1961

Papers Concerning Logan Water Works; Correspondence

Dean F. Peterson
*Utah State University*

Alvin A. Bishop
*Utah State University*

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March 2, 1961

Mr. Ray C. Hugie,
City Engineer
Logan, Utah

Dear Ray:

In accordance with your request I have made a study of the capacity of the Logan City culinary water line in Logan City in relation to improvements made since 1915. The following information is presented.

In 1915, Logan City installed a wood stave pipe from the Dewitt Spring to the distribution reservoir consisting of the following:

- 643' - 2½"
- 5257' - 22"
- 10300' - 18"
- 10128' - 16"

The 2½" pipe connected the spring with a head house and measuring weir on the bank of Logan River. From this point, the 22" pipe conveyed the water to a point near the third dam, the 18" pipe and 16" pipe taking it the rest of the way to the reservoir. The available slope in the 22" pipe between the head house and the third dam is only 2 ft. per 1000 ft., giving a capacity of 3.75 cfs. From the third dam to the distribution reservoir the slope is much steeper, averaging 7.6 ft. per 1000 ft., which with smaller pipes (18" and 16" combined) gives the same capacity, that is 3.75 cfs.

In 1934 - 7,128 feet of the 16" pipe was replaced with 20" steel. This had the effect of reducing the friction losses in the line below the third dam and made the effective capacity of this section about 10 cfs. However, the system capacity remained at 9.55 cfs since the 22" line could convey only this amount to the third dam. Likewise, the 1947 construction replacing the balance of the 16" wood stave with 24" steel pipe further reduced the capacity; however, the total capacity remained at 9.55 cfs. The 18" line from the third dam to reservoir remained the same, giving an effective capacity of 9.55 cfs.

In 1949, the balance of the wood stave pipe was replaced with concrete pipe. Between the spring and the third dam, 36" pipe was used for a distance of 5900 ft. and 10,440 ft. of 24" was used to connect to the steel pipe installed in 1915.

I recall that I made measurements of the spring and dam in 1949 when we were making the design for the new pipe line. A copy of the measurements I made are attached which showed 13.61 cfs being diverted on May 6, 1949. This

(over)
Ray C. Hugie  
Logan, Utah  
March 2, 1961 

Page Two

The 1949 construction increased the capacity between the spring and the third dam to 33 c.f.s. and increased the capacity of the line below this point to 19.5 c.f.s.

In the future when the 20" and 24" steel lines require replacement the capacity can be further increased. The 20" line will probably require replacement soon, and if replaced with 30" pipe the capacity of the system will then be 27.5 cfs. Replacing the 24" steel line with 30" will further increase the capacity to an ultimate of 30 cfs.

A summary of the capacity of the water system in the canyon gives the following:

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Capacity (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1915 to 1949</td>
<td>13.8 cfs</td>
</tr>
<tr>
<td>1949 to present</td>
<td>19.5 cfs</td>
</tr>
<tr>
<td>When 20&quot; steel is replaced with 30&quot;</td>
<td>27.5 cfs</td>
</tr>
<tr>
<td>Ultimate capacity with 30&quot; replacing 24&quot; steel</td>
<td>30.0 cfs</td>
</tr>
</tbody>
</table>

In making the above study I found it convenient to plot a profile of the entire system since the 1949 construction made substantial changes in the alignment and grade at several points. A print of the profile is enclosed for your information.

I hope the above information will provide you with the data you need to analyze and plan the water system.

Sincerely,

A. A. BISHOP  
Hydraulic Engineer
March 27, 1961

Mr. Ray Hugie
City Engineer, Logan City
Logan, Utah

Dear Mr. Hugie:

As per your request we have made an investigation into the possibility of obtaining water from wells. Following is a report on this to date:

**General**

The situation with regard to underground water is more complicated and has already been further developed than we had originally thought. There are already an estimated two-hundred odd wells, all but about 25 are small domestic wells located in Logan City and immediately adjacent to the west. Fortunately these are shallow, 200 feet maximum and mostly of the order of 100 feet in depth. The State Engineer will *not* grant a permit to drill without hearings if we file for waters from these shallow aquifers. Advertising and hearings may take several months. Even if such permits were granted, we would then face litigation—a single disgruntled well owner could start it, and based on the recent Current Creek decision we would seriously risk our investment due to court injunction if we tapped these shallow aquifers in any case.

