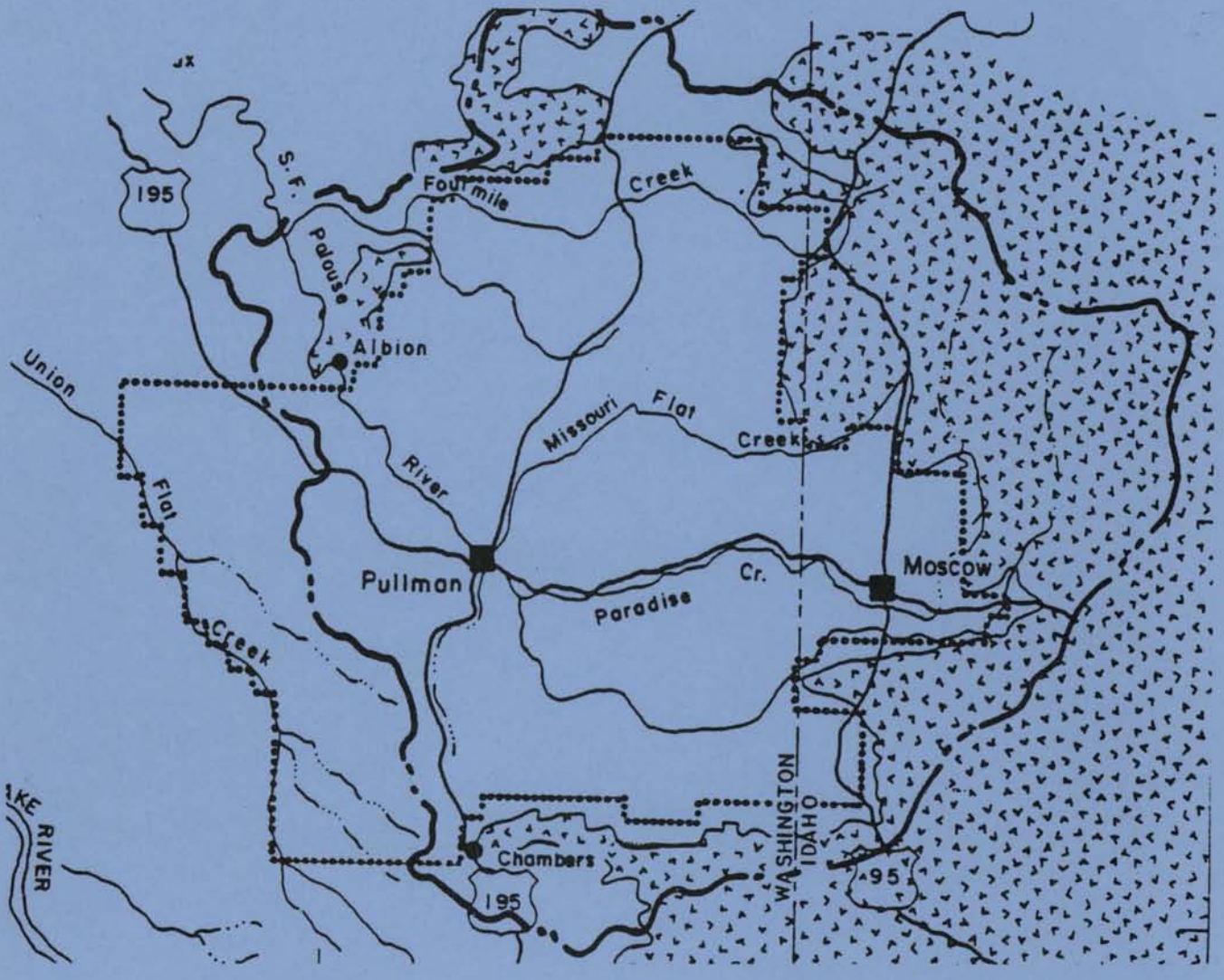
CATALOG OF WATER REPORTS PERTINENT TO THE MUNICIPAL WATER SUPPLY OF PULLMAN, WASHINGTON AND MOSCOW, IDAHO — A SUMMARY



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INTRODUCTION

A series of meetings of officials and representatives of the University of Idaho, Washington State University, City of Moscow, City of Pullman, Latah County, and Whitman County identified the need to determine whether the water supply situation in the Moscow-Pullman area was being adequately planned (as of 1984). Discussion revealed the extensive accumulation of reports that has been written about the subject and filed in various offices. It was recognized that no one person or entity could hope to keep the information in mind or even give proper focus and interpretation. To help in keeping the information in an accessible form and to aid future decision makers with pertinent information, it was agreed that an annotated bibliography should be developed of reports that have been written on the subject and an appropriate bibliographic listing be developed along with an indication of where the reports are filed. A brief description of the water supply situation as to source, locations of wells, and organization of operating entities along with a brief history of the Pullman-Moscow Water Committee activity is here reported to assist those who will at times want to review the problem of water supply for the communities and entities involved.

WATER SUPPLY SITUATION AND ENTITIES INVOLVED

The municipal water supply for the Pullman-Moscow area consists of four separate systems; (1) the University of Idaho, (2) City of Moscow, (3) Washington State University, and (4) City of Pullman. All water is drawn from ground-water. Studies catalogued in this summary indicate that there is a hydraulically connected ground water aquifer that supplies the four entities. Figure 1 shows a map of the area, the

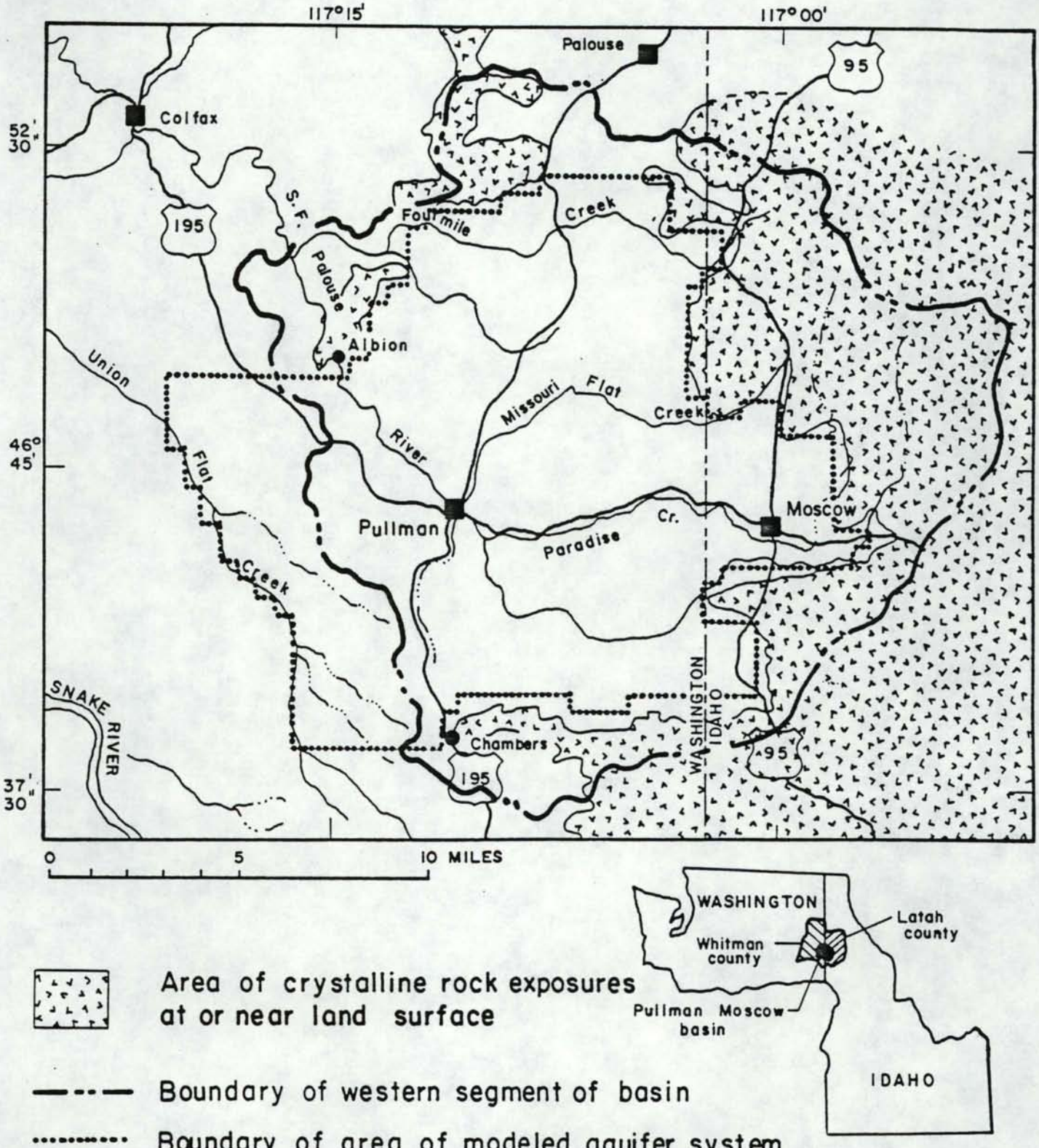
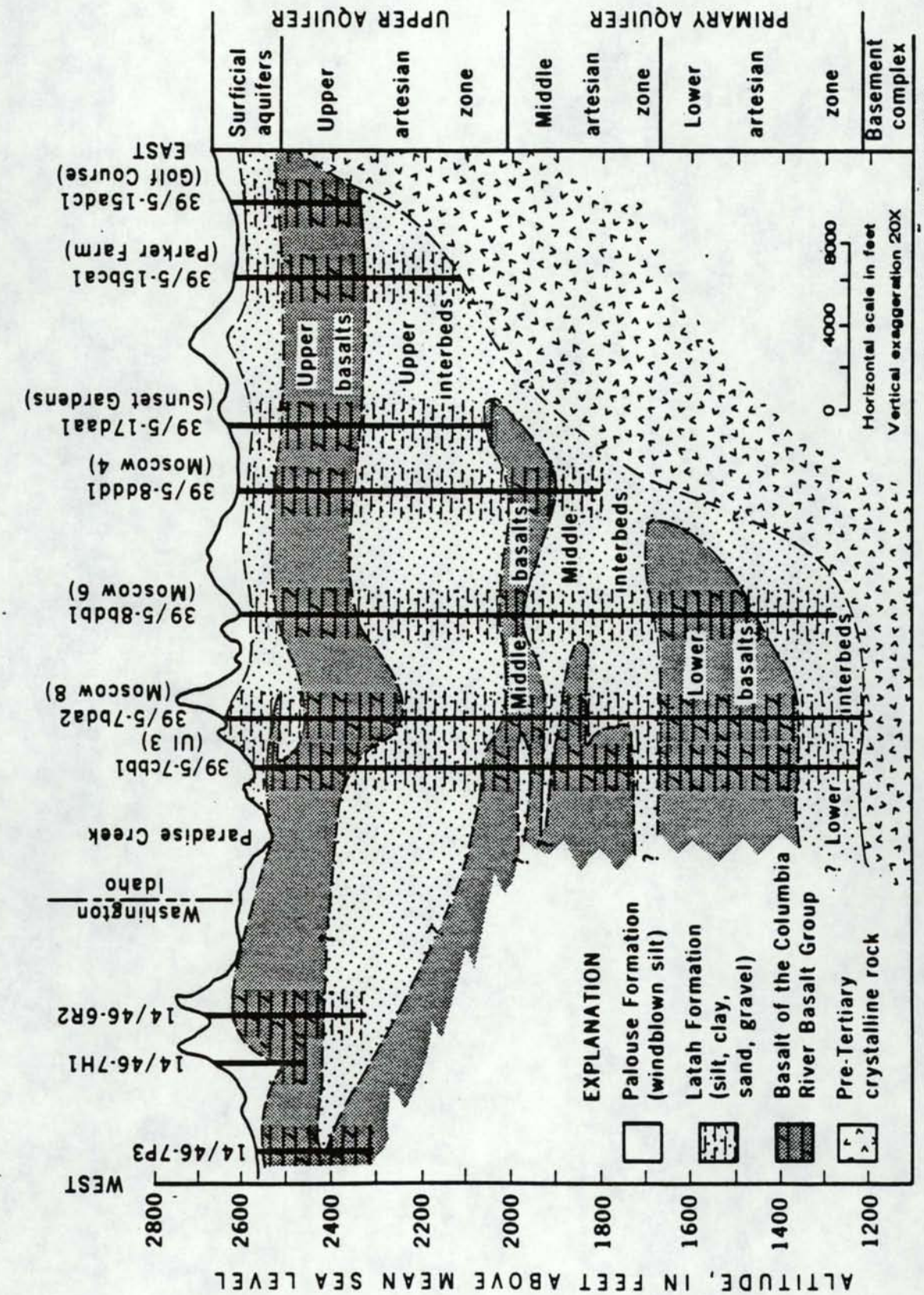


