly reduced."<sup>19</sup>

In 1926, in response to the difficulties with the old wells, the city constructed a new well ("A") utilizing an electrically driven Layne Pump. It was located 207 feet south of Horn Pond and about 300 feet east of the pumping station. This well tapped the same aquifer as the previous wells. Its purity was affirmed by tests made by Metcalf & Eddy, a Boston Engineering Consulting firm and by the MSBH, and in 1927 the water from the new well was turned into the system.<sup>20</sup>

The development of the new well, however, did not solve the city's water problems. Faced by increasing consumption and inadequacy of supply, the city continued to chlorinate and use Horn Pond surface water. The use of the Horn Pond supply led

to charges in the City Council by one councilman in July, 1929, that the Mayor and the newly appointed Water Commission were endangering lives by relying on "filthy" Horn Pond water rather than seeking a new source of supply.<sup>21</sup> While bacterial analysis by the MSBH found that the chlorinated water was safe to drink, the MSBH also warned that "sole reliance" on the chlorinating apparatus as protection against disease was dangerous.<sup>22</sup> Horn Pond was designated as an "emergency water supply" for Woburn by an Act of the General Court in 1929.<sup>23</sup>

Faced again by severe reductions in its water quality, the city began seeking a new source of supply. It hired a geologist and the engineering consulting firm of Metcalf & Eddy for this purpose.<sup>24</sup> The Metcalf & Eddy investigations resulted in discovery of "good water bearing material" below the Horn Pond surface and at a greater depth than the old driven wells. In 1931, the so-called "Bowler System" was utilized to construct three new gravel packed wells ("B", "C", and "D"). Tests and analysis by the MSBH provided evidence of the water's high quality.<sup>25</sup> These wells, boasted P. D. Bowler, president of the company that constructed them, gave Woburn "a water supply...second to none in the entire country both in purity and actual cost of production. Woburn has a supply for all time in its underground deposits and will never have to go into the Metropolitan system or engage in the construction of filtration plants."<sup>26</sup>

#### Deterioration of the Third Set of Wells, 1935-1958

In spite of predictions, the water system continued to have difficulties. A short time after it began operating, Well "C" pumped fine sand and had to be abandoned.<sup>27</sup> In 1935 the water supply became muddy and "offensive in taste" for several days, although free from bacteria. The problems were traced to the Layne pump plus excess demands on the system caused by a large fire.<sup>28</sup>

To deal with the supply problem, in 1937 Well "A2" was constructed on the south shore of Horn Pond to a depth of 90 feet and Well "E" was constructed to a depth of 60 feet. Improvements were also made in the distribution system.<sup>29</sup> During the World War II period and immediately after, however, the system again produced inferior water. In 1943 and 1944 householders complained that the water was "unclean", and the Woburn Superintendent of Public Works recommended that the water system be cleaned, "In order that this unsatisfactory and unhealthy situation may not become progressively worse."<sup>30</sup> In

1946 the Superintendent reported that during the high usage summer months, "water all over the City, particularly in the Montvale section, becomes dirty and unusable." He recommended renewing Wells "A" and "C" as a means to generate new supply.<sup>31</sup>

A further episode occurred in November, 1950, when a power failure caused the electrical pumps to shut down and water was again drawn directly into the system from Horn Pond. The water was "shown to be safe for drinking at time of analysis."<sup>32</sup> The city made some improvements in the distribution system between 1950 and 1960, when it installed booster pumping stations and constructed a small concrete reservoir and a large steel reservoir.<sup>33</sup>

In 1954 tastes and odor again developed in the water supply and Woburn residents made a number of complaints to the city. In order to eliminate the tastes and odor, the Department of Health recommended that Horn Pond Hill Reservoir be cleaned annually and that deciduous trees near the reservoir be removed and coniferous trees planted to prevent leaves from blowing into the reservoir.<sup>34</sup> It was obvious that major overhaul of the system was needed, and in 1955 the City contracted with Whitman & Howard, Inc. to do a study of the water system and recommend improvements.<sup>35</sup>

