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230 Old Country Road
Mineola, N.Y.

Ground Water Branch

March 15, 1950.

Approved by Walter
3/23/50 for open file
- transmitted U.S.

Mr. A. G. Fiedler, Assistant Chief
Ground Water Branch
Water Resources Division
Washington 25, D. C.

Dear Mr. Fiedler:

Reference is made to your request of February 27, 1950 for information as to the possibility of obtaining a ground-water supply of about 200,000 gallons per day in the vicinity of the Veterans Facility, Castle Point, Dutchess County, New York.

The rock aquifers in the vicinity of the Castle Point Veterans Hospital yield limited quantities of water which, in general, are sufficient for domestic and farm purposes only. The possibility of obtaining the stated quantity requirements of about 200,000 gallons daily or more from the bedrock formations seems poor with the exception of the Wappinger limestone underlying the Fishkill Valley three miles to the south.

Glacial terrace deposits occur along the east side of the Hudson Valley. These deposits are found, in part, on the hospital property. Driller's reports indicate only small quantities of water have been encountered in drilling through the terrace deposits. However, careful and extensive testing has not been done to our knowledge. Properly constructed wells adjacent to the Hudson River might produce sizeable quantities of water from induced infiltration from the river. But, such wells might produce water of high chloride content. A sample of river water taken 50 feet from the east shore at Chelsea, about one mile northwest of the Facility, on August 26, 1949 showed 580 parts per million of chloride. Another sample taken at about the same spot on November 17, 1949 showed 19 parts per million of chloride, (see attached table of analyses). This indicates the variable nature of water in the Hudson River at this point.

Available information, including drillers' reports and field investigations in the area, suggests a considerable depth of overburden and a possible source of water about one mile from the hospital between the Red School House and well Du 378, and also north of the Red School House road, (see attached well table and map). Property in this area is owned in large part by the State of New York. Additional studies would be required to determine the extent, exact character, and water-bearing properties of these deposits.

Three miles to the south large quantities of water are available in known areas in the Fishkill Valley. These supplies have been developed from the underlying rock formations as well as the unconsolidated materials. It seems reasonably certain that a satisfactory supply could be obtained from this area.

Eighty percent of the present water supply of Castle Point Hospital is reported to be from the Hudson River, which is within a distance of one-half mile. The other twenty percent is obtained from seven bedrock wells drilled by J. P. Harris, Port Chester, New York. The following depths and yields were reported for the year the wells were drilled:

Well Number	Depth (in feet)	Yield (GPM)
a.	300	10
c.	285	30
d.	290	18
e.	295	12
f.	310	15
g.	292	15
h.	250	25

A pumping test was conducted on well "a" by R. H. Brown, Ground Water Branch, U. S. Geological Survey. This test, on April 23, 1946, yielded results only of a general nature, inasmuch as it was not possible to have four of the seven pumps shut off prior to and during the pumping test. The one well yielded a steady pumpage of 9.4 gallons per minute once pumping equilibrium was established. The drawdown was 111 feet with 95 percent recovery in 1-3/4 hours. Thus adequate supplies are not likely to be obtained from the rock which these wells tap. Regional information on the probable aquifer indicates that all seven wells enter rock at relatively shallow depths.

At a location near well "f", test borings for a new hospital building were made by the Reliable Drilling Company of New York City. The log of one of the deeper borings is listed below.

Boring H. Elevation 212.58'. Water level 20.5'.

	Thickness
Clay and gravel fill	0 - 6'
Clay, gravel, stone fill	6' - 10' 8"
Brown clay, gravel and stone	10'8" - 23' 0"
Blue clay, gravel and stone	23' - 28'
Blue clay, and gravel	28' - 32'

All the wells within one mile of the Facility tap rock and yield small quantities of water sufficient for domestic use. The rock formation underlying the area is the Austin Glen shale which consists of alternating beds of graywacke and shale. The graywacke, massive and relatively impermeable, confines water within the shale beds. Yields up to 50 gallons per minute have been reported from this formation in other areas, but the average in the vicinity of the hospital is 13 gallons per minute.

