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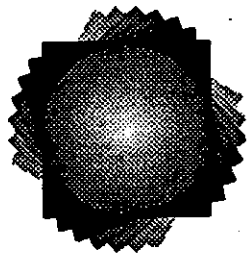
January 1992

Pullman-Moscow Water Resources Committee



Groundwater Management Plan

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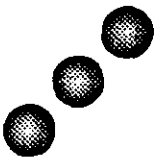

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THE PULLMAN-MOSCOW

GROUND WATER MANAGEMENT PLAN

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Through 1988 Intergovernmental Agreement (see section 4.2 and appendix A) the **COMMITTEE** is charged to coordinate planning in order to ensure a long-term supply of water for the **ENTITIES**, encourage water conservation, maintain an area ground water data base, investigate the primary and alternative water sources, and act as a liaison between the **ENTITIES** and the governing state agencies.

Through a **Resolution of Understanding** among the city and county governments, the universities, and the governing state water agencies (the Washington Department of Ecology and the Idaho Department of Water Resources), the state governments have agreed to work with the **COMMITTEE** in the formation of the **PLAN**.

1.4 Ground Water Basin Definition, Geology, and Land Use

The **BASIN** managed by the **PLAN** is defined roughly by the surface drainage areas of the South Fork of the Palouse River upstream of the confluence of Four Mile Creek and the South Fork of the Palouse River, and a portion of the Union Flat Creek Drainage below Uniontown, as shown in Figure 1. The studies of Smoot and Ralston (1987) and Lum, *et al.* (1990) includes this same area in addition to a portion of the main Palouse River drainage between Potlatch, Idaho and Colfax, Washington. For modeling purposes, the **BASIN** extends to the Snake River and includes the southwest facing side of the Snake River Canyon. Figure 2 shows the potential impact area of the **PLAN**. The area of potential impact includes the greater Palouse River Basin and the Lower Granite Pool on the Snake River.

Figure 3 shows graphically the main surface and subsurface components of the **BASIN**. Most of the **BASIN** is composed of loess loam soils overlaying many layers of basalt. In the eastern most part of the **BASIN**, the loess soils overlie the granitic basement formation, which extends downward and westward, forming a lower boundary to the basalts. The basalt formations and overlying loess soils continue westward from the **BASIN** toward the Columbia Basin of central Washington. Along the southwestern edge of the **BASIN**, the Snake River Canyon cuts deeply into the basalt flows, which are in places several thousand feet thick. Between the basalt layers lie sedimentary deposits (or interbeds). The basalts and interbeds make up the primary aquifer of the **BASIN**. As one moves westward in the **BASIN** from Moscow to Pullman, the interbeds become thinner (Figure 5) and play a less important role in the ground water system.