#### The 1958 Whitman & Howard Report and the Origins of Wells "G" and "H"

The Whitman & Howard report was delivered to the city in August, 1958. It provided a thorough analysis of the problems with the existing Woburn water system and made a number of recommendations for improvements. Its discussion of problems relating to water quality and supply, to the condition of the system, and its recommendations, are summarized below (page numbers noted refer to pages in the report):

##### A. Analysis of the System:

1. The reservoir's open construction exposed its contents to animal and human pollution. Biological growths in the reservoir created taste and odor problems although cleaning the reservoir annually "pretty much solved the problem." (p. 6)

2. Pressure losses in the system were caused by the location of the reservoir which resulted in deriving all water either from the wells and/or from the reservoir through the same pipes at the instant of demand. (p. 6)
3. The distribution system in North Woburn was inadequate leading to pressure drops. There was also inadequate pressure in West Woburn. (p. 8)
4. Tests of water pressure for fire protection showed several localities where the flow was much lower than that in 1937. (p. 10)
5. Deterioration was present in the older unlined water distribution mains. (p. 15) The system's major mains could not carry required water without large pressure drops. (p. 18)
6. Per capita water consumption was very high from 1915-1925 probably due to tannery use and leakage. Per capita consumption from 1937-1957 was variable from year to year but showed a tendency to increase yearly over time. (p. 25)

**B. Ground Water Supply:**

1. The report stated that Woburn is situated over two ancient river beds: one running from near the Atlantic Gelatin factory at the Winchester-Woburn line northerly under the Aberjona River to Mishawum Pond to the Wilmington line: a second "is believed" to begin in Winchester under the Aberjona River at Judkins and Wedge Ponds and to run northwesterly along Horn Pond Brook to Horn Pond itself. Many industries draw underground water from the aquifers underlying the Aberjona River. The Horn Pond aquifer had been used for public water supply since 1873.

**2. Industrial Water Supplies:**

--Atlantic Gelatin (5 wells): wells not used for drinking purposes "Due to evidence of previous or present pollution of the aquifer (demonstrated by the high chloride content), the water from these wells is not used for drinking purposes."(p. 30)

--John J. Riley Co.. (1 well): "The water is polluted and is used for industrial purposes only." (p. 30)

--Consolidated Chemical Industries (6 wells): "The water from the two deep wells is reported to be of good quality." (pp. 30-31)

--Independent Tallow Company (well field): "Water shows indications of pollution and a high iron content has been reported." (p. 31)

--Sylvania Electric Products, Inc. (3 wells): "Two of the wells are within 150 feet of a 24-inch sewer, and an application for use of the water for drinking purposes was turned down by the Department of Health." (p. 31)

### 3. Public Groundwater Supplies:

This section described the various wells as follows:

--Well "A2" (1937), "the most productive source of public water supply in the City..." (p. 32)

--Well "B" (1931): "This well is said to have been constructed without engineering supervision, and no concrete data on the construction methods employed has been found." Acidification is necessary at about two year intervals. (p. 32) Recommends cleaning and surging in 1958. (p. 33)

--Well "D" (1931): Also constructed without engineering supervision. Required acidification in 1949.

--Well "E" (1937): This well is the second major source of city water supply. It and A2 "are believed to be excellent, dependable, long-lived water supply sources." (p. 33)

The report also notes that among the abandoned groundwater wells were the old filter galleries, a driven well close to Well "D", and Wells "A" and "C". Wells "A" and "C", however, were held to hold "considerable promise" for renewal.

### 4. Important Groundwater Conclusions:

--"Much of the ground water potential of the City of Woburn has been meticulously investigated in the past." (p. 34)

--"The Aberjona River valley still has a potential for ground water supply for certain industrial used [sic], but the ground waters of this valley are, in general, too polluted to be used for public water supply." (p. 34)

--"Based on knowledge of previous investigations, the Horn Pond area is, undoubtedly, the best potential source for an additional public ground water supply." (pp. 34-35)

--"An unexplored area lies west of Mishawum Pond, between the Pond and the Reading-Woburn line." (p. 35)