Figure 1. Map of Pullman-Moscow Ground Water Supply System and Principal Communities Involved



Source: Barker (1974)
Jones and Ross (1972)
Lin (1967

Figure 2. Schematic Cross-Section of Pullman-Moscow Ground Water Aquifer

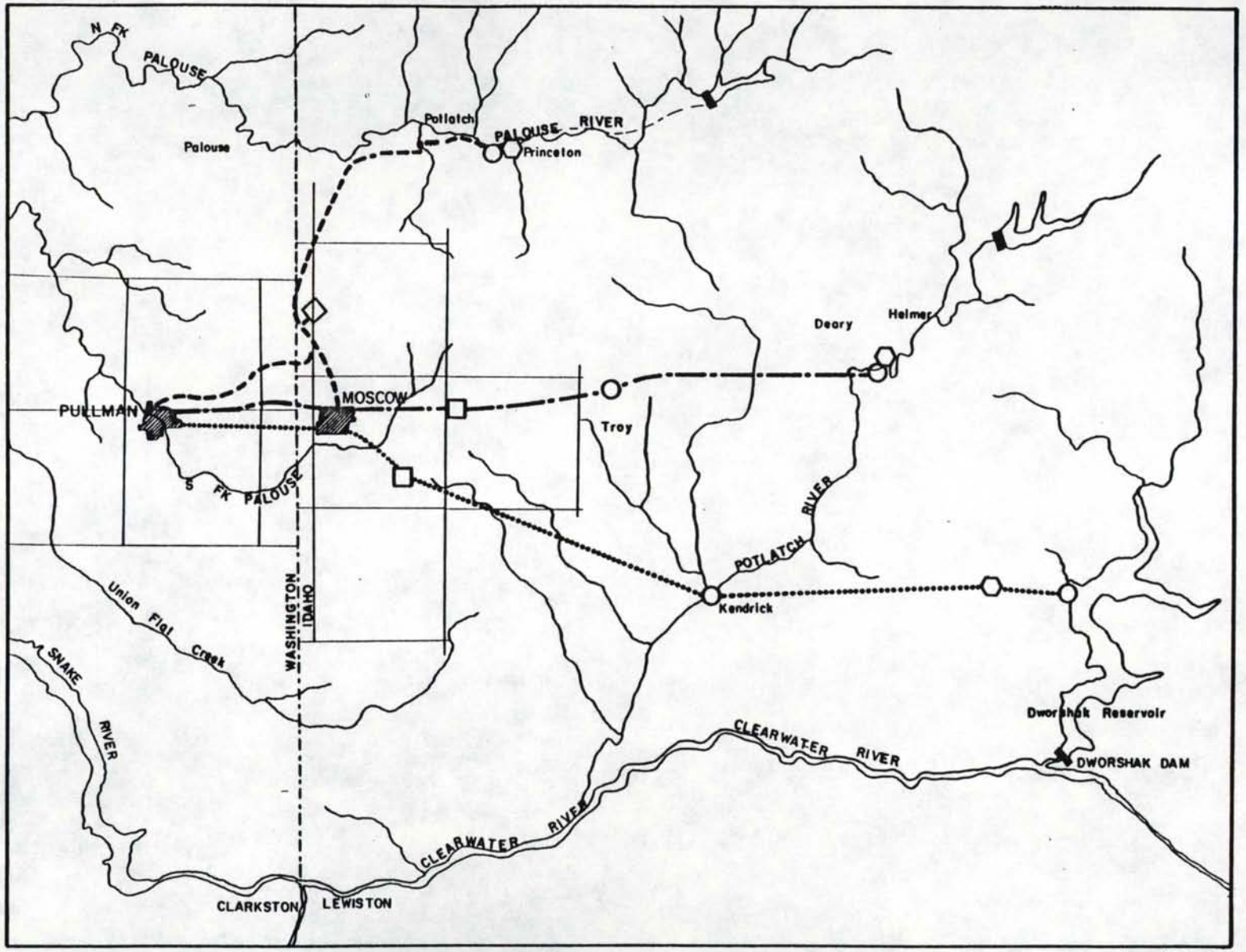
location of the major users of water, and indication of general boundaries of the groundwater aquifer as well as the surface water hydrologic boundary. Figure 2 gives a schematic cross-section of the groundwater system and the relative location of principal wells.

Recent interest in the planning functions of Latah County and Whitman County has indicated the growing suburban areas may at times have a water shortage and the future use of water is not just a municipal problem but a bi-county problem, so there is interest in county government of being properly aware of water supply and its adequacy.

In the 1960's there appeared to be a rather serious decline of the ground water levels and this led to several reports, meetings, and entity studies. New wells were drilled and systems enlarged to meet growth. A significant study at the close of the 1960's was a study of surface water alternatives for supplying water (Stevens, et.al., 1970). That report identified interesting possibilities and should be of interest to future officials, planners, and decisions makers. Figures 3 and 4 are maps indentifying the various possible schemes. That study and several subsequent ones were the result of recommendations and action of a Pullman-Moscow Water Committee that has functioned with varying degrees of activity.