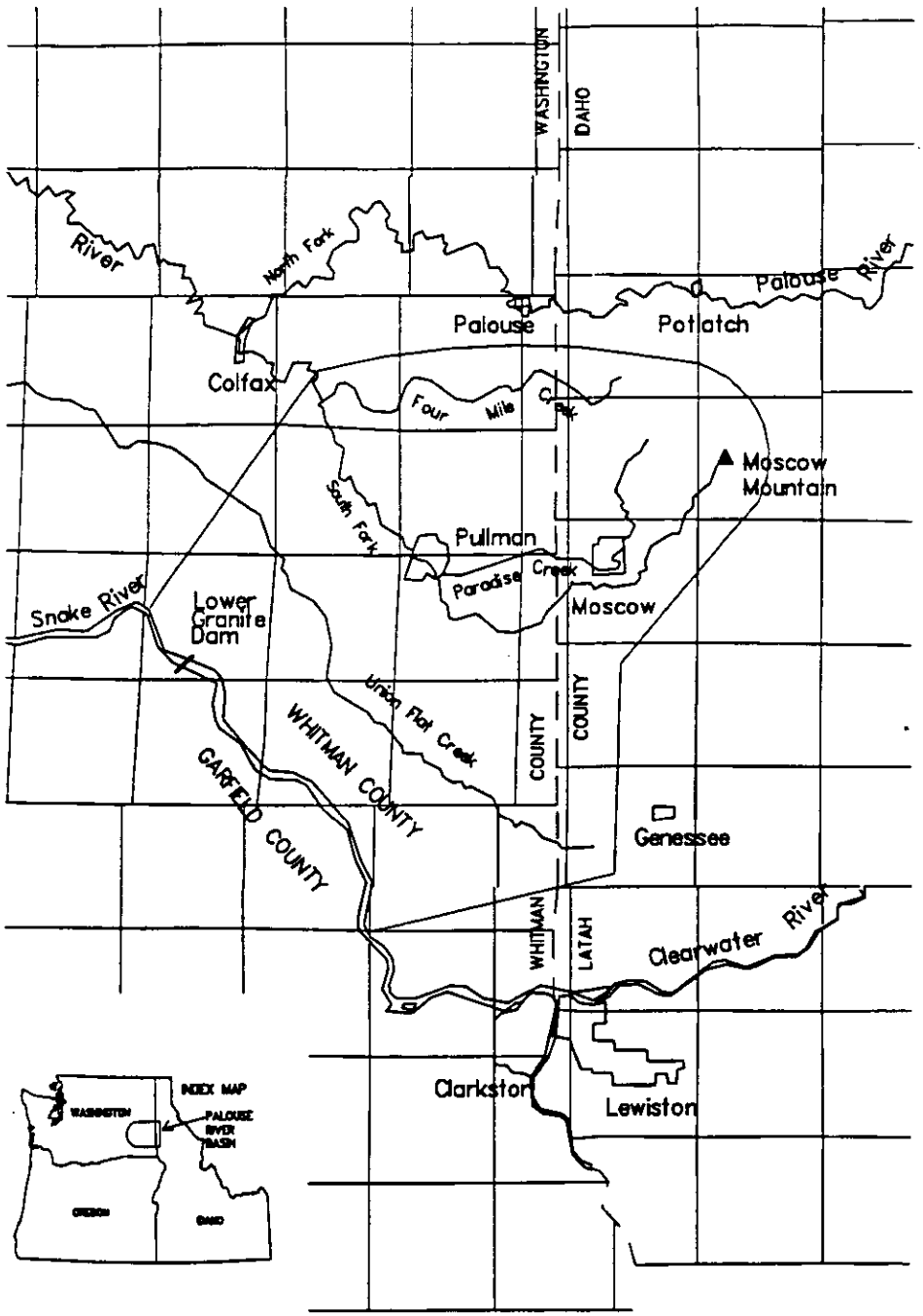


Figure 1. Pullman-Moscow Ground Water Basin (from Lum *et al.*, 1990)