Another bedrock formation occurring within a one-mile radius is the Deepkill-Nassau shale which is limited in extent and occurs only in a very narrow area at Chelsea. In other areas of the county, these shales yield small quantities of potable water. The average is about 6 gallons per minute. Well Du-485 at the Chelsea Yacht Club located about 3/4 mile northwest of the hospital yields about

20 gallons a minute and has been pumped for extended periods at this rate. This is the largest continuous yield from wells in this zone (except for the wells at the Castle Point Hospital). Although the well is located about 25 feet from the edge of the Hudson River, no bad taste in the water was reported by the owner. The water is obtained from the underlying Deepkill-Nassau shales. This formation consists of alternating red and green shales interbedded with chert in this area.

The terrace deposits, upon which the Castle Point Veterans Hospital is located, are reported to have no great thickness. The greatest reported penetration is 32 feet. (Boring H). Drillers report little or no water in these deposits. The small quantities of water that do occur, however, are found just above the bedrock. No wells have been constructed adjacent to the Hudson River in these deposits in an attempt to obtain large quantities of water by induced infiltration.

It is understood that the chemical quality of water in the Hudson River at the Castle Point Hospital property is of concern to the Veterans Administration with respect to their existing surface water source. It is also an important factor in the consideration of terrace depths adjacent to the river as an additional source of supply as the chief source would be induced infiltration from the river.

In the summer of 1949 the New York State Department of Health, in cooperation with the New York State Department of Commerce and the New York State Department of Conservation, began an investigation on the pollution of the Hudson River. Samples of water were taken at 15 stations from the Bear Mountain Bridge to Troy, New York. Station 4 is located one mile north of the Castle Point Veterans Hospital at Chelsea. Samples have been taken on two occasions and the results of the analyses are listed in the accompanying table.

Four samples taken at Chelsea in August 1949 at flood tide indicate a fairly high chloride content, ie., an average of 695 parts per million. At the next station, five miles upstream from Chelsea, samples taken two hours previously on the incoming tide had an average chloride content of 48 parts per million. Samples collected in November had lower chloride content but the same relative drop between stations was observed.

Most of the wells within two miles of the Facility tap rock and yield only small quantities of water. The rock formation in this zone is the Austin Glen shale, except for a small amount of the Deepkill-Nassau shale in the vicinity of the Matteawan State Hospital. The average yield of the rock wells within the two mile radius is 12 gallons per minute. The 3,100-foot well, W.S.P. 151, at the Matteawan State Hospital, encountered bedrock at 117 feet, but the exact location of the well is not known. Along the Red School House Road (the general location is indicated by a cross on the accompanying map), the depth of bedrock has been reported as 178 feet. No large producing wells have been developed in this overburden and no information is available on its water-bearing properties.

Within a three-mile radius of the Facility there are a number of wells yielding large quantities of water, as shown on the attached table of well records. At the City of Beacon, 3 miles southeast of the hospital, 1,400 gallons per minute is obtained from both the overburden and the Wappinger limestone below. This well

is located in a preglacial and glacial valley and the water is obtained about equally from both aquifers. The Wappinger limestone which comprises the floor of this valley, contains large openings or solution channels which have been filled with fine yellow clay which may be pumped out. Available information indicates substantial quantities of potable water can be obtained from properly constructed wells in the Wappinger limestone.

To the west, within the same valley, the Texas Company obtains 300 gallons per minute from a well in shale rock overlain by 40-foot of fine sand. This sand is reported to contain little water. The overburden throughout the valley, however, is reported to contain large amounts of clay with occasional beds of gravel. It is from these beds of gravel that large supplies of water can be secured.

Three possible sources of ground-water supply exist for the Castle Point Veterans Hospital:

1) Infiltration into wells to be drilled near the Hudson River.

2) Development of supplies from overburden in areas to the east of the hospital.

3) Development of supplies from the Fishkill-Beacon Valley, to the southeast and south of the hospital.

The only significance to be attached to the above order of presentation is increasing distance to the possible source of supply.