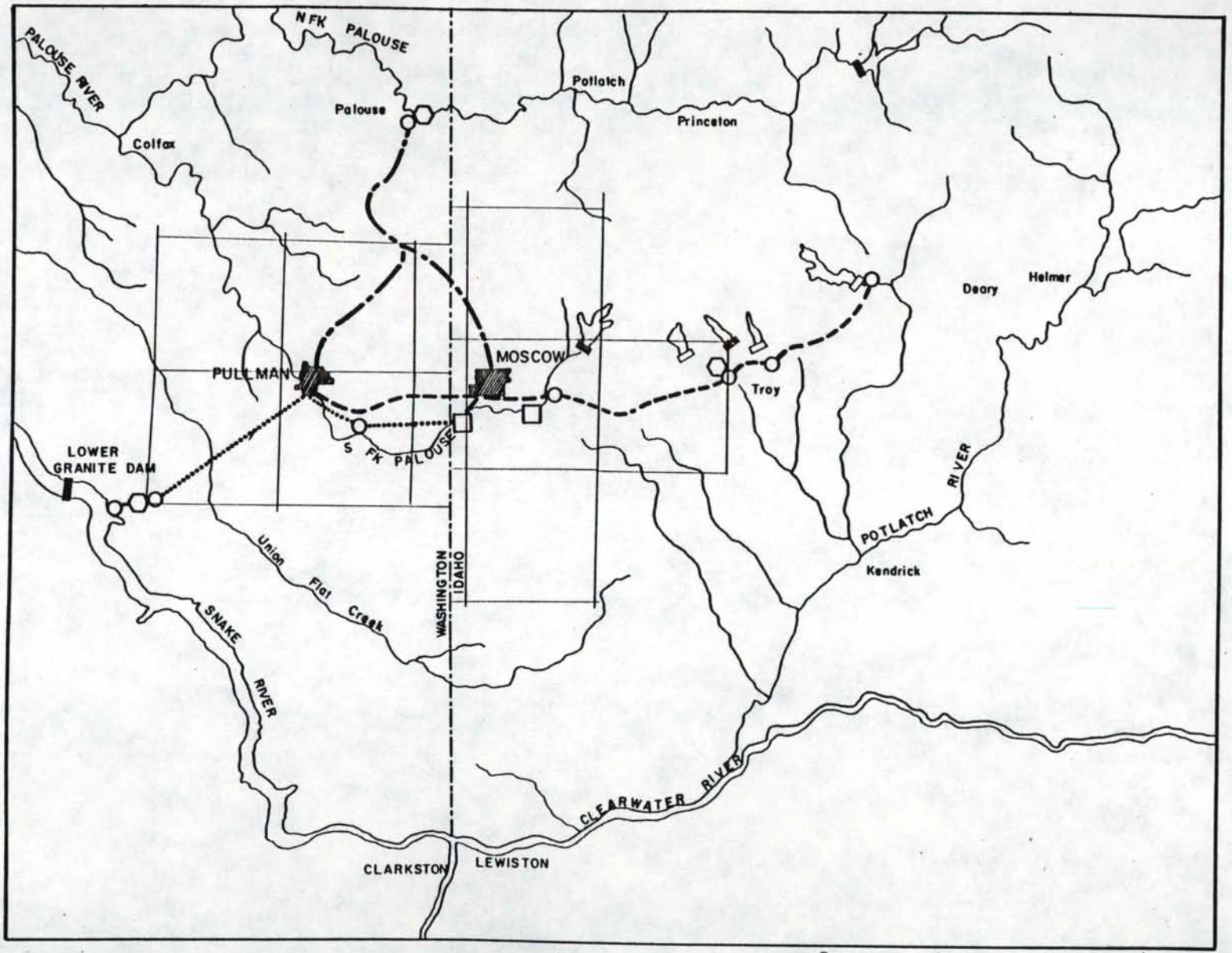
PULLMAN-MOSCOW WATER COMMITTEE

As a result of a recommendation made at a meeting of the Regents of the University of Idaho, the four entities of the University of Idaho, City of Moscow, Washington State University, and City of Pullman organized an eight member committee to study the water supply problem and to make recommendations to the respective governing and administrative leaders. The committee functioned very actively for the period



Source: Stevens, et.al. (1970)

Figure 3. Location Map of Alternatives for Surface Water Supply to Moscow and Pullman (Map 1)



Source: Stevens, et.al. (1970)

Figure 4. Location Map of Alternatives for Surface Water Supply to Moscow and Pullman (Map 2)

from 1967 to 1977 and then a public reaction to a Corps of Engineers planning study on a pumped-storage development brought the committee to a state of inactivity and committee membership was not replaced as members moved or passed away. Near the close of the committee activity, two rather significant recommendations were made. The first was that the U.S. Geological Survey make a groundwater model study. That study was rather slow in being published but was released in 1979 and made some projections of possible lowering of the groundwater levels in the deeper aquifers of the Moscow basin. The other recommendation of the committee was that the sewage effluent of the City of Moscow sewage treatment plant be used as a water supply source for the play field and the University of Idaho golf course. This was considered to be a prudent conservation measure that would help reduce the growing demand on water. That recommendation has now been implemented and there appears to be confirmation of the wisdom of that water supply decision.

A 1982 oral report by J.W. Crosby reviewed the U.S. Geological Survey projections of 1975 and compared the projections with the actual trends in water level. The report was made at a meeting at City Hall in Pullman on March 24, 1982. The officials and representatives present at the meeting at which Crosby reported recommended that an annual updating of water level changes and water pumping be circulated among the entities of University of Idaho, City of Moscow, Latah County, Washington State University, and City of Pullman. A further recommendation was that the Pullman-Moscow Water Committee be disbanded until a more urgent need becomes apparent. This report was commissioned at that time to insure that adequate records be preserved and adequate base maintained for future studies.

The untimely death of J.W. Crosby prompted a reconvening on March 7, 1984 of representations of the two universities and the two communities at which an updating of the trends of water use and water level decline was presented. As a part of the record these findings are presented as Figures 5 and 6. The concensus of the group was that a careful monitoring be continued and that a study be made of the digital groundwater model developed by Barker (1974) incorporating the 10 years of new data and responding to questions of applicability of the model that might have arisen.

ANNOTATED LISTINGS

The following are citations and a brief annotation of each report that has been prepared on the Pullman-Moscow water supply problem. The listing is arranged alphabetically by author and an indication is made on each entry as to where a copy was on file as of April 1982.

A recommendation of the writers and preparers of this catalogue is that it be updated at least every five years and an inventory be made to confirm that the reports are still available for possible detailed study.

Abbreviations for the violation as to where reports are filed is as follows:

IDWR - Idaho Department of Water Resources, Statehouse, Boise, ID
IWERRI - Idaho Water & Energy Resources Research Institute, Moscow, Idaho
M - Moscow City Hall
P - Pullman City Hall
UIPP - University of Idaho Physical Plant
UI Library- University of Idaho Library
WRC of WSU- Water Resources Center of Washington State University
WSU - Washington State University Owens Engineering and Science Library

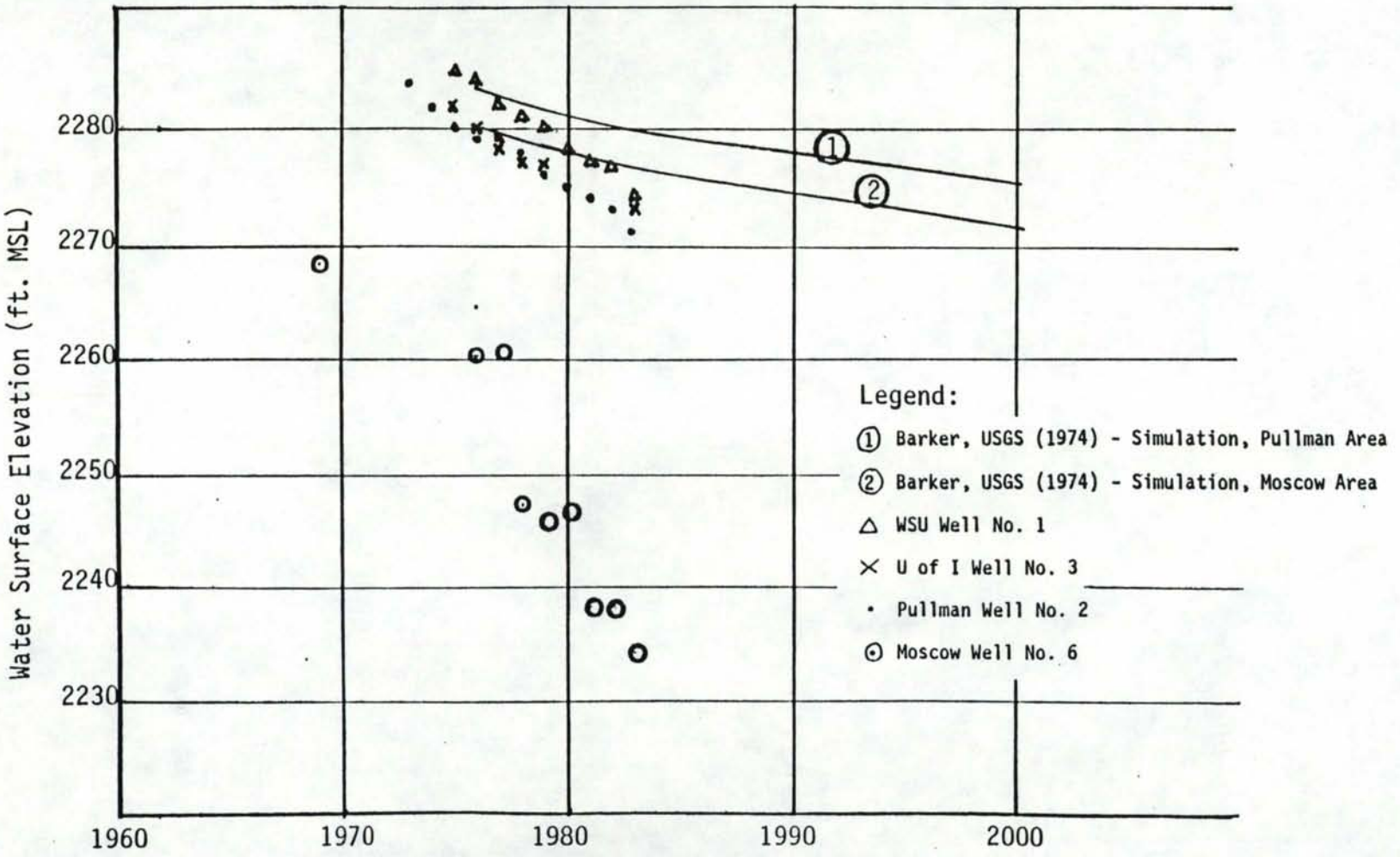


Figure 5. Comparison of Actual and Projected Decline of Water Levels in Wells of Moscow-Pullman Basin.

