

SUMMARY COMMENTS

ON

MOSCOW - PULLMAN WATER SUPPLY
WITH SPECIAL REFERENCE TO THE
ADVISABILITY OF RELYING GROUND
WATER FROM THE PRESENTLY IDENTIFIED
GROUND WATER AQUIFERS OF THE MOSCOW BASIN

by

C. C. Warnick
Professor of Civil Engineering
University of Idaho

to be
presented orally to
Moscow City Council
March 1, 1971

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INTRODUCTION

I have followed the Moscow Water Supply problem for many years and have served at times on the Moscow City Water Supply Committee and was in 1967 asked by Mr. Kenneth Dick to prepare a recommendation regarding application for water rights for presentation to the Idaho Board of Regents with respect to action the University might take. This recommendation was dated March 3, 1967 and a copy is appended to this summary of my comments.

It should be pointed out that the recommendation requested was concerned with a surface water supply and the reply was so directed at that time I did not discourage further search for water supply from ground water and have since encouraged the two cities actions to try to develop a new rotary-drilled well, primarily for exploratory purposes. This 1967 recommendation was also prior to the report of Jones and Ross entitled "Moscow Basin Ground Water Problems - How Long Will the Water Last?"

The contention as presented in the conclusions of Dr. Jones as presented to the Moscow City Council on January 25, 1971 would appear to convey the idea that it is unwise to continue action as recommended by the Moscow-Fullman Water Supply to pursue further negotiations for obtaining a surface water supply. I feel that this is the purpose for which I have been asked to advise the Moscow City Council as to the course of action to follow with regard to further water studies.

INTERPETIVE MATERIAL

I will state first that I am concerned that the Jones and Ross report may be taken to be too optimistic for a contention that ground water from the Moscow Basin will be adequate until the year 2000 and perhaps 2100.

I should like to present my points in opposition to certain statements and conclusions presented in summary form to you on January 25, 1971.

From page 4 of Dr. Jones' presentation the following is repeated:

Interpretations

1. In order to reach the artesian aquifers, much of the recharge passes through the water-table aquifers in the recharge zone.
2. If pumpage exceeded recharge to artesian aquifers then the water-table aquifers should have shown long-term declines during the time that the artesian aquifers showed long-term decline

Observation

Hydrographs shown below demonstrate that water table in surficial aquifers has been stable for many years. Water-table fluctuations are related to differences in precipitation and show no relation to the decline or recovery of the water levels in the upper artesian zone.

Conclusion

Pumpage of upper artesian zone did not exceed recharge through 1966.

Analysis of these contentions:

The first indicates much of the recharge passes through the water-table aquifers. This is not borne out by studies of J. W. Crosby III and his graduate student Chang-Lu Lin.

Crosby and Lin contend that the mechanism for ground water recharge is channelized underflows which appear to be occurring mostly up against the contact between the basalt and the granite basement rocks near the boundaries of the basin.

I contend that the water-table aquifers would not necessarily fluctuate if the artesian aquifer below it had only a limited hydraulic connection at the boundaries. Evidence in their Figure 3 would indicate that there is a slight upward trend to the water level of the surficial aquifers with time. I would explain this as a response to a steady increase

in watering of lawns and delay in surface runoff due to man's activity in the central populated portion of the basin.

A study of two reports mentioned by Jones and Ross namely Bloomsburg and Stevens reveals some interesting questions with regard to possibilities for recharge of the basin.

Bloomsburg Study of Crumarine Creek shows:

On page 37, Table 6, annual precipitation as follows:

1955-56	42.5 inches
1956-57	32.3
1957-58	40.6

On page 39, Table 8, annual runoff as follows:

1955-56	12.10 inches
1956-57	8.64
1957-58	8.92

On page 39, Table 7, figures for evapotranspiration

	High Value	Low Value
1955-56	21.39 inches	19.8 inches
1956-57	21.37	17.2
1957-58	24.74	18.5

If we perform a water balance on these figures, it is revealing, note a water balance equation is:

Recharge = Precipitation - Runoff - Evapotranspiration.