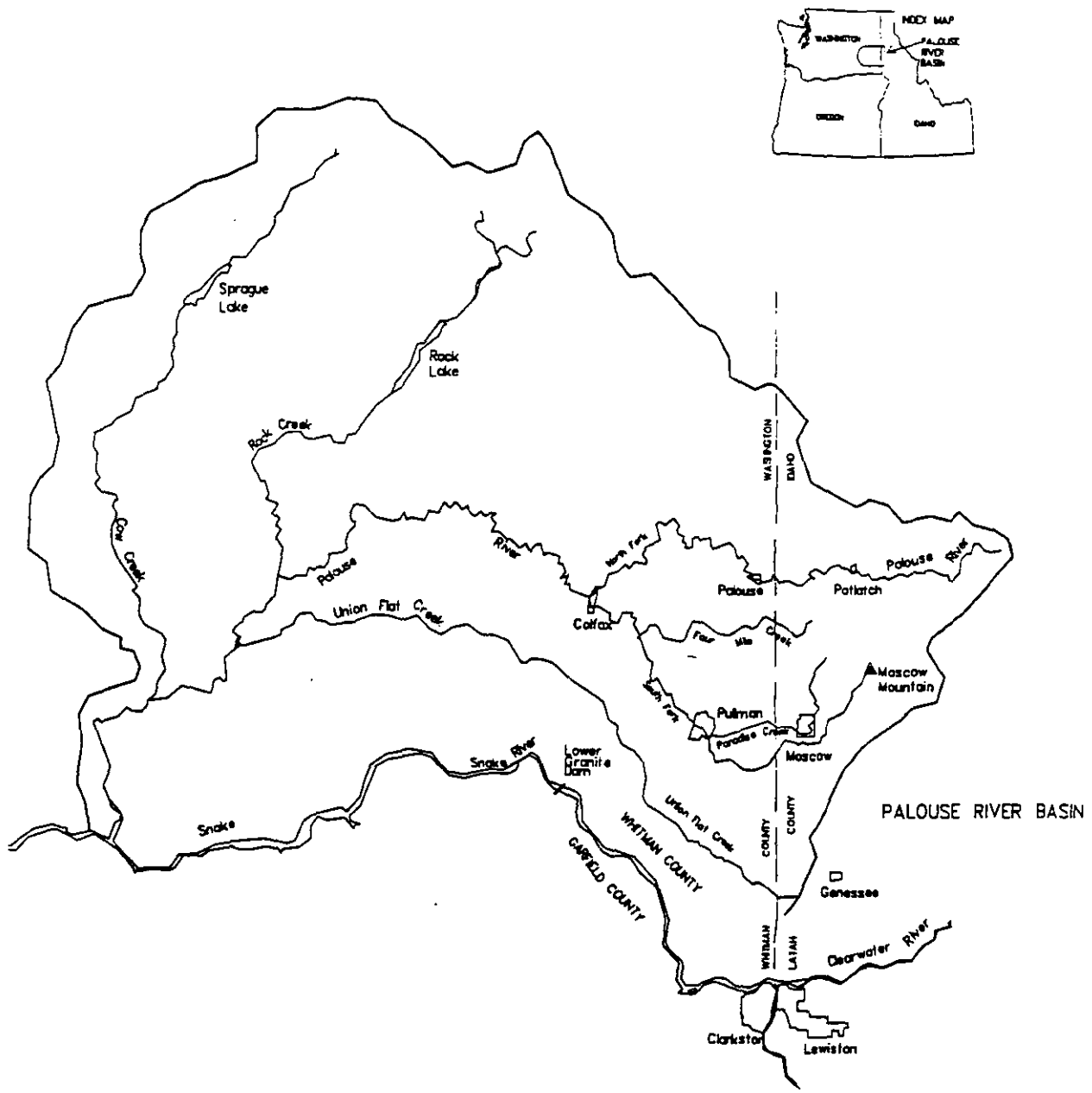


Figure 2. Pullman-Moscow Ground Water Management Plan Potential Impact Area

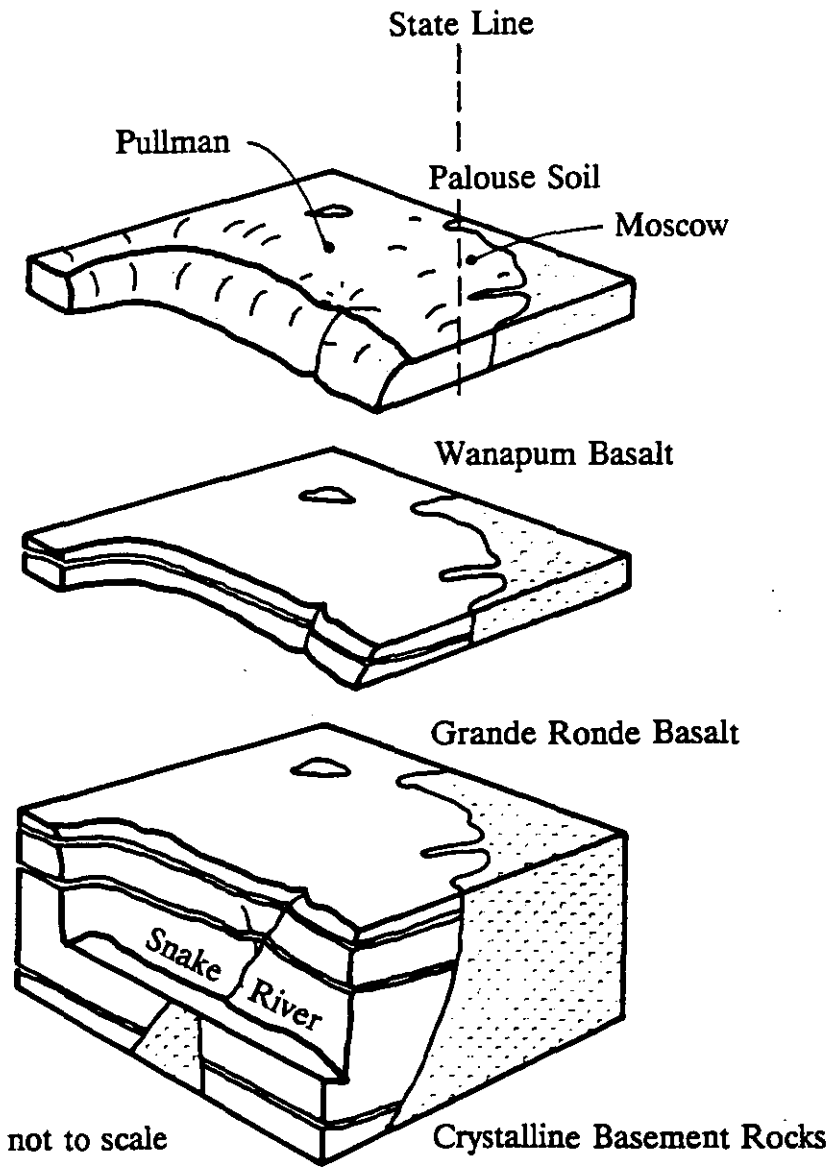


Figure 3. Graphical Representation of the Pullman-Moscow Ground Water Basin

The cities of Pullman and Moscow and the two universities are the major water purveyors in the **BASIN**. Most of the water is pumped from wells penetrating various depths of the basalt aquifers. Primary uses of the water are municipal, institutional, and private; essentially no ground water in the area is used for agricultural irrigation. Primary land use in the **BASIN** is dry-land farming of small grains, peas, and lentils. The high water storage capacity of the loess soils is sufficient to retain enough precipitation from the fall and winter months to carry most of the crops through the drier parts of the year. In the western part of the **BASIN** where the precipitation is less, successful dry land farming includes rotating the fields into fallow to allow sufficient moisture carryover from one year to the next. Prior to development, beginning in the 1800's, most of the **BASIN** was natural grassland and little was woodland.

Annual precipitation in the **BASIN** ranges from 15 inches along the Snake River to over 50 inches at the top of Moscow Mountain at the northeast corner. Precipitation averages 22 inches annually for Pullman and 24 inches annually for Moscow. Most of the precipitation in the area falls in the period November to June. In general, precipitation in the **BASIN** increases eastward and with increased elevation. Streams in the area flow generally to the west and northwest. Ground water in the **BASIN** is believed to flow primarily westward toward the Snake River.

1.5 General Statement of Ground Water Concerns

Water levels in many wells in the Pullman and Moscow areas have declined since their first use. At times, water level declines have averaged one to two feet per year and have been greatest near the city centers. Concerns over the water declines have motivated a number of geologic and ground water modeling studies for the **BASIN**, as well as an evaluation of possible alternative water supplies. Water quality issues are not a major concern in the **BASIN**, because ground water quality is excellent and meets all federal drinking water standards.