#### C. Test Well Investigations:

A number of test wells were driven and the results of the analysis of their quality was provided. A number of the tests produced water of poor quality and only one, in the so-called "Akerson Gravel Pit" east of Mishawum Pond, produced "good quality water." (p. 36) Pumping tests were recommended at the so-called Collins Farm in the vicinity of Well "E", and a location near the Horn Pond Pumping Station. (p. 38) Incomplete pumping tests indicated that the water-bearing strata in the Akerson Gravel Pit area was too limited to warrant development, that the well near the Horn Pond Station could deliver 2 M.G.D., and that the well in the vicinity of "E" could produce about .7 M.G.D. without drawing on "E". (pp. 38-39)

#### D. Recommendations:

1. Raising the level of Horn Pond - recommended as "extremely desirable" (pp. 39-40)
2. Improvements to Storage Facilities and Distribution System: Four alternative plans presented for storage facilities, and Plan IV. providing for new 4.4 M.G. tank on Rao Rock Hill was recommended. (pp. 41-72)
3. Metering was recommended for the unmetered one-third of the town. The report noted that "unless a strong

policy of metering is pursued, the improvements proposed herein may prove inadequate in a relatively short time."(p. 74)

E. Maintenance of the Water System:

The report noted that the water system had "not been properly maintained for a long period of time." This neglect was blamed on limited budget, too few water department employees, a low pay scale and "a general city-wide indifference to Water Department maintenance." Serious deficiencies were noted in the lack of an inspection program ("no program of cleaning and surging and inspecting pumps has ever been established"), and the failure to "properly" surge and clean any well until the spring of 1958. (p. 81)

F. Connection with the Metropolitan District Commission:

The Report concluded by observing that if the recommendations for improvements made in the report were implemented, and if the projected increases in consumption were accurate, Woburn would not have to connect to the Metropolitan District Commission for supplies until 1975 or later. (p. 86)

G. Appendix 1: Effect of City Wells on the Level of Horn Pond:

The report observed that in cases where well supplies were adjacent to surface waters, "the probability exists that during dry periods some of the water pumped from the wells may be directly or indirectly drawn from the pond, lake or river." (p. 1-1) Tests showed that the level of Horn Pond water was affected by pumpage from the wells adjacent to the pond. (pp.1-2)

Wells "G" and "H": From Construction to Shutdown, 1958-1979

The 1958 Whitman-Howard Report resulted in construction of a new well (Well "F") at the westerly side of Horn Pond, as had been recommended. This well was put on line in 1961.<sup>36</sup> Supply still remained insufficient, and in 1963 Whitman & Howard were again digging test wells in Woburn in search of ground water supplies.<sup>37</sup> These tests were at sites located near the Aberjona River and apparently drew from the Aberjona aquifer. No information was available to this writer to explain why, so soon after the construction of Well "F", Woburn needed to seek further supplies. In addition, no explanation

was available in the form of a report or a letter as to why, after the Whitman & Howard Report of 1958 had rejected the use of the Aberjona groundwater as "too polluted to be used for a public water supply" (presumably by industrial rather than bacterial wastes), wells were being sunk in that aquifer.

In November, 1963, L. M. Pittendreigh of Whitman & Howard wrote to the Massachusetts State Division of Health (MSDH) that the most promising area for a water supply suggested by the preliminary tests was in the vicinity of Well "16" near the Rod & Gun Club. He also commented favorably on Well "9", in the same general area and Well "8", south of Salem Street.<sup>38</sup> Results of tests of the water at these wells conducted by the MSDH Lawrence Experiment Station were included with the Pittendreigh letter. These tests were for the standard parameters utilized in 1963 and included no tests for metals aside from iron and manganese or for various organic pollutants such as chlorinated hydrocarbons.

The Pittendreigh report was reviewed for the MSDH by Senior Sanitary Engineer H. D. Nickerson. He noted that the water was, according to preliminary test, "of relatively good chemical characteristics." He also noted, however, that the wells were in the vicinity of the J. J. Riley Tannery "and as a result, the chloride content is somewhat higher than normal." The Sanitary Survey of the area "indicates no immediate source of pollution..."<sup>39</sup> Following this report, Worthern H. Taylor, Director of the State Division of Sanitary Engineering, wrote to the Woburn Public Works Department that "Examination of the sites shows that there are no sources of sewage pollution in their immediate vicinity, although the J. J. Riley Tannery is located in the general area." Taylor noted that the water from Sites 8 and 16 contained "a relatively large amount of chlorides, but generally the water from all three sites is of suitable quality for public water supply purposes." The Division of Sanitary Engineering approved the three sites as suitable for extended testing.<sup>40</sup>