The development of a well or wells near the Hudson River on or adjacent to the property of the Castle Point Veterans Hospital would perhaps be the closest possible source of a sizeable ground-water supply. Further testing in the area would be required and should be planned to explore the possibilities of induced filtration from the Hudson River. The quality of ground water obtainable at this location would depend in part on the quality of the river water. As mentioned above, available analyses for Hudson River-water indicate highly variable chloride contents in the River in the vicinity of the Castle Point Veterans Hospital. An intensive program of sampling and analyzing in connection with the installation of at least one test hole would be required before an adequate supply by induced filtration could be assured. It is believed the City of New York plans to pump about 100 million gallons daily directly from the Hudson River at a site between Chelsea and Poughkeepsie as a temporary measure to increase their aqueduct supply from the Catskill area. It is not known what effect this may produce on the chemical quality of the river water in the vicinity of the Veterans Hospital, but it would tend to increase the chloride content by reducing the flow of the River.

As previously discussed, information presently available indicates that in the area to the east, owned for the most part by the State of New York, overburden is relatively thick. No specific data is available, however, on the character of the overburden or on its ground-water content. This information can be obtained by intensive ground-water investigation in the area, which should include:

(1) inventory of all existing wells and boring data, including records obtained during the construction of the New York City aqueduct located between Van Wyck Ridge and Fishkill; (2) overburden thickness tests conducted by electrical resistivity (this could be planned to tie in with proposed seismic work on the grounds of the Matteawan State Hospital which are to be made by Mr. Paul Bird of the Soil Mechanics Laboratory of the New York State Department of Public Works in connection with plans by the State to develop a new source of supply for that institution); (3) possible drilling of several test holes, the location of which would be determined on the basis of the inventory and geophysical studies.

The third area proposed here, the Fishkill-Beacon Valley, to the southeast and south of the Castle Point Veterans Hospital seems to offer an assured source of ground-water supply. However, the terrain and distance from the hospital may make the cost of construction so great as to be economically unfeasible.

Attached is sheet giving estimates for studies to determine the possibility of obtaining an adequate supply of ground water from water-bearing beds in the "terrace" areas near the Facility, and in the overburden areas a mile or so to the east and southeast.

Your attention is called to the fact that at present, the City of New York is now passing the free flow of Rondout Creek through its Delaware River Aqueduct. This flow ranges from about 5 million gallons daily in dry periods to about 200 million gallons daily in wet periods such as at the present. The maximum diversion of Hudson River water authorized by the State is 100 million gallons daily. It is my understanding that the Hudson water will be heavily chlorinated before it is pumped into the aqueduct, and that the intake in the River will be placed so as to draw in the minimum of objectionable material. Thus, if the Facility tapped the aqueduct, they would receive a partially treated and diluted Hudson River water. Further, the City of New York will soon begin the process of filling their just-completed reservoir on Rondout Creek, and expect to pass a more or less constant supply through the aqueduct within a year or two. Thus, there would be more or less constant dilution. The entire Delaware project is scheduled for completion in 1955 at which time the Hudson River pumps will be reduced to standby status. In the meantime, they are to be used only as a last resort. Possibly they may never be used, if the $50,000.00 rain-making program just authorized by the City turns out to be a fruitful process.

Very truly yours,

M. L. Brashears, Jr.
District Geologist.

Enclosure.