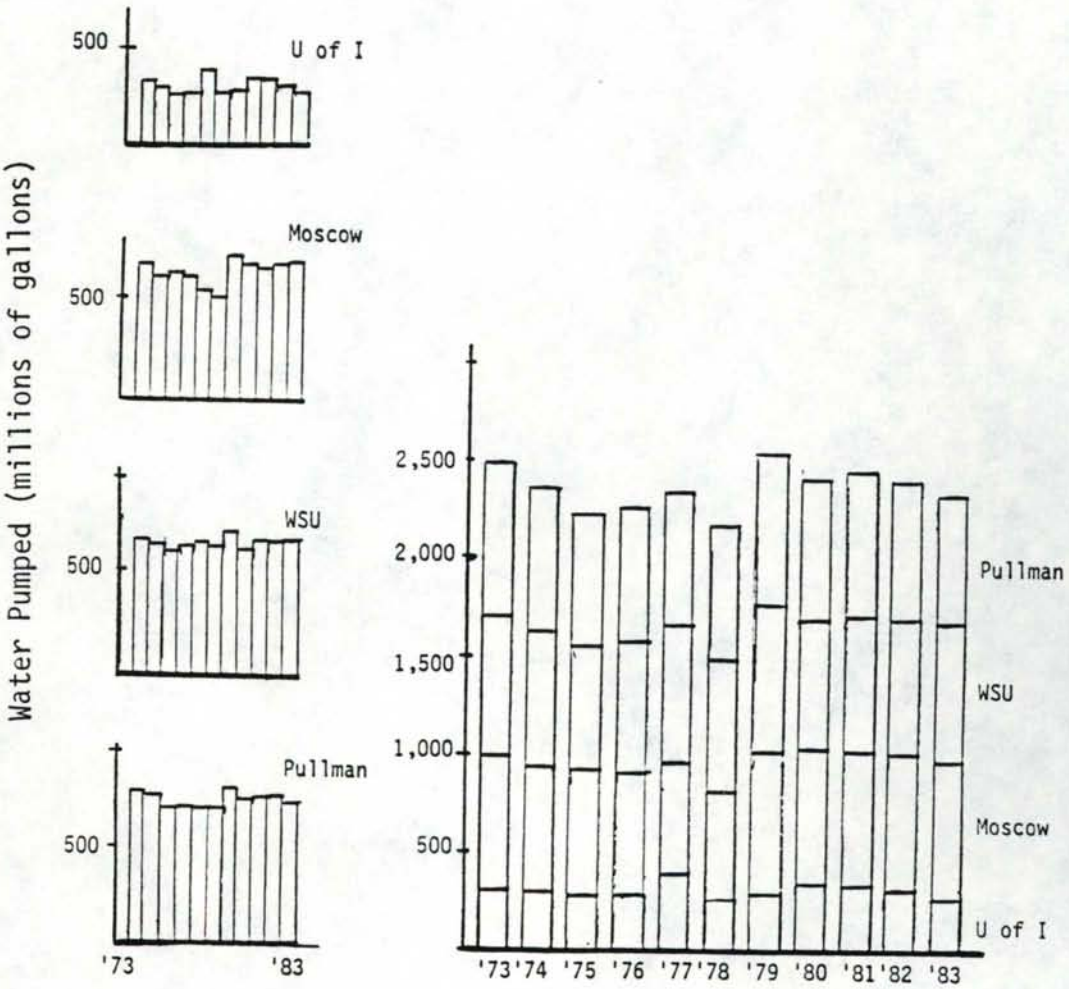


Figure 6. Moscow-Pullman Community Water Usage as Pumped from Ground Water

Abbott, Jesse W., 1968. "A Flood Analysis of Paradise Creek, an Ungaged Stream near Moscow, Idaho", Master of Science Thesis, University of Idaho, Moscow, Idaho, 97 pages.

The first phase of this report presents a flood frequency curve for Paradise Creek at Moscow, a method of estimating flood frequency curves for other locations in the Palouse Basin, and rainfall intensity-frequency-duration curves for the Moscow area. Phase II delineates areas of potential flooding within Moscow and presents recommendations.

Location: University of Idaho Physical Plant (UIPP)
Moscow City Hall (M)
Idaho Water and Energy Resources Research Institute (IWERRI)
U of I Library

Agnew, Allen F. and Russell W. Busch, 1971. "Interstate Ground Water Aquifers of the State of Washington". State of Washington Water Research Center, Pullman, Washington, 163 pages.

This summary of ground water problems around the borders of the state of Washington contains a good description and review of the Pullman-Moscow area. Further testing to define the groundwater regime is suggested. A separate section of the report covers the legal aspects of interstate aquifers.

Location: IWERRI
WRC of WSU

Allred, C. Stephen, 1973. "Water Users Handbook, The How and Why of Water Rights and Related Matters". Idaho Department of Water Administration, Boise, Idaho, 25 pages.

This handbook has been prepared to give answers to general questions about water rights in Idaho, and how one obtains and perfects these water rights. Data for irrigation seasons and water requirements, as well as information on dam safety, well drilling and related matters is provided.

Location: IWERRI

IDWR, Statehouse, Boise

Anderson, Keith E., 1973. "Evaluation of the Ground Water Situation in the Moscow-Pullman Basin". Anderson & Kelley, Boise, Idaho, 5 pages.

This letter report to the PNWRC recommends that groundwater use be continued in the Pullman-Moscow area. Future development should include increasing the production from existing wells prior to drilling new wells, drilling new wells as required, interconnection of city and university systems in each city, and eventually interconnecting the two cities. With proper monitoring the groundwater supply should be adequate for continued use and development, and will still give ample lead time for development of an alternative supply source, if required.

Location: IWERRI

Barker, R.A., 1979. "Computer Simulation and Geohydrology of a Basalt Aquifer System in the Pullman-Moscow Basin, Washington and Idaho", State of Washington Department of Ecology Water Supply Bulletin 48, Olympia, Washington, 119 pages.

A finite difference model was developed to simulate hydrologic characteristics of the primary basalt aquifer system in the Pullman-Moscow Basin. The author contends that vertical leakage from the upper aquifers is the most important source of recharge to the primary or deep basalt aquifer. Model simulation which projects a doubling of 1975 pumping rates by 2000 indicates a water level decline of about 30 to 35 feet.

This paper contains a review of previous investigations, records of well tapping the primary aquifer system and comprehensive recommendations for future investigations.

Location: IWERRI
Moscow City Hall
Pullman City Hall

Bloomsburg, George L., 1959. "A Water Balance Study of Two Small Watersheds". Masters Thesis, University of Idaho, Moscow, Idaho, 66 pages.

A hydrologic study of the Crumarine Creek and Gnat Creek watersheds was conducted. Isohyetal maps of the watersheds were constructed from precipitation data, evapotranspiration was

calculated, and runoff measured. Deep percolation was calculated as the sum of precipitation minus runoff and evapotranspiration. Some conclusions presented include:

1) There is an increase in precipitation with elevation in these watersheds.
2) Evapotranspiration losses vary from 53 to 69 percent of the annual precipitation.
3) Runoff from these watersheds was determined to be 22 to 25 percent of the annual precipitation.
4) Groundwater recharge was calculated to be between 7 and 35 percent of the annual precipitation.

Location: UIPP
U of I Library

Bloomsburg, G.L., 1969. Comments on Jones & Ross report "How Long Will the Water Last?" University of Idaho, Moscow, Idaho, 3 pages.

A short hand-written critique of the Jones & Ross paper is presented. The use of image wells is commented on.

Location: IWERRI

Brown & Associate, 1973. "Cost of Rural Domestic Well Near Moscow, Idaho". College of Engineering, University of Idaho, Moscow, Idaho, 17 pages

Typical costs for well construction in the area southeast of Moscow are presented. These costs are compared to the cost of

extending city service to the area. Based on these figures it is recommended that the city of Moscow consider extending services to the area and charge individual home owners for the installation of the system.

Location: IWERRI

Brown, Jeffrey C., 1976. "Well Construction and Stratigraphic Information: Pullman Test and Observation Well, Pullman, Washington". Washington State University, Pullman, Washington, 35 pages plus 9 figures.

Well construction and stratigraphic information for the 982 foot Pullman Test and Observation Well, located near the central part of the Moscow-Pullman Basin, is presented. Pump testing of the well was not performed, nor were water quality samples taken, however comparisons are made to nearby wells of similar depth.

Location: IWERRI

Brown, Jeffrey C. and Thomas Weber, 1976. "Report on Borehold Geophysical Investigations University of Idaho Well #4". Washington State University, Pullman, Washington, 12 pages.

An analysis of the geophysical investigation, and its geologic and hydrologic implications, on the 747 foot water well #4 of the University of Idaho is presented. Ten geophysical logs are presented, as are the results of pump testing.

Location: UIPP

Buettner, Mark R., 1973. "The Lost River Project-Water Quality of the Palouse River Drainage". Idaho Cooperative Fishery Unit, College of Forestry, Wildlife and Range Sciences, University of Idaho, Moscow, Idaho, 29 pages plus appendix.

Sixteen sampling stations were established and monitored for a 16 week period, from April 15 to August 1, 1972, in ann attempt to characterize the water quality of the approximately 2500 square mile Palouse River Drainage. Approximately 18 parameters were measured 11 times, flow was measured once. Results are summarized and recommendations presented for the improvement of water quality in the Palouse River.

Location: IWERRI

Butcher, Walt, 1971. "Relative Costs of Ground and Surface Water System". Department of Agricultural Economics, Washington State University, Pullman, Washington, 7 pages.

This paper presents "very quick calculations" on the relative cost of providing groundwater pumpage at greater levels from greater depths versus a switch to a surface water supply. Indications are that surface water sources will require an increase on the order of ten times the cost of groundwater supplies. Further research into the unknown variables is recommended.

Location: IWERRI

Cavin, Richard E., 1964. "Significance of Interbasin Sediments in the Moscow Basin, Idaho. Masters Thesis, Washington State University.

This reports on resistivity and seismic investigation of the formations composing the Moscow ground water aquifers. Emphasis was directed towards the sediments between basalt layers. Techniques used are discussed maps and cross-section representations are presented.

Location: WSU

Cavin, Richard E. and J.W. Crosby III, 1966. "Supplemental Seismic Studies for the City of Moscow, Idaho". Washington State University, College of Engineering Research Division, Pullman, Washington, 22 pages.

To supplement the 1960 report of Crosby and Cavin additional seismic studies of the aquifer formation in the Moscow area were performed. The general configuration of the ancient crystalline rock surface in the study area and the lithology of the stratigraphic section overlying this surface are discussed and recommendations for well locations are presented. It is pointed out that data for the area under the city are needed, and must be obtained through non-seismic means.

Location: IWERRI

UIPP

M

Collins, Ralph, et al, 1974. "Environmental Impact Statement, Laird Dam Site Project to Develop a New Water Supply for Pullman, Washington and Moscow, Idaho". Prepared by a team of students taking Environmental Science 493, Fall Semester, 1973. Faculty Advisor: George W. Hinman, Washington State University, Pullman, Washington.

A detailed ESI for the Laird Project is presented with sections on the description, scope and purpose of the Laird Dam Project, a description of the present condition of the watershed, present water quality, project alternatives, and the impacts of the proposed project.

Location: IWERRI

Coupe, Larry D., 1976. "An Economic Analysis for Several Moscow Effluent Irrigation Plans". University of Idaho Semester Planning Report, Moscow, Idaho, 19 pages.

Authors introduction:

"This paper presents a rough economic analysis of several alternative plans for irrigating University lawns with the Moscow sewage treatment plant effluent. The lawns in question are the golf course, west play fields, and the proposed expanded arboretum. The analysis shows that using the effluent is a viable method of supplying new water when the existing system becomes critical."