Mr. Mayo of the State Engineer's Office feels we would be protected from interference possibilities if we tapped aquifers at depths of below 250 feet and believes an immediate permit may be issued to drill wells in such aquifers. There would seem to be no difficulty about making the exchange for canal water and changing the point of diversion to DeWitt Spring.

With this situation in mind Mr. Hugie, Mr. Rames and I tentatively chose locations for four wells. These are indicated on the attached map. Two would deliver water to the Logan and Northern Canal and two to the Hyde Park and Logan Northfields Canal. Because of the fact that no logs are available at these depths in this region, since dry holes were recently found both at North Logan and Richmond, and because of the greater investment required for the deeper wells, and since I am not a geologist, I consulted Dr. J. Stewart Williams, a professional geologist, who is both
Following your instructions, I am proceeding with
preparation of plans and specifications for this construction.
well versed in the local geology and has had a great deal
of experience in ground water geology work. Dr. Williams
reviewed these locations with me and in the light of local
geology he feels that prospects are very good for obtaining
production wells at the proposed locations. It might be quite
easily obtained at this site. I recommend that the City
decide on an initial program of pre-emitting and developing
the deeper groundwater resources under the City. I believe
this is the most favorable way to firm up a long-term water
supply. The development of the groundwater resource is
moving throughout the state at a very rapid rate and avail-
able supplies are being quickly tied up. There are current
applications to drill additional wells at the Fish Hearing
Fonds. One competitive well drilled into these strata could
completely block Logan City's future use of them. Likewise
Logan City's wells would make difficult their use by others.
This well, water, if available, may be used for exchange at
the Spring, or if not needed for that purpose, could dou-
bleless be pumped directly into the distribution system without

treatment. I cannot over-emphasize the importance, in my
opinion, of getting some rights in and developing what may
very likely be Logan's last water hole. I would hope we
could obtain at least 3 c.f.s. and perhaps 5 c.f.s. per well.

I have made the following tentative, unofficial estimate
of cost based on the assumption that the wells would be 350 feet
deep and 16 inches in diameter. I believe we should drill
test holes at locations 1 and 3. If these are satisfactory,
test holes probably would not be needed at the other two
locations. This estimate is not the "Engineer's Estimate"
to be used for the purpose of letting contracts.

6-in Test holes 2 @ 350' 700' @ $7.00/ft 4;4,900
16-in Production wells 4 @ 350' 1400' @ $17.00/ft 23,800
Test 4 wells @ $750. Ea.
Pumps and motors, electrical connections, Pump house, measuring device, discharge
Engineering Services
Net Total
Engineering, Permits, Contingency, etc.
15%
$53,700
33,700
$8,855
$10,000
$2,455
$72,755.00

22,000

$62,755
Following your instructions, I am proceeding with preparation of plans and specifications for this construction.

Rights-of-Way

The City owns suitable property at all sites except Site No. 1. It is believed that property might be quite easily obtained at this site. I recommend that the City do this immediately.

Negotiation With Utah Power and Light

Use of well water in exchange will decrease the amounts of water available for power production by U.P.& L. and the University, at least in theory. As far as U.P.& L. is concerned, if we go ahead, I suggest that the Commission consider with its attorneys whether or not to approach U.P.& L. in advance regarding this matter. It may be that some favorable arrangement can be worked out. On the other hand the City might wait and see whether U.P.& L. chooses to protest the transfer, and, if they do, take appropriate action at that time. Even if U.P.& L. was paid damages for the power lost, I do not believe this would be a major expense. I cannot speak officially for the University, but, I believe they have an interest in this problem which is greater than the theoretical loss of power involved at the State Dam and would not place obstacles in the way of this project.