We would recharge under the higher figure of evaporation as follows: Possible

Annual Recharge as follows:

1955-56	9.0 inches
1956-57	2.3
1957-58	7.0 or 260,000,000 gallons

This amounts to an average annual recharge of 6.1 inches which is enough water from that basin to supply the present average demand of Moscow and University 2,000,000 mgd for 130 days. This does not appear to be a very large contribution to recharge from the area which Crosby and Len contend basin recharge is coming from. It is recognized that there is other recharge to the aquifer, but this points out a limiting possibility.

To confirm this questionable limit, the Stevens report indicates seasonal evapotranspiration at Moscow is about 17.0 inches with a possible error of 25%. Thus evapotranspiration could be as high as 22 inches or equivalent to average precipitation. This does not consider the runoff that does occur. Thus I contend recharge to the Moscow basin aquifers is not very high and cannot be expected to supply a high sustained yield of ground water withdrawal.

I only would ask one question then, If the declining levels in the upper artesian aquifer was not overdraft above recharge what really caused the continued decline?

Analysis of the Jones and Ross model study:

I would contend that the Jones-Ross Model is not a valid model on three points:

1. The aquifer is not infinite to the west as assumed and these leads to a premise that is explained orally and by the figures.
2. The model does not consider withdrawals by Pullman which appear to be drawing water from the lower aquifers.
3. The change in water levels in the aquifers could occur in the model and take an infinite time to draw down because water is coming from storage on the infinite side of the model.

A series of sketches illustrate the point here.

(Figure 1, 2, and 3.

- 4. The increased rate of drop in the piegometric level in Pullman wells would give support to the questionable nature of the model. See Figure 3.

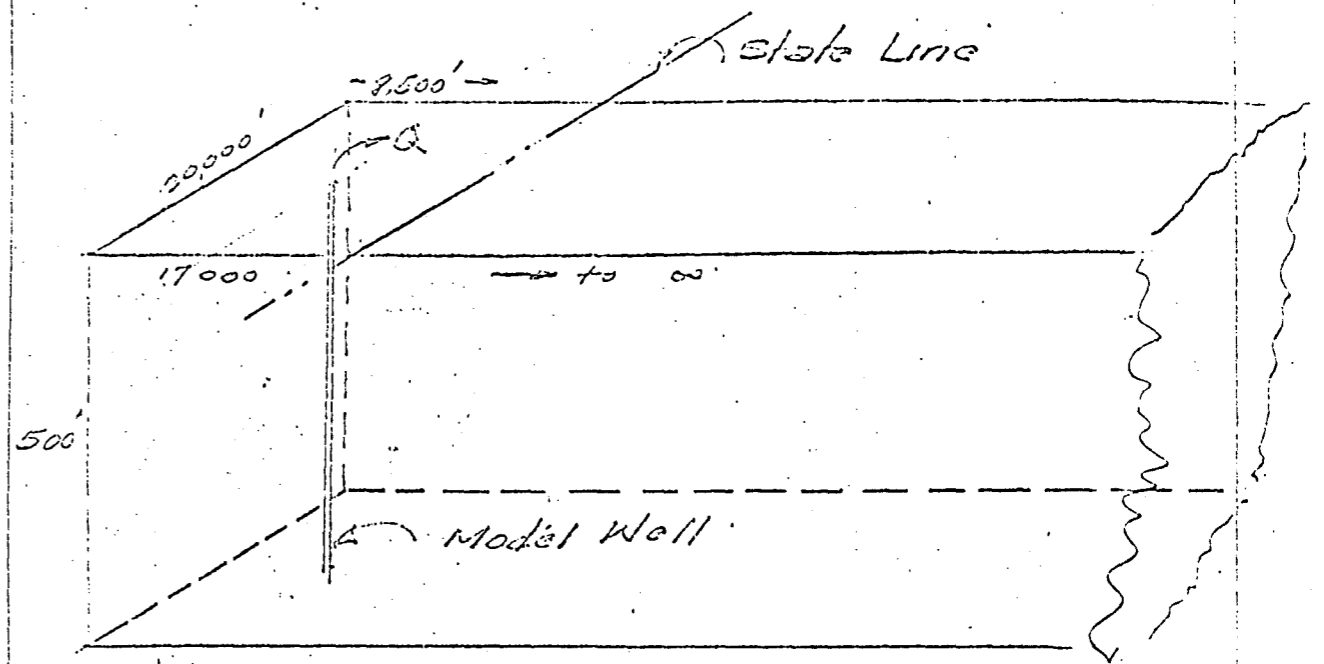


Fig. 1 oblique view of Model Aquifer Upper Artesian Zone.