The pumping tests were held at two sites in February and March, 1964. One test well was in the vicinity of a truck terminal south of Salem Street and the second was in the vicinity of the rifle range north of Salem Street. On May 19, 1964, L. M. Pittendreigh wrote to Woburn Mayor Edward F. Gill that the tests showed that the water quality in these wells "was found to be comparable with the present ground water supplied to the City of Woburn, being low in iron and manganese." Pittendreigh recommended the construction of two gravel packed wells at the sites of Test Wells 8 and 16 and the acquisition of all land within a minimum radius of 400 feet

from the proposed gravel packed wells. "In summarizing the test well investigation," Pittendreigh commented, "we feel that the City is fortunate in finding an additional groundwater supply of good quality in East Woburn and that the development of this supply will aid in overcoming the City's Water Problem."<sup>41</sup>

At the end of May, 1964, Whitman & Howard submitted a report on their test well work to the MDPH and asked for approval by the Department for construction of Gravel Packed Wells.<sup>42</sup> Senior Sanitary Engineer Nickerson again reported on the tests to his department. He observed that the Whitman & Howard report on their test well work lacked "many pieces of engineering information relative to site No. 8 (and No. 16)." Chemical analysis of both the wells showed the water to be "low in turbidity, sediment, color, odor, moderately hard, low in iron and manganese, and to show the presence of some organic materials..." Chloride content at 8 was approximately 39 parts per million and 20 ppm at 16. Nickerson noted that "the areas at site No. 8 and 16 are satisfactory from a sanitary point of view in that there are no immediate sources of pollution in the general area." "However," he added, "there is some question as to the actual capacity of the proposed gravel packed wells."<sup>43</sup>

After receiving the Nickerson report on the pumping tests, W. H. Taylor, Director of the Division of Sanitary Engineering, responded in July to the Woburn Department of Public Works. He noted that analyses of the water at Site 8, south of Salem Street, "showed the water would be relatively hard, to contain some organic material, and to contain a larger amount of chlorides than usual for ground water of the area." "The relatively high chloride content," he added, "may be due to industrial operations in the area and in the future it may be necessary to limit the yield of any permanent well at that location to maintain a suitable water quality." In regard to Site 16, Taylor noted that the water was "relatively hard, but otherwise of good chemical quality and suitable for a public water supply." Approval was given for the construction of two gravel packed wells at Sites 8 and 16, with a third well to be possibly added at the site of 16 after the first two were in operation. The city was required to acquire all land within at least 400 feet of each site before they could be used as sources of public water supply "to allow for the proper development and protection of the sources."<sup>44</sup>

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During the summer of 1964, the plan for land takings was approved by the MSDH and construction of the wells proceeded.<sup>45</sup> During the period the wells were under construction, the Woburn system experienced difficulties with

"dirty water" and heavy growth of aquatic weeds and algae in Horn Pond. According to Whitman & Howard, the dirty water was a result of the adherence to the sides of pipes of material such as iron bacteria or manganese slimes. This caused the quality of the water at many locations in the city to be "far from the good quality that you have at the wells." Whitman and Howard recommended a flushing of the mains and a calgon treatment to deal with the problem.<sup>46</sup> Horn Pond was chemically treated by the Allied Biological Control Corporation in November, 1966. City wells along the shore of the pond were shut down during this period.<sup>47</sup>

Well G (formerly Well 8) began service in the latter part of 1964, while Well H (formerly Well 16) was put into service during the first half of 1967. However, during the summer of 1967 the MSDH recommended that both be taken out of service "due to the poor bacterial quality of the water supplied therefrom." The MSDH required "that these wells may not be used as sources of public water supply without continuous chlorination to assure the safety of the water."<sup>48</sup> Chlorination facilities were installed at one of the wells (apparently "H") on April 3, 1968, and probably at "G" shortly after that.