Location: IWERRI

Crosby, James W., III, 1964. "A Comprehensive Approach to a Local Ground Water Problem". Paper presented at New Mexico State University, NSF Water Resources Conference, June 1964, 9 pages plus figure.

This paper summarizes the seismic investigations conducted in the Moscow-Pullman area and reports on the Studies under way on carbon-14 and tritium dating of ground water.
Location: IWERRI

Crosby, James W., III, 1956. "Ground Water Exploration and Development". Washington State Institute of Technology Circular 20, Washington State University, Pullman, Washington, 25 pages.

This paper reviews the current status of certain accepted ground water exploration and development techniques, and describes some newer techniques which are being investigated. Included are seismic, electrical, magnetic, and gravity methods, drilling methods, well completion and well stimulation, well logging and artificial recharge. Special emphasis is given to the aquifer types of the Pacific Northwest.
Location: IWERRI

Crosby, James W., III and Richard E. Cavin, 1960. "Geologic Investigation of the Moscow Ground Water Basin, Employing Geophysical Studies". Geohydrologic Research Group, Washington State University, Pullman, Washington.

High resolution reflection seismology was used to study stratigraphic conditions in the Moscow area. Recommendations for development of additional groundwater supplies are included.

Location: IWERRI

UIPP

M

WRC of WSU

Crosby, James W., III and R.M. Chatters, 1965. "Water Dating Techniques as Applied to the Pullman-Moscow Ground Water Basin". College of Engineering Bulletin 296, Washington State University, Pullman, Washington, 21 pages.

In a detailed study of the Pullman-Moscow ground water basin over 50 samples of well water were collected and analyzed for Carbon-14 and for Tritium. The data indicates that the groundwater is distinctly stratified and displays a well defined relationship between water age and elevation of the productive zone.

The bulk of the groundwater appears to have been placed in storage by the closing phases of the Pleistocene glaciation. Some additional recharge has been occuring in the Pullman subbasin since the thermal maximum about 6500 years ago. Data indicate that no recharge has occured in the Moscow area in recent times; recharge in the Pullman subbasin is estimated to be 108 million gallons per year, or about 10 percent of the present pumpage rate.

Location: IWERRI
UIPP
WRC of WSU

Crosby, James W. and Jay V. Anderson, 1971. "Some Applications of Geophysical Well Logging to Basalt Hydrology", Ground Water, Vol. 9, No. 5, 8 pages.

The reviews various tools used to log well's and gives examples of logging responses to techniques used in basalt aquifers. Data of examples are taken from wells logged in the Pullman area. Particular data are presented on an observation well on the Washington State University campus and on WSU Wells No. 1 and No. 3. The principal producing zone of these wells is identified in the report.

Location: WSU
WRC of WSU

Crosthwaite, E.G., 1975. "Basic Ground-Water Data for the Moscow Basin, Idaho". U.S. Geological Survey, Boise, Idaho, 96 pages.

This report presents basic geologic and hydrologic data available for the Moscow Basin. This includes a table of well records, well logs, a table of annual groundwater withdrawals, water levels in observation wells, a contour map showing approximate elevation of the water-level in the upper series of basalt flows and interbedded sediments in the southern part of the area. A bibliography

of the more important reports pertaining to groundwater in the Moscow Basin area is also included.

Location: IWERRI

UIPP

Day, R.L., 1968. "A Microclimatic Profile Between the Snake River Canyon and Clearwater Mountains, Idaho". Water Resources Research Institute, University of Idaho, Moscow, Idaho, 60 pages, 23 figures, plus appendix and data.

Authors abstract:

"Temperature and relative humidity records have been kept at a maximum of 18 sites, and precipitation records at 8 sites, along a 75-mile profile between Wawawai, Washington, elevation 675 feet in the Snake River Canyon, and Crater Peak, elevation 6400 feet in the Clearwater Mountains, Idaho. Most distinctive microclimatic feature is the extreme development of nocturnal temperature inversions during summer and early autumn. Mean inversions between non-contiguous hilltops and bottom lands may reach 20 to 30 degrees. Greatest recorded on a specific day has been 42 degrees. Mean temperatures, length of frost free season, nocturnal relative humidities, natural vegetation, and land use are all strongly influenced by these inversions. None of the six official Weather Bureau stations in the vicinity of the profile is located to show these inversions. Diurnal temperature and relative humidity patterns differ greatly at individual sites along the profile and are analyzed and compared. Precipitation normally varies by a factor

of at least 3 1/2 along the profile, but may reach several times this value during individual months. Maximum snow depths range from none at Wawawai to 14 feet at Lost Lake near Crater Peak during specific snow seasons.

Location: IWERRI

Dick, Kenneth A., 1967. "Report on Domestic Water Supply". University of Idaho, Moscow, Idaho, 4 pages plus supporting correspondence.

This report was prepared for the Regents of the University of Idaho to present a review of the domestic water supply problem in the Moscow-Pullman area and to present proposed solutions. Recommendations included the concept of a four-party cooperative approach, that the Regents file for water rights on the Potlatch River, and that feasibility study be financed by the four parties.

Location: IWERRI

Ebasco Services, Incorporated, 1958. "Interim Report, Phase One-Preliminary Reconnaissance and Consultation, Supplemental Water Supply for the City of Moscow, Idaho". Ebasco Services Incorporated, New York, New York, 22 pages.

This interim report presents the conclusions of Ebasco Services with regard to the water supply situation in Moscow. This review was of limited materials. Major conclusions are:

1) the groundwater supply of the Moscow basin is limited,

2) present data are inadequate to evaluate the safe yield of the aquifers,
3) supplemental water supply ... should be obtained by the development of storage reservoirs for surface water flow, and
4) it does not appear necessary or economic to divert surface water from outside of Moscow basin.

Additional recommendations for Phase Two are presented, as is a discussion of previous studies, future water requirements, consultations with geologists and information on a surface water supply.

Location: UIPP

Foxworthy, B.L. and R.L. Washburn, 1963. "Ground Water in the Pullman Area, Whitman County, Washington". U.S. Geological Survey Water Supply Paper 1655, 71 pages.

Excerpted authors abstract:

"This report presents the results of an investigation of the groundwater resources of the Pullman area, Whitman County, to determine whether the 1959 rate of groundwater withdrawal exceeded the perennial yield of the developed aquifers, and if so, 1) whether additional aquifers could be developed in the area, and 2) whether the yield of the developed acquifers could be increased by artifical recharge.

Geologic and hydrologic information are presented. Conclusions included, 1) that Moscow and Pullman are in separate sub-basins, 2) that for about the last 25 years the annual discharge of ground water from the artesian aquifers has exceeded the local recharge, 3) that data indicate the existence of potentially good artesian aquifers below those now extensively developed, and 4) that the most feasible method for artificially recharging the Pullman artesian zone would be by direct injection of watre into wells.
Location: WSU

Funk, Tim, et al, 1973. "University of Idaho Watering System" An Alternate Analysis". University of Idhao, Moscow, Idaho, 8 pages.

Authors abstract:

"Ths possibility of using effluent from the Moscow sewage plant in place of pure well water to water the University Golf Course and Wicks Field was considered and deemed feasible. The distances between the three locations was not excessive. The output was sufficient to supply the needs of the two areas and the water was safe without further treatment. The cost was $72,800 and further consideration is recommended."
Location: IWERRI

Hammond, Jack S., 1971. "Pullman-Moscow Water Supply, Snake River Alternative". University of Idaho Semester Planning Report, Moscow, Idaho, 14 pages.

This report presents a pre-feasibility economic analysis of a combined pumped storage and municipal water supply project. The upper reservoir would be located in MacMurray Canyon, just downstream from Wawawai Canyon, and use the Lower Granite pool. From this analysis it appears that a pumped storage alternative would be economically feasible and would help lower the cost of the municipal water supply. The author recommends further study to refine the economic analysis.

Location: IWERRI

Hemud, Abdul Rahman, 1971. "Geophysical and Hydrogeological Investigations of the Moscow Landfill Site, Latah County, Idaho." Master Thesis, University of Idaho, 59 pages and electric logs and maps.

This reports on an electrical resistivity survey attempting to define chemical alteration of the groundwater in the vicinity of a sanitary landfill operated by the City of Moscow near Viola grade approximately five miles north of Moscow. Mineralized water was traced down gradient from the landfill for 1800 feet. Data did not distinguish between poor quality water which had entered the ground water by infiltration from surfaces streams and poor quality water which may have moved down the valley from the landfill as groundwater, maps of groundwater levels, electrical resistivity logs and chemical data are reported.

Ichimura, Vernon T., 1978. "Uranium Concentration in the Ground Waters of the Pullman-Moscow Basin, Washington, Idaho, by the Nuclear Track Technique". Master of Science Thesis, Washington State University, Pullman, Washington, 124 pages.

Excerpted authors abstract:
"Uranium concentration in the Pullman-Moscow groundwaters was determined by using a high-sensitivity nuclear fission track technique. The observed error of the method ranged from 10% to 49% depending on the number of tracks observed."

"The distribution of uranium in the groundwaters of the Pullman-Moscow basin shows clusters of high concentration along the eastern edges of the basin in close proximity to the granodiorite of the Thatuna batholith. This phenomenon probably relates to the Moscow basin recharge area. Very low uranium concentrations are generally associated with deep high-yield municipal and domestic wells. This observation probably relates to reducing conditions in the deep ground water environment of the Pullman-Moscow basin."
Location: WSU

Johnson, William F., 1973. "Comprehensive Water Supply Study for Washington State University". Department of Physical Plant, Washington State University, Pullman, Washington, 14 pages.

An analysis of the WSU water supply system is presented, with recommendations for improvements in the campus water works for the

next ten years. These include a new well, a new reservoir, and several new pipelines.

Location: IWERRI

Jones, Robert W., 1971. "Outline of a Report on Moscow Ground-Water Studies". Presented orally at Moscow City Council, 11 pages.

An oral presentation of Jones and Ross model studies of the Moscow basin was given January 25, 1971 to the Moscow City Council. This document contains an outline and Figures referred to in that presentation.