cc: Asselstine

Station No. / Lab. Nos.	4A [2] CS-1368 B-15473	4A [3] CNP1908 B 19351	Du 325 The Texas Company	Du 326 The Texas Company	Du 657 Beacon Oil Company
Bacteria per ml.	13,000	5,800			
M.P.N. per 100 ml.	4,300	240			
Color	20	26			10
Turbidity	18	14			10
Odor*	2 musty	2 earthy			
Suspended matter	2	4			
Ammonia nitrogen	0.02	0.04			
Organic nitrogen	0.47	0.52			
Nitrite nitrogen	0.01	0.008			
Nitrate nitrogen	0.60	0.24			
Oxygen consumed	8.0	14.0			
B.O.D. (5 day)	0.8	1.0			
Dissolved oxygen	5.6	8.4			
Temperature °C.	26	12			
% saturation	68.3	78.0			
Carbon dioxide	7.0	4.0			
pH	7.4	7.3	7.7	7.7	7.2
Alkalinity	59.0	63.0			95.0
Chlorides as (Cl)	580.0	19.0			15.0
Sulfates as (SO_4)	107.6	26.2	235	156	69.3
Fluorides as (F)	0.15	0.15			
Manganese as (Mn)	0.06	0.03			0.02
Silica as (SiO_2)	7.5	2.0	4	9	
Iron and aluminum as (R_2O_3)	6.6	1.2			2.5(Fe)
Calcium as (CaO)	53.5	33.9			
Magnesium as (MgO)	—	8.5			
Total solids	699.0	152.0	248	138	276
Volatime	118.0	17.0			
Fixed	581.0	135.0			
Dissolved solids	679.8	128.4			
Volatile	113.6	13.0			
Fixed	566.2	115.4			
Suspended solids	19.2	23.6			
Volatile	4.4	4.0			
Fixed	14.8	19.6			

[1] Division of Laboratories and Research, New York State Dept. of Health.

[2] Hudson River Station 4, Chelsea Flood Tide, East Shore, August 26, 1949.

[3] Hudson River Station 4, Chelsea Flood Tide, East Shore, November 17, 1949.


Wappingers Falls
Lake Onida
Hughsonville
Fishkill
Beacon
Glenham
ORANGE CO
DUTCHESS CO

Wells Within a One, Two, and Three Mile Radius of Castle Point, U. S. Veteran's Hospital.