Geological Assistance

Procurement of professional geological advice and assistance would seem to be quite urgent on the basis of the magnitude of the project and the risks involved in underground work. I feel this is very important and could easily save considerable money in well construction. Furthermore, availability of a geologist thoroughly familiar with the logs of the wells and their relation to local geology would be most helpful in the event of interference lawsuits. I have discussed this matter unofficially with Dr. Williams. He would render such service which would include assistance in location, inspection and evaluation of the drillings, assistance on contract documents and inspection of construction, recommendations on perforations, and construction design and methods and would assist in defense against interference protests and suits. His retainer for the four wells would be $500.

Engineering Services

I have discussed this with A. A. Bishop. While I am scheduled to go overseas on June 15, Mr. Bishop will be
available after that so we can render the necessary service. We would be happy to continue on the present time-spent arrangement if you wish, however, I believe our professional position would be better if we were to accept a percentage fee. We would agree to include retainer of the geological expert at our expense in case we went on this basis. We would propose to prepare all necessary plans, specification and contract documents, prepare necessary filings, location surveys, inspect and supervise construction, and prepare final plans and report complete for the wells, equipment and housing. Our proposed fee would be 7 percent of the net total construction cost which is in accordance with standard fee schedules for this magnitude of work.

In this regard we have made an investigation into the possibility of obtaining water from wells.

Following is a report on this to date.

BISHOP AND PETERSON

Dean F. Peterson

The situation with regard to the more complicated and has already been far more expensive than we originally thought. There are already an estimated two-hundred odd wells, all but about 13 are small domestic wells located in Logan City and immediately adjacent to the west. Fortunately these are shallow, 200 feet maximum and mostly of the order of 100 feet in depth. The State Engineer will not grant a permit to drill without hearings if we file for water from these shallow aquifers. Advertising and hearings may take several months. Even if such permits were granted, we would then face litigation—a single disgruntled well owner could start it, and based on the recent current water decision we would seriously risk our investment due to court injunction if we tapped these shallow aquifers in any case. Mr. Hayes of the State Engineer's Office feels we would be protected from interference possibilities if we tapped aquifers at depths of below 500 feet and believes an immediate permit may be issued to drill wells in such aquifers. There would seem to be no difficulty about selecting the exchange for canal water and changing the point diversion to De Witt spring.

With this situation in mind Mr. Hughes, Mr. Kesling and I tentatively chose locations for four wells. These are indicated on the attached map. They would deliver water to the Logan and Northern Canal and two to the Hyde Park and Logan Hospitalia Canal. Because of the fact that no logs are available at these depths in this region, since dry holes were recently found both at North Logan and Richmond, and because of the greater investment required for the deeper wells, and since I am not a geologist, I consulted Mr. J. Stuart Williams, a professional geologist, who is both
Dr. Dean F. Peterson, Dean
School of Engineering
Utah State University
Logan, Utah

Dear Dean:

Enclosed you will find specifications for the drilling of a 16" O. D. irrigation well.

You will note that the specifications call for the Owners to furnish the pipe necessary to drill the well. Our reason for doing this on the one well was because of the steel strike and it was necessary for us to protect the driller. This provision is highly undesirable and only as a last resort would I use it. It is readily understandable that for any reason the well driller might choose, either rightfully or wrongfully, he can blame and use as an excuse, faulty pipe. Where if he furnishes the pipe and it is solely his responsibility less trouble is apt to occur.

If we may be of further assistance to you, please let us know.

Sincerely yours,

N. S. Bassett
Mr. Criddle:

In connection with our applications for well appropriations Nos. 32, 883; 32,884; 32,885; 32,886, reference is made to your notice of protest dated May 24 transmitting several protests and to subsequent protests totalling 35. These protests are listed on the attached tabulation.