Location: IWERRI

Jones, R.W. and S.H. Ross, 1969. "Detailed Ground Water Investigation of Moscow Basin", Water Resources Research Institute, University of Idaho, Moscow, Idaho, 12 pages.

Mathematical models of the Moscow basin artesian aquifer were designed to study groundwater problems of the basin. Model studies indicate that groundwater in storage in Moscow basin will meet the needs of the basin for the next 50 to 100 years. Model studies also indicate the feasibility of artificial recharge utilizing seasonal runoff. High iron levels of water in certain areas of the artesian aquifers are the result of natural recharge water carrying iron from weathered bedrock on the margins of the basin.

Location: IWERRI

Jones, Robert W. and S.H. Ross, 1969. "Moscow Basin Ground Water Problem: How Long Will the Water Last?" Paper presented at Seventh Annual Symposium on Engineering Geology and Soils Engineering, Moscow, Idaho, April 9-11, 1969. Revised June 17, 1969, 19 pages and 11 figures. Ground water supply in the Moscow basin was analyzed by means of mathematical modeling of the artesian aquifer system. Coefficients in the model were used selected after analysis of actual pumping data, however boundary problems precluded pump testing. The water available for use, assuming no recharge to the aquifer, will be adequate to meet the needs of the basin beyond 2000.

Location: IWERRI

M

Jones, Robert W. and S.H. Ross, 1972. "Moscow Basin Ground Water Studies". Idaho Bureau of Mines and Geology, Moscow, Idaho, 95 pages.

This report summarizes the studies undertaken by Jones and Ross, which consisted of analysis of pumpage and water level records, using a mathematical model of the aquifer and an analysis of long-term records of water level fluctuation in observation wells. They conclude that the basin will have adequate groundwater supplies beyond the year 2000. Recommendations include the appointment of a Pullman-Moscow Hydrologist to direct studies needed to further define the system.

Location: IWERRI

Jones, R.W., S.H. Ross, and R.E. Williams, 1968. "Feasibility of Artificial Recharge of a Small Ground Water Basin by Utilizing Seasonal Runoff from Intermittent Streams". Paper presented at Sixth Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho, April 17-19, 1968, 17 pages plus figures.

An artificial recharge program is proposed for the Moscow Basin, utilizing seasonal runoff from the South Fork of the Palouse River and recharge wells. This program is economically favorable when compared to alternative proposals to import surface water from great distances.

Location: IWERRI

UIPP

Kaal, Ayad S., 1978. "Analysis of Geologic Factors for Location of Water Wells in the Granitic Environment of Moscow Mountain, Latah County, Idaho". Masters Thesis, University of Idaho, Moscow, Idaho.

This reports on an investigation of groundwater occurrence on Moscow Mountain at the edge of the Moscow groundwater basin. The geologic setting of the area is reported and the source of water is considered to be coming from weathered granite at shallow depths. The study reports on an attempt to relate specific capacity of wells to fracture traces as indicated on aerial photographs of the area. An appendix contains representative water quality data on the groundwater studied. The degree of

fracturing enduced from the photo interpretations to give indications where productive groundwater might be obtained.

Kelly, Thomas L., 1973. "A Planning Study of Water Source Alternatives for the University of Idaho: Golf Course". University of Idaho s Semester Planning Report, Moscow, Idaho, 11 pages.

This paper compares two alternative sources of irrigation water for the University of Idaho Golf Course. These are groundwater and sewage plant effluent; at this time ground water is recommended as the best economic alternative.
Location: IWERRI

Kogut, Merry A., 1976. "Water Resources of the Palouse Basin (WRIA 34)". Water Resources Management and Information Section, Department of Ecology, State of Washington, Olympia, Washington, 20 pages.

This report reviews the water resources of the Palouse River basin, and includes some information on land use, water rights, sedimentation problems, and other related topics. Appendices contain a summary of surface water rights, a summary of groundwater rights, monthly distribution of flows at Palouse gaging stations, and a summary of potential major water resource projects in the area.
Location: IWERRI

Lambert, Patricia, ed., 1973. "A Guide to Water Research Information Sources in the State of Washington". Washington Water Research Center, Report #16, Pullman, Washington, 237 pages.

Information on libraries and special collections which have significant collections of water research information related to the State of Washington is annotated. Each annotation contains a description of the subject area available in the collection, identification of unique sources of information, and instructions for obtaining these data.

Location: IWERRI

WSU

Laney, F.B., V.R.D. Kirkham, and A.M. Piper, 1923. "Groundwater Supply at Moscow, Idaho". Bureau of Mines and Geology Pamphlet No. 8, Moscow, Idaho, 13 pages and plates.

This report presents a description of the geology of the Moscow Basin and the aquifers tapped by wells in the area. The piezometric surface of the aquifer is presented, and the water surface decline is noted. A calculation of recharge capacity of the aquifer is presented, and compared with total annual withdrawal from the aquifer. Recommendations for well location and development to overcome the "apparently alarming decrease" in pumpage from municipal wells are offered.

Location: IWERRI

UIPP

Lee, Harry W., 1973. "Latah County Flood Plain Report". Prepared for Latah County Commissioners, Moscow, Idaho, 88 pages.

This report contains background information on Latah County, a discussion of problem areas within Latah County, a review of studies made in Latah County and information about past flooding in the County. Alternatives for future planning are presented, as well as a list of funding sources for flood control programs. Location: IWERRI

Lin, Chang-Lu, 1967. "Factors Affecting Ground-Water Recharge in the Moscow Basin, Latah County, Idaho". Masters Degree Thesis, Washington State University, Pullman, Washington, 86 pages, 52 references.

Authors abstract:
"The depleting ground-water reservoir reflected by long term declines in the piezometric surface creates a critical problem in the moscow basin. Results of climatological, hydrological, and geological studies indicate that (1) low intesity of precipitation; (2) frozen ground; (3) high evaporation potential; (4) thickness, extent, and clay content of the Palouse loess and Latah Formation; (5) interflow zones; (6) fracture zones; and (7) the presence of ancient drainage channels are the primary factors affecting ground water recharge in the basin.

Fluorescent dye-dilution techniques have been used to detect stream losses near the margins of the plateau basalts. Results of these measurements verify other studies and indicate that this method is a sensitive tool in measuring the low flow of a stream. By applying this method, it can be shown that a portion of the surface flow joins the underflow in areas of low gradient and again rejoins the surface stream in reaches of steep gradient along Crumarine Creek. A portion of the underflow or component of surface flow eventually recharges the basin. Vertically and laterally recharged water migrates toward the ancient buried drainage channels of past geologic times and is carried out of the basin as underflows. Total current recharge is not sufficient to meet the demands of the city indicated by recent pumpage data. Eventually, additional sources of water will be necessary."

Location: IWERRI
Pullman
WSU

Luzier, J.E and R.J. Burt, 1974. "HYdrology of Basalt Aquifers and Depletion of Ground Water in East-Central Washington". Department of Ecology, Olympia, Washington, 53 pages and 3 plates.

This study had the primary goals of determining the hydraulic characteristics of the basalt aquifers, and the effects of present and projected pumpage on long term groundwater supply. A discussion of aquifers in the Pullman area is included.

Location: IWERRI

Molnau, Myron, 1971. "Comparison of Runoff From a Catchment Snow Pillow and a Small Forested Watershed". University of Idaho, Moscow, Idaho, 5 pages, 6 figures.

Authors abstract:

"A 12-by-12 foot square pressure pillow was modified by the addition of drains to collect the snowmelt from the pillow. This meltwater was collected in tanks and monitored by stage recorders. The daily runoff amounts from the catchment pillow was compared with the mean daily runoff from a 1580 acre watershed and one of approximately 80 acres. The runoff from the pillow provided a good measure of the timing of runoff from the two watersheds. A time lag of one day was found for the small watershed and 2 to 3 days for the latter watershed."

This pressure pillow was installed on Moscow Mountain, in 1967. The 80-acre watershed is Felton Creek, and the 1580 acre watershed is Crumarine Creek."

Location: IWERRI

Moscow, City of, et al., 1972. "A proposal to the U.S. Environmental Protection Agency for A Research and Demonstration Study on the Removal of Iron & Manganese From Potable Water Supplies Using Ozone". Submitted by City of Moscow, Idaho in cooperation with University of Idaho and Stevens, Thompson & Runyan, Inc., Moscow, Idaho, 32 pages.

A proposal submitted to the EPA outlining the project objectives, the proposed treatment system financial obligations of an ozone treatment system to remove iron and manganese. Project justification and capabilities of the members of the project team are also included.

Location: IWERRI

Moscow, City of. "Well Information and Data", City of Moscow, Idaho.

Water quality data from samples of City Wells No. 2, No. 3, No. 6 and No. 8 are available. A description of units and geologic section for wells 4, 5, and 7 (not in use), and a description of the well and records of static water levels (1964-1966) for Well No. 7 are also available. A drill log map showing the location of wells with drill logs is also in the City collection on water resources information.

Location: M

Moscow City, 1983, "Well No. 9 Construction Report-City of Moscow, Idaho". Sectionalized Report.

This report contains a summary of activities and technical data concerned with the construction of Moscow City Well No. 9. It contains the complete specifications, and a detailed log of the well. The report presents an analysis of hydrologic data involved and report of the well tests conducted. A separate Geophysical Report by James W. Crosby and Thomas L. Weber of the

Geological Engineering Section of Washington State University dated April 15, 1982 is a part of this report. The report also contains information on Idaho Department of Water Resources water right permit and necessary extension to the original application. The report also presents a final cost estimate and record of the water quality tests conducted and record of easements that have been obtained.

Location: M

Najjar, Ismail M. 1972. "Distribution of Trace Elements in the Ground-Water of the Moscow-Pullman Basin, Idaho, Washington. Masters Thesis. University of Idaho. 189 p.

This report contains an extensive recortd of the chemical composition of well-water samples taken from groundwater from three aquifers: An upper confined aquifer, a middle confined zone and a shallow unconfined qquifer. Chemical elements studied were Fe, Zn, Mn, Ca, Mg, K, and Na. In addition the pH and the electrical conductivity were also studied.

Location: WSU

Nassar, E.G. and Kenneth L. Walters, 1975. "Water in the Palouse River Basin, Washington". Water Supply Bulletin 39, Washington: Department of Ecology, Olympia, Washington.