When the chlorinated water first entered the system there were many complaints of its taste and odor from East Woburn residents. "The odor," wrote one resident, "is almost like a clear bleach....Why can't we have water like the rest of Woburn?"<sup>49</sup> Adjustments were made of the chlorine dose to attempt to control the bacterial quality of the water without imparting a chlorine taste. City officials maintained that after the initial flurry, complaints had ceased until a resident mailed a complaint to the Boston Herald in August.<sup>50</sup> Debate in the Woburn City Council over the water question led to the Council authorizing the Mayor to enter into an agreement with the Metropolitan District Commission (MDC) about joining its system.<sup>51</sup>

During the same spring and summer (1968) there were complaints of "red water" in the system as well as of chlorine taste.<sup>52</sup> Whitman & Howard attributed the color to the city's many miles of unlined old cast iron pipe. After submitting engineering plans, the MSDH gave the firm permission to add "Calgon" (sodium hexametaphosphate) to Wells "G" and "H" to inhibit the precipitation of the iron.<sup>53</sup> The treatment was also intended to adjust the water's pH content.<sup>54</sup>

In February, 1969, the City of Woburn increased the chlorine feed rate at Well "G" by 50 percent based on test results.<sup>55</sup> Complaints about the taste and odor of East Woburn water were raised anew. Residents protested that the water was "very unpotable," "very hard," and had a "strong chemical taste." The problem existed in both Wards 4 and 5.<sup>56</sup> Aldermen from Wards 4 and 5 insisted that Well "G" be closed for the winter and Council appointed a special committee to discuss the water problem with the Mayor and city officials.<sup>57</sup> At a meeting between city officials and engineers from Whitman & Howard, City Engineer George Olson observed that the problem was not an easy one to solve and that city officials had been working on it. Nothing was wrong with the water, he claimed, since the chlorine was present to control bacteria.<sup>58</sup> The City proceeded to investigate the prospects of connections with the M.D.C. through the neighboring town of Stoneham.<sup>59</sup> In April, the Woburn Times reported that a neighborhood committee was being organized to explore the problem and to attempt to close down Well "G"; in late August a group of East Woburn residents presented the Mayor with a petition protesting the inferior quality of their water.<sup>60</sup> Although the Mayor argued that the chlorination of "G" had been "unreasonably" ordered by the MSDH because the bacterial contamination was in Well "H", he promised to close "G" by mid-September. By October 1 the well was closed.<sup>61</sup>

While Well "G" was shut down during the fall and winter of 1969-70, other potential threats to the Woburn water supply developed.<sup>62</sup> Plans were announced for construction of a new industrial park to be called "Industri-Plex 128", to be located at the junction of Routes 128 and 93, at a site formerly occupied by the Stauffer Chemical Companies.<sup>63</sup> Upon examination of the site, the State Division of Environmental Health observed that the 450 acre site, which was located in the Aberjona River Valley, was just north of Wells "G" and "H" located in the river flood plain. The Division warned that "the proposed filling and drainage may adversely affect the City of Woburn's public water supply during high flows and flood conditions of the Aberjona River...." It recommended that construction take place only if the abandoned lagoons and dumps of the Stauffer Chemical Company "be excavated and disposed of in an area which will not be affected by flooding." and that all sewer construction and lift station plans be approved by the Division.<sup>64</sup>

Because of limits in the supply, in the spring of 1970 the City of Woburn again began pumping from Well "G" in order

to meet increased water demands. According to the Woburn Times, complaints about taste and odor problems in the water soon began "to pour again like so much water through a broken dam."<sup>65</sup> City officials maintained that Well "G" had to be used at peak times until M.D.C. connections were made. Engineer John Nason, located at the Woburn Pumping Station, observed that the "absolutely safe" water from "G" was needed because the city had 'taxed' its older wells during the winter.<sup>66</sup> In the fall, in response to complaints about water quality in East Woburn, Nason prepared a memorandum in which he commented about the low levels of Horn Pond and the Horn Pond aquifer, and recommended that until Woburn had an M.D.C. connection, Well "G" "should not be shut down."<sup>67</sup> His recommendation was concurred in by the Superintendent of Public Works who noted that the dry hot summer had badly depleted ground water supplies in the Horn Pond area.<sup>68</sup>