Well number	Owner	Altitude above sea level (feet)	Type of well a/	Depth of well (feet)	Diameter of well (inches)	Depth to bedrock (feet)	Geologic subdivision	Depth to which well is cased (feet)	Water level below land surface	Method of lift	Yield (gallons per minute)	Draw-down (feet)	Use	Temperature (°F.)	Remarks
							Radius One Mile								
Du 405	Chelsea Yatch Club	5	Drl	52	6	35	Deepkill-Hassau shale	35	20	Suction	20	—	—	—	
Du 767	Clarence Reed	160	Drl	90	6	2	Austin Glen shale	16	12	do.	20	—	Domestic	—	
Du 768	Evalyn Ash	140	Drl	100	6	19	do.	19	20	—	15	30	Domestic	—	Hardness reported to be 221 parts per million.
Du 769	Walter Richards	140	Drl	83	6	23	do.	23	15	—	6	10	Domestic	—	Well goes dry when pumped at 10 gallons per minute.
Du 770	A. C. Winkler	160	Drl	100	6	10	do.	10	21	—	10	24	Domestic	—	
Du 774	Frank E. Moore	140	Drl	100	6	15	do.	30	25	—	15	25	Domestic	—	
Du 777	Arthur Booth	220	Drl	60	6	7	do.	7	20	—	10	25	Domestic	—	
Du 784	Harold Bates	40	Drl	89	6	.8	do.	18	25	—	6	—	Domestic	—	
							Radius Two Miles								
Du 330	Cookie's Farm Camp	160	Drl	130	6	—	Austin Glen shale	—	—	Jet	20	—	—	—	
Du 331	do.	160	Drl	69	6	49	do.	49	17	Suction	12	—	—	—	
Du 466	J. Veling	260	Drl	370	6	25	Deepkill-Hassau shale	25	28	Jet	1.5	—	Domestic	—	
Du 483	Matteawan State Hospital	180	Drl	284	8	—	do.	—	.69	None	—	—	None	—	
Du 657	Beacon Oil Company	220	Drl	15	6	6	Austin Glen shale	6	?	Suction	?24	—	Domestic	40	Analyses available.
Du 758	Good Counsel Novitate	200	Drl	216	6	140	Deepkill-Hassau shale	140	16	—	—	—	None	—	
Du 759	do.	200	Drl	275	6	93	do.	93	42	—	7	—	None	—	
Du 771	M. Crawford	220	Drl	100	6	0	Austin Glen shale	3	15	—	10	—	Domestic	—	Driller reported a yield of 2 gallons per minute at a depth of 90 feet.
Du 772	Stephan Sokanek	220	Drl	155	6	5	do.	20	18	—	11	—	Domestic	—	Driller reported a yield of 1 gallon per minute at a depth of 100 feet.
Du 775	John Passaloqua	120	Drl	105	6	35	do.	43	40	—	18	2	Domestic	—	Driller reported hydrogen sulfide.
Du 776	Bernard Nemsick	120	Drl	102	6	15	do.	30	20	—	15	15	Domestic	—	
Du 779	Ward Schofield	100	Drl	96	6	10	do.	20	10	—	20	—	Domestic	—	
Du 781	Stephan Shalagan	40	Drl	100	6	3	do.	11	10	—	10	—	Domestic	—	
Du 782	M. Igo	100	Drl	112	6	14	do.	16	20	—	5	—	Domestic	—	
Du 785	Ward Schofield	80	Drl	83	6	30	do.	30	10	—	6	—	Domestic	—	
W.S.P. 102 No. 150 (4 wells)	Brockaway Brick Company	20	Drl	99-150	6	—	do.	5-18	—	—	—	—	Industrial	—	
W.S.P. 102 No. 151	Matteawan State Hospital	160	Drl	3,100	10	—	—	117	1.5	—	10	—	None	—	Well reported to have encountered 3,000 feet of shale and 100 feet of limestone.
							Radius Three Miles								
Du 325	The Texas Company	222	Drl	373	8-6	23	Deepkill-Hassau shale	23	14	None	35	126	None	54	Pumping test data available. Analysis available.
Du 326	do.	271	Drl	463	8	404	do.	404	71	—	300	76	None	54	Do.
Du 327	J. E. McCutchen	240	Drl	81	6	—	Pleistocene gravel	80	22	None	14	—	None	—	
Du 328	Manhatten Cottage Farm Company	240	Drl	262	6	20	Wappinger limestone	20	—	Suction	—	—	None	—	
Du 329	Franklin Pepper	200	Drl	123	6	16	Austin Glen shale	16	—	Jet	2	—	Domestic	—	
Du 339	Green Fuel Economizer Company	150	Drl	100	6	16	Deepkill-Hassau shale	16	—	—	—	—	Industrial	52	
Du 342	D. Kligerman	200	Drl	177	6	10	Austin Glen shale	11	12	Jet	5	—	Domestic	—	
Du 346	Michael Kilela	280	Dug	35	44	—	Pleistocene deposits	—	—	—	—	—	Domestic	—	
Du 348	L. Feldman	264	Drl	240	6	35	Deepkill-Hassau shale	38	4	Suction	12	—	Domestic	—	

Wells Within a One, Two, and Three Mile Radius of Castle Point, U. S. Veteran's Hospital.—Continued

Well number	Owner	Altitude above sea level (feet)	Type of well a/	Depth of well (feet)	Diameter of well (inches)	Depth to bedrock (feet)	Geologic subdivision	Depth to which well is cased (feet)	Water level below land surface	Method of lift	Yield (gallons per minute)	Draw-down (feet)	Use	Temperature (°F.)	Remarks
							Radius Three Miles								
Du 153	R. R. Rosenbush	180	Dug	21	54	—	Pleistocene sand	—	12	—	4	—	Farm	—	
Du 154	A. Gobbi	200	Drl	97	6	7	Austin Glenn shale	42	16	Suction	7	—	Domestic	—	
Du 184	W. C. Hoyt	120	Drl	210	6	—	Deepkill-Hassam shale	—	—	None	—	—	Domestic	—	
Du 630	City of Beacon	200	Drl	550	16-8	135	Pleistocene gravel and Poughquag limestone	—	0	Turbine	1,400	—	None	51	Well not completed.
Du 750	Brewerly Dye Works	140	Drl	150	8	16	Deepkill-Hassam shale	10	30	—	38	—	None	—	

a/ Drl, drilled.