This document is referred to in the report by Merry A. Koguk. Although not located in any of the files which were looked at, it

should be available and worthwhile.

Location: Washington Department of Ecology, Olympia, Washington

Packer, Paul, 1953. "Pertinent Information on Ground Water Supply in the Moscow Pullman Area". 9 pages.

This paper presents data and calculations on precipitation, interception losses, streamflow losses, evapo-transpiration losses, and the resulting recharge to the basin. Consumption, based on 125 gallons per capita per day, of water from the aquifer is reported to be only about 51 percent of the total annual recharge. Conclusions presented are that the "under ground water resource is presently sufficient to meet current demands", and that forest practices in the last half century have not materially influenced streamflow.

Location: IWERRI

Pullman-Moscow Water Resources Committee, 1969. "Scope of Water Supply Study, (Preliminary)". Pullman-Moscow Water Resources Committee, Moscow, Idaho and Pullman, Washington.

This notebook contains the scope of work and background information for the Pullman-Moscow Water Resources Study. Excerpts from other PMWRC reports are included.

Location: IWERRI

Pullman-Moscow Water Resources Committee, 1969. "Status Report to the Moscow-Pullman Water Resources committee." Pullman-Moscow Water Resources Committee, Moscow, Idaho, and Pullman, Washington, 13 pages and correspondence.

This report, dated February 26, 1969, and transmitted to the Mayors of Moscow and Pullman and to the Presidents of U. of I. and WSU, reports on the studies conducted on the water supply for the Pullman-Moscow area since the committee was formed in 1967. A list of general factors to be considered in the evaluation of alternatives is provided.

Location: IWERRI

UIPP

Pullman-Moscow Water Resources Committee, 1976. "Status Report, Pullman-Moscow Water Supply Study". Pullman-Moscow Water Resources Committee, Moscow, Idaho, Pullman, Washington, 7 pages.

This status report summarizes the 1970 STR Water Supply Study, proposes an Executive Secretary of the PMWRC, and presents data indicating the lowering of the water level in wells in the area. The development of other sources of water is advocated.

Location: IWERRI

Pullman-Moscow Water Resources Committee, 1973. "Status Report on Committee Activities". Pullman-Moscow Water Resources Committee, Pullman, Washington and Moscow, Idaho, 5 pages.

Activities of the PMWRC are reported. These include the Water Supply Study of 1970, and the arrangements with the U.S. Geological Survey to update factual information about the groundwater situation. The Committee reported on efforts to define a course of study to project the extent and availability of groundwater. Funding in the fall of 1972 is reported, and membership is updated. A list of 28 papers and reports on file for the PMWRCC at the U. of I. Water Resources Institute is included.
Location: IWERRI

Ralston, Dale R., 1972. "Guide for Location of Water Wells in Latah County, Idaho". Information Circular No. 23, Idaho Bureau of Mines and Geology, Moscow, Idaho, 14 pages plus figures.

This report summarizes the knowledge of groundwater geology in Latah County and provides a guide for land owners and drillers for the construction of water wells. The well numbering system used by the USGS in Idaho is presented, the groundwater geology of the area is described, groundwater potential in five subareas is described, and recommendations for well location are given.
Location: IWERRI

Rice, Richard D., 1970. "Design Requirements for an Irrigation Water Main from the Moscow City Sewage Plant to the University of Idaho Golf Course". University of Idaho, Moscow, Idaho, 14 pages.

This paper summarizes design criteria and requirements for an asbestos-cement irrigation water main of 6400 feet. This line will deliver water from a storage tank at the Moscow City Sewage Treatment Plant to the University of Idaho Golf Course. This water will meet all applicable health guidelines, and will result in reduced demands on the Moscow Basin Ground Water reservoir during the peak summer irrigation season.

Location: IWERRI

Ross, Sylvia H., 1965. "Contributions to the Geohydrology of Moscow Basin, Latah County, Idaho". Idaho Bureau of Mines and Geology, Moscow, Idaho, 113 pages, 12 plates.

This report describes the geology and groundwater resources of the basin, records information about private wells in the basin, indicates areal distribution of iron in groundwater in the several aquifer systems, and suggests subjects for further research.

Location: IWERRI
UIPP

Russel, I.C., 1897. A Reconnaissance in Southeastern Washington, U.S. Geological Survey Paper 4. 96 pp.

This report has a brief mention of groundwater and wells that had been drilled in Moscow, Idaho and Pullman, Washington. This reports a well at the old Palace Hotel in Pullman was drilled in

1894 to a depth of 77 and reached flowing water at 65 feet. It was reported to be a 6-inch well through 53 feet of solid basalt. The elevation of the ground surface was reported as 2340 msl. The water rose in the pipes 20 feet above the mouth of the well. A well directly across the street was reported to be drilled in 1889 to a depth of 73. It was called the Ripley well. A photograph of the water flowing above ground surface is reported on page 81 of the report. The article reports that fourteen wells had been drilled in Moscow, Idaho since 1890 (1890-97) and that ten were flowing in 1891. Mention is made at this early date that water taste suggested presence of iron.

Location: WSU

Seitz, H.R., 1971. "The Effect of a Landfill on a Hydrogeologic Environment", Master's Thesis, University of Idaho, 37 pp. and Appendices.

This reports on study of the hydrogeology of an area around a sanitary landfill near the edge of the Moscow groundwater basin. The landfill was operated by the City of Moscow for several years. Field observations and water samples identified the major aquifer and the path of groundwater flow. Analysis of groundwater samples revealed degraded water quality in surface water and the shallow groundwater. Serious widespread pollution of groundwater by the landfill was not evidenced. Low permeability of the overlying loess soil and the catcon exchange capacity of the soil were found to be factors that controlled the rate of travel of various

pollutants. Maps, water levels, and data on hardness, ammonia, nitrate, chemical oxygen demand, tannen, lignin, conductivity, iron, alkalinity, chlorides and pH are reported.
Location: UI Library

Siath, John, 1973. "Statistics for City of Moscow Wells #2, 3, 6, and 8."

The following information is given for four city wells: location, drill log, (description of well, description of units, geologic section), monthly pumpage, yearly pumpage, water level fluctuations, and pump tests.
Location: IWERRI

Smith, Wm. A., 1973. "An Analysis of Moscow Water Supply". Public works Department, Moscow, Idaho, 12 pages.

Historical and projected demands on the Moscow Water Supply are presented, and conclusions drawn regarding the ability of the present system to meet future demands. This report does not consider the University of Idaho system or the Moscow distribution system.
Location: IWERRI

Sokol, Daniel, 1966. "Interpretation of short term water level fluctuations in the Moscow Basin, Latah County, Idaho". Idaho Bureau of Mines and Geology, Moscow, Idaho, 27 pages.

Seasonal and daily water level fluctuations of four wells in the Moscow area for the period of November 1963 to May 1965 are presented and analyzed. All five aquifers, except the lowermost show seasonal recharge indicating that each is part of an active hydrologic system. Daily fluctuations in response to pumping in other wells, earthquakes, winds, and barometric pressure are identified.

Location: IWERRI
UIPP
WSU

Stevens, Peter R., 1959. "Groundwater Problems in the Vicinity of Moscow, Latah County, Idaho". U.S. Geological Survey Open File Report, (also Water Supply Paper 1460-H, 325-357, 1960) 63 pages.

Excerpted authors abstract:

"The water supply in the Moscow area presents a potentially critical problem because the present supply is barely adequate and the total supply available within the foreseeable future. An evaluation of the available geologic and hydrologic data, an estimate of the amount of usable groundwater, and a description of the occurrence of groundwater in the Moscow basin are presented.

Available data are insufficient to determine accurately the average annual recharge to the artesian aquifers.

The 1955 demand for water at moscow is expected to double by 1970. The use of surface water is suggested for a direct supplemental source, and for possible artificial recharge of the artesian aquifers."

Location: UIPP

WSU

Stevens & Thompson, 1956. "Report on Water Supply and Treatment and Improvements to Sewerage System for Moscow, Idaho". Stevens & Thompson, Portland, Oregon, 57 pages.

This report summarizes the water supply and sewerage situation in Moscow with recommendations to improve both systems. A financial analysis of the proposed recommendations is included.

Location: UIPP

Stevens & Thompson, 1962. "Master Plan for Water Distribution System, Moscow, Idaho". Stevens & Thompson Consulting Engineers, Portland, Oregon, 14 pages.

This document presents the development of a Master Plan which outlines the water storage and distribution needs until the year 2000. Recommendations include the completion of Wells 8 and 9 land the construction of two additional storage tanks.

Location: UIPP

Stevens, Thompson & Runyan, Inc., 1969. "Prospectus for Professional Services, water Supply Study". Stevens, Thompson & Runyan, Boise, Idaho.

This document is the proposal by STR to the PMWRC to develop the objectives, methods of approach, proposed work program, and capabilities of STR.

Location: IWERRI

UIPP

M

Stevens, Thompson & Runyan, Inc., 1970. "Water Supply Study". Report prepared for Pullman-Moscow Water REsources Committee by Stevens, Thompson & Runyan, Inc., Boise, Idaho, 85 pages plus figures and appendix.

Population growth and future water demands for the Pullman-Moscow area are presented, and water supply sources within a 40 mile radius of the Pullman-Moscow area were considered. Previous studies conducted within the region are reviewed and commented on. Criteria for the comparison of alternates are provided, and six potential water supply projects are compared. Methods of organizing and financing a project and conclusions and recommendations to the Pullman-Moscow Water Resources Committee are also presented.

Location: IWERRI

UIPP

M

Stevens, Thompson & Runyan, Inc., 1972. "Water Treatment - An Alternative Analysis for Moscow, Idaho". Stevens, Thompson & Runyan, Inc., Boise, Idaho, 41 pages.

Alternate methods of water treatment, to ameliorate high levels of manganese and iron in the City of Moscow Wells No. 2 and No. 3 are presented. Six methods were investigated, the recommended methods are either contact filtration or pressure filtration with Ozone. Relocation of the water department to an expanded building at the Polk Street site is recommended should new quarters be desired.
Location: IWERRI

Stevens, Thompson & Runyan, Inc., 1973. "A Report on the Feasibility of Union Flat Creek Pumped Storage". Prepared for U.S.C.E., Walla Walla District, by Stevens, Thompson & Runyan, Boise, Idaho, 29 pages and appendices.