Water <sup>→ 1971?</sup> was pumped from Well "G" into the system up until January, 1970, when it was again closed.<sup>69</sup> On May 10, Well "G" began pumping water again, only to be closed at the request of East Woburn Councilman Mahoney who said he was "bombarded with calls of complaint" about the water. Mahoney noted that if the well had not been shut down, "this would have been the fourth successive year that the residents would be compelled to use it for drinking and other household purposes, i.e., putrid, ill smelling and foul water."<sup>70</sup> By July, however, as hot weather depleted the reservoirs, Well "G" was again put into service.<sup>71</sup>

Complaints about water from Well "G" appeared to subside for the remainder of the summer. The main problem mentioned in regard to water quality during the remainder of 1971 and into 1972 concerned sodium chloride (salt) in drinking water. According to John C. Collins, Director of the Division of Environmental Health, Woburn was "one of the communities in the Commonwealth where corrective action is most needed to reverse the trend of increasing salinity."<sup>72</sup>

Hot weather in the summer of 1972 again brought depletion of the Woburn water supply and warnings by Superintendent of Public Works Albert J. Wall that a "ban" on certain water uses would be implemented or "the controversial 'G' Well" opened again unless water users cooperated to reduce consumption. The Woburn Times editorialized that, "It took long enough to close down the offensive 'G' well, and in our opinion, it should never be opened again to service homes in this city."<sup>73</sup> Voluntary restrictions on water use appear to have avoided the crisis, and Well "G" was apparently not activated in the summer of 1972.<sup>74</sup> A similar situation prevailed in the summer of 1973.<sup>75</sup>

Throughout 1972, 1973, and into 1974, under the leadership of the Woburn Conservation Commission, water quality questions focused on problems in Horn Pond rather than Well "G". The initial concern involved the dumping of salt laden snow in and around the pond but extended to other contaminating substances.<sup>76</sup> In March, 1974, an extensive survey of Horn Pond conducted by Habitat, Inc. identified four of the major pollutants in the pond. High counts of chlorides, nitrates, phosphates, and coliform bacteria were noted, all at levels above those recommended by government standards for class B ponds ("drinking water"). The report observed that the "most critical problem that threatens the water quality of Horn Pond is the rapid accumulation of nutrients, particularly phosphates and nitrates, which stimulate the growth of aquatic weeds and algae."<sup>77</sup> In addition, dissolved oxygen levels were low in the deeper ends of the pond. Among the pollutants identified were sewage, fertilizers, lead and road salt.

The summer of 1974 brought a return to the cycle of water shortages and threats to reactivate Well "G" by Superintendent of Public Works Wall.<sup>78</sup> On June 17, Woburn City Engineer Thomas J. Mernin wrote the Director of the State Bureau of Water Supply notifying him that the City was "considering its East Woburn Well Field for emergency water supply purposes." He included copies of the chemical analysis and noted that he had been informed by Kenneth Tarbell of the Bureau of Water Supply (Tewksbury office) that the Bacterial Analysis for both wells was zero. The chemical analysis included the parameters of turbidity, sediment, color, odor, pH, alkalinity, hardness calcium, magnesium, sodium, potassium, iron manganese, silica, sulfate, chlorides, ammonia nitrogen, nitrate nitrogen, nitrite nitrogen, and copper.<sup>79</sup> Over the protests of Alderman Donald H. O'Brien, Well "G" was activated in August. Superintendent Wall admitted that the treatment of the water created taste and odor problems as well as discoloring sinks and tubs, but he insisted he had no alternative.<sup>80</sup> In fact, the severity of the drought compelled the City to consider activating Well "H" as well as "G", a position that aroused a "storm of protest from East Woburn residents."<sup>81</sup> Well "G" continued to feed water into the system until December, when the demands of Ward 5 residents as well as Alderman O'Brien, forced the city to again close the well.<sup>82</sup>

Throughout the 1970's, the solution to Woburn's water problems was consistently presented as a tie-in with the M.D.C. system. Legislative provision for this connection was provided at the end of 1971 and the beginning of 1972, and a contract signed in August, 1972.<sup>83</sup> The agreement called for Woburn to

purchase at least one-third of its water supply from the M.D.C. Construction of a water main connecting Woburn and the M.D.C. supply at Spot Pond in Stoneham was well underway when, in January, 1975, a fire destroyed the M.D.C. pumping station at Spot Pond, interrupting the Woburn connection.<sup>84</sup> The city would be forced to depend completely on its groundwater supplies for some time. In view of this situation, Alderman Donald O'Brien attempted in February to commit the city to a summer water curtailment program in order to avoid use of water from Well "G".<sup>85</sup> He was unsuccessful in this regard.