We do not believe that any of these protests are based on valid grounds for the following reasons:

Of 35 protestants, 30 (all except Nos. 5, 18, 32, 33, 34) are in connection with wells apparently in Young Ward. We feel that the proposed wells will not interfere for the following reasons:

1. Isopiestic maps of the ground water aquifers tapped by these wells show conclusively that the origin of the water is definitely from streams to the south, not from the Logan River drainage.

2. These wells are generally 5 miles or more distant from the nearest proposed well. This should be well outside the reasonable zone of influence of the proposed wells, even if they tapped the same stratum.

3. These wells are generally not deeper than 100 to 200 feet and therefore tap much shallower strata different from the strata (below 250' depth) which Logan City proposes to tap.

With regard to possible interference with wells owned by River Heights (No. 5), these wells penetrate strata at least 150 feet above those which Logan City proposes to develop. They are on the opposite side of and near to Logan River and probably obtain their supplies by rather direct recharge from Logan River. Unless the whole aquifer in this area were homogeneous and unstratified, which would preclude artesian pressure and which is not the case, it is almost impossible that interference could occur. Mayor Olsen has not protested the drilling of the Logan City wells, but has only asked for an evaluation.
With regard to protestant Carson, No. 18, this well is one and one-half miles away. It doubtless penetrates much shallower sediments than those which Logan City proposes to penetrate.

With regard to protestant Pinder, apparently for Logan River and Blacksmith Fork Irrigation Co., on the grounds that springs and return drainage to the river above their diversion will be dried up, this seems inconceivable. It is impossible to imagine that these shallow drainages could have any hydraulic connection with the deep strata Logan City proposes to penetrate.

Based on the above information, we feel that our applications should be approved without further delay.

Mayor, Logan City
8. Orson W. Wilson  Rte 1  Logan, UT.
   Culinary well No. 31820. I cannot find this in the
   Sections within and adjacent to Logan City. How
   far away is it? He implies that he lives some distance
   from Logan.

9. Dilworth Young  Rte 1  Logan, Utah.
   Think Logan should develop surface storage. Culinary well
   A29306. How far from the proposed wells is this
   well located.
<table>
<thead>
<tr>
<th>Plaintiff</th>
<th>Location</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floyd V. Israelsen</td>
<td>Young Ward</td>
<td>Claims culinary and animal use of flowing wells. No reference is made to any specific appropriation. No information is given as to depth of wells. These wells must be several miles away from the nearest proposed well if not much farther. These wells are already drying up. What is their depth and location?</td>
</tr>
<tr>
<td>Lorin Coleman</td>
<td>RFD #1</td>
<td>Eight wells, six irrigation; 2 culinary. These wells are at least 3 miles away from the proposed wells. Depth or appropriation numbers are not stated.</td>
</tr>
<tr>
<td>Willard K. Hill</td>
<td>RFD #1</td>
<td>Culinary well # A23877, I do not find this in 53, 33, 427, 28 Tp 12 or 5 3 Tp 11. So it must not be very close.</td>
</tr>
<tr>
<td>Norman J. Olsen</td>
<td>RFD #1</td>
<td>Not a definite protest; only if State Engineer finds interference. #1 is 12'14&quot; 192&quot; located on bench in River Heights immediately. So is Logan R. #2 is 12½' - 140' deep. Both penetrate strata far above those proposed by Logan City.</td>
</tr>
<tr>
<td>Heber Olsen, River Heights Town</td>
<td>River Heights Town</td>
<td>Culinary well in Young Ward. Doesn't say how far away or how deep.</td>
</tr>
<tr>
<td>Frederick N. Lloyd</td>
<td>RFD #1</td>
<td>Culinary well in Young Ward. Doesn't say how far away or how deep.</td>
</tr>
<tr>
<td>Russell Williams</td>
<td>RFD #1</td>
<td>Says located in Sec. G 491. Doesn't say how far away or how deep.</td>
</tr>
</tbody>
</table>
October 10, 1961

Mr. Muril Osborne:
Technical Services Inc.,
292 West Center Street
Provo, Utah

This will instruct you to proceed with construction of a production well at Site No. 3 in accordance with the specifications which are part of the contract between Logan City and Technical Services, Inc. Permission is granted to remove the casing from the 3rd test well at this site and to construct the production well in that hole. It is understood that this permission in no way amends or modifies the basic contract, by implying any liability on the part of the owner for the success or failure of this particular method of construction, or otherwise.