This document reports on a reconnaisance-level feasibility study of a multi-purpose pumped storage project. The study area includes Almota Creek and the Union Flat Creek in the proximity of the Lower Granite pool. The site with the best benefit/cost ratio was the Upper Almota site, utilizing a 13,000 acre foot reservoir with an additional 5400 acre feet supplemental reservoir to

enhance the multi purpose aspects of the project. This considered as one of the purpose supplying M and I water to Pullman and Moscow.

Location: IWERRI

Tinniswood, William W., 1948. "Water Pipe Tuberculation and Incrustation Due to Iron Bearing Ground Waters". Masters Thesis, University of Idaho, Moscow, Idaho, 42 pages.

Tuberculation and incrustation of water pipes due to high iron content in the University of Idaho water supply is investigated. Recommendations include the use of zeolite filtration to reduce the concentration of iron in the water.

Location: UIPP

Trihey, E. Woody, 1973. "Completion Report on the Well Altitude Survey in the Moscow Sub-basin, Idaho". Submitted to the Pullman-Moscow Water Resources Committee and the U.S. Geological Survey, Boise, Idaho.

This document presents surveyed land surface datum and measuring point datum information for 22 wells in the Moscow area. The results indicate that estimated altitudes used in previous water level studies were in error an average of three to five feet with extremes ranging from 0.3 to 18.6 feet.

Location: IWERRI

Trihey, E. Woody, 1973. "Transactions of the Pullman-Moscow Water Resources Committee, February 1971 - February 1973". Pullman-Moscow Water Resource Committee, Pullman, Washington and Moscow, Idaho, 6 pages plus appendix.

This document presents a short summary of PMWRC activities from February 1971 to February 1973 and includes memoranda, minutes of PMWRC meetings, response to Geologist Specialists Conference on December 13, 1971, and correspondence of the PMWRC.
Location: IWERRI

Trihey, E. Woody and George Gagon, 1975. "Recommendation for Uniform Groundwater Records in the Pullman-Moscow Basin". Pullman-Moscow Water Resources Committee, Pullman, Washington, Moscow, Idaho, 6 pages.

Recommendations for uniform groundwater records are presented, specifically that information be compiled on both existing and future wells operating for public water supply. Data to be compiled include monthly pumpage, monthly static water levels, annual pumpage and charge in static water level, and a narrative description of the well. Sample formats are provided.
Location: IWERRI

Troy Watershed Development Committee, Inc. No date. "Troy Watershed Development Project". Troy, Idaho.

This project notebook contains copies of information, date 1966 through 1969, gathered for an economic feasibility study for the development of a multi-purpose reservoir of about 18,000 acre-feet storage capacity. The project investigation was initiated by the Troy Watershed Development Committee, with engineering assistance from the Latah SWCD _____. Material in this notebook includes land ownership data, soils data, preliminary dam cost estimate, preliminary hydrology, and more.

Location: IWERRI

University of Idaho. "Well Logs, Specifications and Pumpage Records" University of Idaho Physical plant, Moscow, Idaho.

Various items of interest are on file with the University of Idaho Physical Plant collection of materials relating to the Pullman Moscow Water Resources Committee. They include:

1) Well Logs for Wells No. 1 and No. 2
2) Well Specifications for City of Moscow Wells No. 7, No. 8 and No. 9; Bid Tabulation for City of Moscow Well No. 9 and a Statement of Costs for University of Idaho Well No. 3.
3) Well No. 3 Water Level Recorder Charts.
4) Water Analyses--Sprinkler System Data.

and 5) Water Pumpage Records and Information.

Location: UIPP

Urban Systems Research & Engineering, Inc., 1973. "Water Resource Project Selection: A Handbook for Administrators". Prepared for the Office of Water Resources Research, Department of Interior, Washington, D.C., 53 pages.

This hard book is addressed to administrators in agencies charged with water-related functions. Sections include a description of the project selection process, who should make decisions, how decisions should be made, local initiative for institutional reform, and additional reading in the area. An example of the consensus ranking procedure is presented in the appendix.
Location: IWERRI

U.S. Army Corps of Engineers, 1972. "Palouse River Basin Study, Corps of Engineers Status REports 1968, 1969". U.S. Army Corps of Engineers, Walla Walla, Washington, 13 pages.

These Status Reports present the progress made by the Corps on their Palouse River Basin Study. Phase I studies were primarily on inventory of water resources, problems, and needs. Findings relative to specific needs are presented. Efforts from September 1968 to September 1969 were directed towards obtaining more detailed information for use in project formulation. Early in 1970 the study was suspended as a result of a law enacted by the Idaho legislature which restricts the use in Washington of water stored in Idaho.
Location: IWERRI

U.S. Army Corps of Engineers, 1975. "Pumped Storage in the Pacific-Northwest". U.S. Department of the Army, Corps of Engineers, North Pacific Division, Portland, Oregon, 8 pages.

This copy of the final draft offers answers to ten frequently asked questions about pumped storage, such as: What is pumped storage, types of pumped storage, why it is needed, when will it be needed, where will the energy to support pumped storage come from, what is the potential in this region, seasonal pumped storage, what sites are other agencies developing, what sites are being planned by the Corps, and how will the best sites be selected.

Location: IWERRI

U.S. Army Corps of Engineers, 1976. "Public Meeting Pullman, Washington 9 March 1976 Palouse Pumped Storage Study". Department of the Army Corps of Engineers, Walla Walla, Washington, 572 pages.

A transcript of the March 1976 public meeting, plus written testimony and newspaper and magazine accounts are presented. Due to the over-whelming public opposition to this project the Corps of Engineers recommended on March 18, 1976 that the study be terminated.

Location: IWERRI

USDA, Soil Conservation Service, 1939. "Agronomy-Range Report, South Palouse Project, Moscow, Idaho". U.S. Department of Agriculture, soil Conservation Service, Moscow, Idaho.

This document contains the results of investigations conducted by the Soil Conservation Service in the South Fork of the Palouse River watershed in the Moscow-Pullman area. Topics include: Sweet Clover as Green Manure Crop in Crop Rotations for the South Palouse, An Analysis of Farming Conditions as Related to Erosion Control on the Nez Perce Prairie, and approximately 15 other reports and inventories.
Location: IWERRI

U.S. Department of Interior, Bureau of Reclamation, 1967. "Reconnaissance Appraisal, Lower Snake River Basin Project, Municipal and Industrial Water Supply, Moscow Pullman Area". (Preliminary Document). Bureau of Reclamation, Spokane, Washington.

The document is a summary of information presented by the Bureau of Reclamation at a meeting of July 7, 1967. The report considered surface water sources to develop an alternative plan to supplement Municipal and Industrial water for the Moscow-Pullman area. Reconnaissance grade estimates are presented for four plans, two of whic provide storage and pumping from the Palouse River, one is for a pumping scheme from the Snake River, and one

features pumping from the Potlatch River. In the attached cover letter, of September 29, 1967, Rupert B. Spearman, the Area Engineer states that the Bureau "will not proceed further with this portion of the actual study unless we have an indication of local interest."

Location: IWERRI
UIPP

Walters, Kenneth L. and P.A. Glancy, 1969. "Reconnaissance of Geology and of Ground Water Occurrence and Development in Whitman County, Washington". Department of Natural Resources, Olympia, Washington, 169 pages and 4 plates.

The availability and degree of development of groundwater are evaluated and summarized for Whitman County, Washington. Records of representative wells and springs, drillers logs of representative wells, and chemical analyses of groundwater are included.

Location: IWERRI

Warnick, C.C., 1967. "Ground Water Related Activities of the University of Idaho". A Summary for Presentation at the Third Meeting of the State Committee on Groundwater, Water Resources Research Institute, Moscow, Idaho, 6 pages.

Projects being conducted or recently completed by the various divisions of the University of Idaho are presented. Thirteen

projects are described, as well as extension activities, and eight course offerings.

Location: IWERRI

Warnick, C.C., 1971. "Summary Comments on Moscow-Pullman Water Supply with Special Reference to the Advisability of Relying on Ground Water from the Presently Identified Ground Water Aquifers of the Moscow Basin". Oral presentation to the Moscow City Council, March 1, 1971.

A presentation was made to the city council which concludes that the groundwater supply of the Moscow basin may not be as large as stated in the Jones & Ross model. Continued study of the groundwater problem and of a conjunctive use project for future demands by the PMWRC is recommended.

Location: IWERRI

M

Warnick, C.C., 1975. Statement for the Hearing on Groundwater Allocation Problems and Policy of Washington House Ecology Committee's Subcommittee on Water Resource Management at Spokane, Washington, 11 pages.

This statement summarizes the Pullman-Moscow Water Resources Committee activities and interest in the groundwater supply problem of the Pullman Moscow area. Copies of a Resolution by the PMWRC and a letter to Senator Jackson requesting funds to study the

Palouse Pumped Storage Project are included.

Location: IWERRI

Williams, Roy E., 1977. "The Dollar Value of Water Conservation in Moscow and Pullman--A Proposed Policy for the Pullman-Moscow Water Resource Committee". University of Idaho, Moscow, Idaho, 10 pages.

The adoption of a new water rate structure by Pullman and Moscow is advocated to encourage conservation of water. Conservation of water will decrease the rate of ground water minng and therefore delay the need to convert to a more expensive source of water.

Location: IWERRI

Williams, Roy E., Douglas D. Eier, Alfred T. Wallace, 1969. "Feasibility of the Re-Use of Treated Wastewater for Irrigation, Fertilization, and Ground Water Recharge in Idaho". Idaho Bureau of Mines and Geology Pamphlet 143, Moscow, Idaho, 105 pages.

This report discusses the problems of stream and river pollution and offers reuse of treated wastewater effluent as an alternative source of irrigation water and water for artificial recharge. Distribution systems and water quality requirements are discussed, with a detailed discussion of areas of maximum potential for wastewater reuse in Idaho. The Moscow area is described as a potential user of this alternative water source.

Location: UIPP