The summer of 1975 again brought the now all-too familiar cycle of unusually hot weather accompanied by increasing demands on the Woburn water supply and threats and discussions in regard to reactivating Well "G". After a hot spell in May, Well "G" was reactivated for three weeks.<sup>86</sup> At the same time, George J. Coogan, Director of the State Bureau of Water Supply and Water Quality, warned the Woburn Board of Water Commissioners that water in Wells "G" and "H" was of "poor quality." He wrote that analyses of the water showed that it contained "elevated levels of nitrates, ammonia nitrogen, chlorides, sulfates, sodium, manganese and hardness and has poor physical characteristics in addition as evidence by the test results for color, odor, turbidity and sediment." Coogan observed that his Department discouraged "continued reliance on these sources to meet warm weather demands." He advised the City to seek "more satisfactory sources of supply or treat these supplies completely to make them more acceptable."<sup>87</sup> There is no evidence that Well "G" was turned on again during the remainder of the summer of 1975, perhaps because of the effectiveness of a water ban.<sup>88</sup> However, because of a damaged pump in another well and a drop in the level of the reservoir, it was activated in November 1975, prompting the familiar complaints from residents of Wards 4 and 5 about taste and odor.<sup>89</sup>

incorrect

The continual problems with the Woburn water supply and especially with Wells "G" and "H" resulted, at the beginning of 1976, in City Council establishment of a "select" committee to study the water problem and the appropriation of \$28,000 to fund a study of the causes of the "odor" and "color" problems in Wells "G" and "H" by Dufresne-Henry, Engineering Corporation of Vermont. Engineer L. M. Pittendreigh, who had worked on the Woburn water system for Whitman & Howard, was now employed by Dufresne-Henry and may have been responsible for the contract. Fifth Ward Alderman Bernard J. Golden, chairman of the council committee on water, saw the proposed study as either eliminating the wells or correcting their problems.<sup>90</sup> Later in

the spring, various city departments agreed to cooperate on the "Blue Water Project" seeking to restore Horn Pond, which was undergoing "rapidly accelerating deterioration of the quality of the water."<sup>91</sup>

The summer of 1976 found the Dufresne-Henry study in progress at the same time as dry conditions forced the reactivation of both Wells "G" and "H".<sup>92</sup> The Woburn Times editorialized that the failure to rectify the city's water problems were caused by the Mayor's deletion of funds from the budget for system improvements recommended by the Superintendent of Public Works. The Mayor's explanation was that the "taxpayers can't afford it."<sup>93</sup> On June 24, the DWPC warned the city to "investigate treatment at G and H wells or to look for additional sources."<sup>94</sup> Hope was expressed that the Dufresne-Henry engineers had found a solution to the problems of taste and odor.<sup>95</sup>

The Dufresne-Henry engineers maintained that the problems in the wells were caused by interaction between the chlorine added to the water to control coliform bacteria, and the manganese in the distribution system. As a solution to the problem, they suggested injecting air in perimeter wells to cause physical and chemical action in the ground water.<sup>96</sup> In February, 1977, the Dufresne-Henry plan for dealing with the problems in Wells "G" and "H" was reviewed by Fred Barker of the Massachusetts Department of Environmental Quality Control (DEQE). Barker questioned the effectiveness of the method recommended by Dufresne-Henry and recommended that filtration of the water from the wells, not air injection, was the solution.<sup>97</sup>