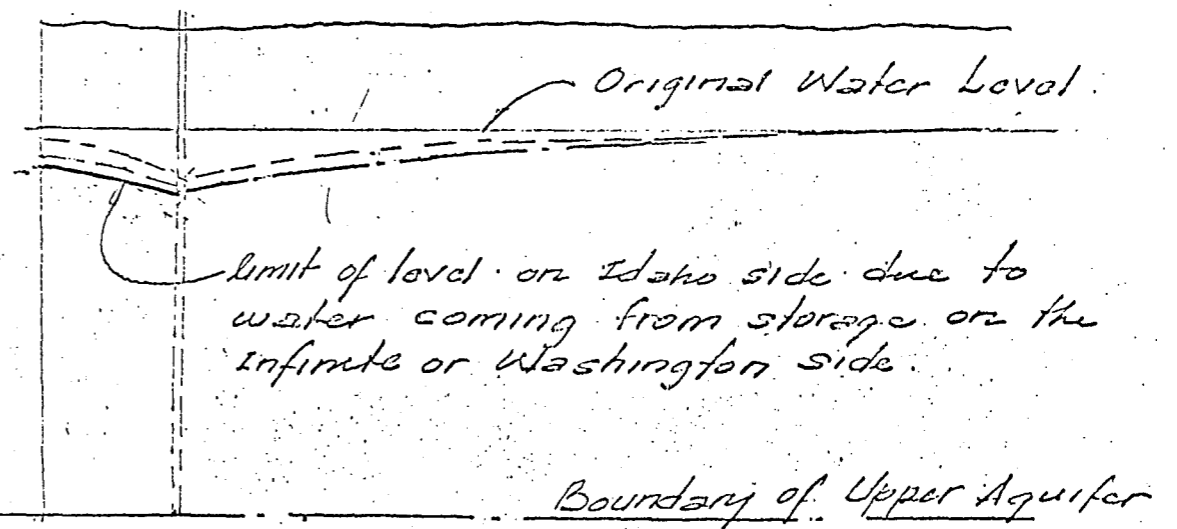
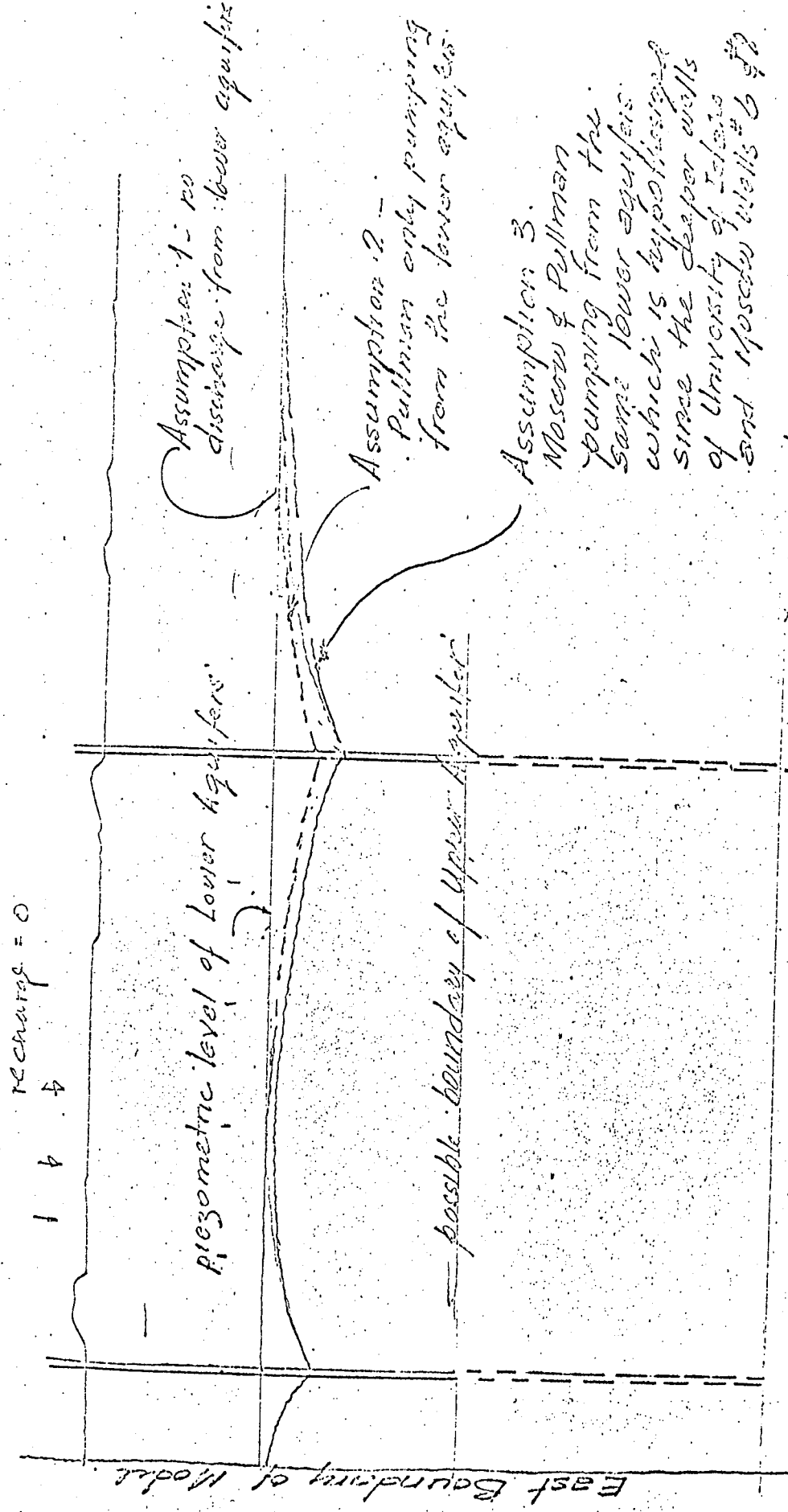