It is our intent to issue a change order permitting use of a 20" casing for the first section of the production hole and this letter also constitutes notice of such intent.

BISHOP AND PETERSON

cc: Commissioner Winget
   City Engineer
   Technical Services, Inc.
Mr. Muril Osborne:
Technical Services Inc.;
292 West Center Street
Provo, Utah

This will instruct you to proceed with construction of a production well at Site No. 3 in accordance with the specifications which are part of the contract between Logan City and Technical Services, Inc. Permission is granted to remove the casing from the 3rd test well at this site and to construct the production well in that hole. It is understood that this permission in no way amends or modifies the basic contract, by implying any liability on the part of the owner for the success or failure of this particular method of construction, or otherwise.

It is our intent to issue a change order permitting use of a 20" casing for the first section of the production hole and this letter also constitutes notice of such intent.

BISHOP AND PETERSON

cc: Commissioner Winget
City Engineer
Technical Services, Inc.
CHANGE ORDER NO. 1

to

CONTRACT FOR EXPLORATORY DRILLING
AND WATER SUPPLY WELLS

LOGAN, UTAH

Technical Services, Inc.
292 West Center Street,
Provo, Utah

Gentlemen:

Reference is made to your contract with Logan City for drilling exploratory wells and construction of water supply wells dated July 10, 1961. In this connection you are directed, as required by the Engineer, to begin construction of the production wells using 20-in. diameter casing of weight and quality satisfactory to the Engineer and in accordance with the general intent of the specifications. This casing shall be extended to such depth as agreed to by the Engineer in consideration of your recommendations.

It is agreed that compensation will be at the bid price per foot for 16-in. casing plus the actual cost to the contractor for the extra shoe required for each well and the increased size of casing. Certified copies of vendor's invoices to support these increased costs shall be included in regular requests for payment submitted in accordance with the specifications.

October 10, 1961

Approved for Logan City

City Engineer
Dec. 6, 1961

Technical Services, Inc.
292 West Center Street
Provo, Utah

Gentlemen:

You are hereby authorized to reduce the size of the casing from 16" to 12" for drilling the production well below a depth of 394' and to proceed with drilling until ordered to stop by the engineer.

BISHOP AND PETERSON
Mr. Duane Jensen  
Technical Services, Inc.  
Logan, Utah  

Dear Mr. Jensen:

As per our conversation of December 13 you may discontinue drilling at approximately 465 feet depth. Please plug off the bottom of the well with a cement plug approximately 6 feet long and perforate as follows, with full-size perforations approximately 1/2" x 6".

<table>
<thead>
<tr>
<th>Depth</th>
<th>Perforations per Ft.</th>
<th>Perforated Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>315-325</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>325-335</td>
<td>Blank</td>
<td>0</td>
</tr>
<tr>
<td>335-365</td>
<td>12</td>
<td>30</td>
</tr>
<tr>
<td>365-375</td>
<td>Blank</td>
<td>0</td>
</tr>
<tr>
<td>375-385</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>385-395</td>
<td>Blank</td>
<td>0</td>
</tr>
<tr>
<td>395-420</td>
<td>8</td>
<td>25</td>
</tr>
<tr>
<td>420-440</td>
<td>8</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>95 feet</strong></td>
</tr>
</tbody>
</table>

Please then surge and bail until the well is clean. After you have sealed off the joints where the pipes reduce you may proceed with the pump test. It is intended that the well be pumped to full capacity for at least 48 hours.

Sincerely yours,

PETESEON & BISHOP  
Engineers