During the summer of 1977, Dufresne-Henry investigated the possibility of a new well site between Wells "G" and "H".<sup>98</sup> At the same time, with the approval of the DEQE, Dufresne-Henry conducted tests of their air injection system and suspended the use of chlorine in Well "G".<sup>99</sup> In January, 1978, L. M. Pittendreigh of Dufresne-Henry reported to Superintendent of Public Works A. J. Wall that the suspension of the chlorine treatment had eliminated the taste and odor problems as well as eliminating complaints from East Side water users. The DEQE, therefore, lifted the chlorination requirement on condition that twice weekly samples were taken for coliform contamination. The DEQE, however, found that there were unacceptable levels of manganese in the ground water at "G" and "H" and asked that it be removed. This required the construction of a treatment plant at a cost of approximately \$1,500,000. Pittendreigh recommended that planning for a

treatment plant begin and that an additional gravel packed well be constructed between "G" and "H" so that "the full capacity of the ground water resource which exists in the Aberjona River Valley can be utilized." "Such a project," he added, "will forestall the need for complete reliance on MDC water for many years and will be more cost-effective and economical in the long run."<sup>100</sup> Investigations for a new well drawing from the Aberjona groundwater and located between Wells "G" and "H" were already underway. The DEQE conducted tests of water from a sample well in this area identified as 1-77 and found "high concentrations of hardness, sodium, iron, manganese, sulfate, chloride, ammonia and C.C.E. suggesting that it lies in that same aquifer as Wells G and H." The DEQE indicated that water from this site, if used as a public source, would "require treatment."<sup>101</sup> [(C.C.E. or OC-A (Organics-Carbon Adsorbable Method) is carbon-chloroform extract, "a mixture of organic compounds that can be absorbed on activated carbon under prescribed conditions and then desorbed with the solvent chloroform." It was used to identify "organic contaminants" (but not chlorinated solvents). The Fourteenth Edition (1975) of Standard Methods for the Examination of Water and Wastewater, indicates that "special effort is needed to make this method useful for drinking water analysis.")]<sup>102</sup> In June, 1978, the DEQE approved the construction of the well as a source of water supply if the water were subject to treatment.<sup>103</sup>

On May 22, 1979, the DEQE informed the Woburn Board of Water Commissioners that analysis of samples of water from Wells "G" and "H" indicated "the presence of trichloroethylene concentrations of 117.6 ppb in the sample from Well H and 267.4 ppb in a sample collected from Well G respective." Such concentrations, noted the DEQE "are significantly above the 10 (or 100) ppb maximum guidelines for trichloroethylene in drinking water established after consultation with the Massachusetts Department of Public Health and the Federal Environmental Protection Agency." The DEQE advised that "the water from Wells G and H should not be used for public water supply purposes," and that a "water emergency" was found to exist in Woburn. <sup>104</sup>

Sampled  
on 5/14

## FOOTNOTES

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  3. Report of the Massachusetts State Board of Health upon a Metropolitan Water Supply, Feb., 1895. House Doc. No. 500. Boston, 1895.
  4. J. T. Fanning, A Practical Treatise on Hydraulic and Water Supply Engineering, New York, 1895, p. 108a.
  5. "Facts About Water Works," Woburn Times, Oct. 24, 1902.
  6. Report of the Massachusetts State Board of Health on Metropolitan Water Supply, Feb., 1895.
  7. Annual Report of the MSBH for 1903, pp. 86-87. The report also warned of possible injurious effects from lead lined pipes in the distribution system.
  8. Report of the MSBH on the Purification of Mystic River.... Senate Doc. No. 363, April 28, 1906, pp. 4-5.
  9. Annual Report of the MSBH, 1907, p. 104.
  10. Annual Report of the MSBH, 1908, pp. 140-144.
  11. Woburn Times, Nov. 24, 1908.
  12. Woburn Times, Aug. 24, 1923.
  13. The article also noted that one source of pollution was oil escaping from the Pumping Station. Woburn Times, Sept. 7, 1923.
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  15. Woburn Times, Oct. 5-6, 1923

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31. Report of Woburn Department of Public Works 1946, p. 163, and 1948, p. 98.
32. Whitman & Howard, "Report on Improvements to the Water System of Woburn," p. 4.
33. History of Woburn's Water Supply, p. 203.

34. Whitman & Howard, "Report on Improvements to the Woburn Water System," p. 4.
35. Whitman & Howard to Mayor William Shaughnessy, Aug. 6, 1958.
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