Fig. 2 Explanation of ground water coming from storage on infinite side.



This would explain more rapid drawdown of Pullman wells in first few years.

Fig. 3 - Hypothetical sketch of Model of Bounded Infinite Aquifer with No Recharge

CONCLUSIONS AND RECOMMENDATIONS

On the basis of my brief study of the problem, I conclude the following:

1. It is unwise to assume that water in storage in Moscow Ground Water basin is adequate even until the year 2000.
2. It is wise to continue water investigations as recommended by the Moscow-Pullman Water Committee which I believe envisions seeking a surface water supply that will be conjunctively developed with the ground waters as known plus possibilities of discovery^d even additional ground water supplies.

I recommend the following for the consideration of the Moscow City Council and the Moscow-Pullman Water Supply Committee.

1. An increased program of ground water studies that is very well integrated with Pullman interests. To include such specific items as follows:
 - a. A search for a definitive mapping of the different piezometric levels that apparently exist between different aquifers or zones that tries to identify the connection between Moscow and Pullman wells.
 - b. An observation of ground water levels that is more extensive than present particularly assessing advisability of monitoring Moscow City Well No. 7 and the Sunset Memorial Gardens well over an extended time base.
 - c. The encouragement of additional geophysical work in Washington. It appears to me much more is known in Idaho than in Washington.

- d. The encouragement of a very careful evapotranspiration study that will help indicate what the potential recharge is in the basin.
2. A stepped up program of trying to organize the Moscow-Pullman Water Supply Committee into an organization that can carry on a sustained planning effort, a development and construction program, and finally an operating program.
3. A study through appropriate state agencies of the true legal status of reciprocal water use in this case.
4. An effort that will encourage reuse of wastewater to conserve net water consumption in both communities, but particularly the University of Idaho.
5. A program of continued effort to get whatever cooperation and financing can accrue by involving state and federal agencies in all phases of the program.
6. A firm committment of working for a multiple use concept in considering any water supply studies for the communities.
7. Bring specific requests to appropriately trained personnel of the two Universities and seek their advice and cooperation.