Chapter 2

History

2. HISTORY

2.1 General

Prior to the turn of the century, free flowing artesian wells were observed in both Pullman and Moscow. Water usage over the years has caused water levels in both the Pullman and Moscow areas to decline, at rates of one to two feet per year (Figure 9, see Chapter Section 5.4). Originally it was believed that Pullman and Moscow obtained water from different aquifers, due to differences in the water chemistries. As Moscow city wells were drilled deeper during the 1960's, it became apparent that both cities are served by a larger common ground water system. Water levels under both cities continued to decline, and several geologic and ground water modeling studies have investigated the dependability of the Pullman-Moscow aquifers for meeting future water use needs. Studies also have been made of possible alternative water sources for the area. Although the **ENTITIES** have had to drill deeper wells over time to obtain water, costs of obtaining and providing water in the area are lower than in many areas of the nation.

2.2 Geologic Studies

A number of geologic and geohydrologic studies have been conducted over parts or all of the **BASIN**. Exhaustive lists of previous investigations can be found in Ross (1965), Smoot and Ralston (1987), and Lum, *et al.* (1990). Ten Eyck and Warnick (1984) have provided a comprehensive annotated catalog of reports and studies pertinent to the Pullman-Moscow water supply.

Russell (1897) reported flowing artesian wells in Pullman and Moscow in the 1890's. Foxworthy and Washburn (1963) and Walters and Glancy (1969) provided significant geohydrologic studies of the area. Foxworthy and Washburn (1963), Ross (1965), Ringe (1968), Brown (1976), and Cotton (1982) have provided discussions of the geology of the **BASIN**. Klein (1987) and Bockius (1985) provided information on the basalt depths and basalt/granite interface. These and other studies of the **BASIN** have resulted in a general understanding of the ground water system as discussed in Sections 1.4 and 5.2, and used in more recent studies of Smoot and Ralston (1987) and Lum, *et al.* (1990).

2.3 Model Studies

Ground water studies of the **BASIN** have been conducted to provide a better understanding of the ground water system and to evaluate or predict future ground water levels. Jones and Ross (1972) modeled the ground water system of Moscow. Their results suggested that pumping in Moscow area wells was less than the recharge to the area, and that ground water should be able to sustain the needs of Moscow beyond the year 2000. Jones and Ross also suggested that the use of artificial recharge through recharge wells may be feasible for the upper portion of the Moscow area aquifers.

Barker (1979) used a two-dimensional ground water model to study the ground water system supplying both Pullman and Moscow. Barker considered an area of roughly 8-mile radius centered around Pullman. He modeled the subsurface aquifers as a single basalt system. His model underestimated water level declines for the area; water levels estimated for the year 2000 were reached by 1985.

Smoot and Ralston (1987) and Lum, *et al.* (1990), studied the **BASIN** using updated geologic information and a more complex, three-dimensional ground water model. The **BASIN** boundaries used by Barker were expanded to include the entire management **BASIN** shown in Figure 1 as well as a portion of the main Palouse River between Potlatch, Idaho and Colfax, Washington. The basalt formations were divided into an upper Wanapum basalt layer and a lower Grande Rhonde basalt. The **BASIN** was divided horizontally into squares 1/2-mile on a side. In the vertical direction, the **BASIN** was divided into 3 layers: one layer representing the loess soil profile, and two layers representing the basalt formations.

Results of the model studies by Smoot and Ralston (1987) and Lum, *et al.* (1990), suggest that the continuation of water level declines would depend on the rate of usage of the aquifers. These model studies suggest *"that ground water levels would stop declining if ground water pumpage were to stabilize at a constant level. However, ground water levels will continue to decline in the foreseeable future as long as ground water pumpage continues to increase"* [Lum, *et al.*, (1990) page 1]. Both studies also suggest that the present rate of water withdrawal is somewhat less than the rate at which the **BASIN** is recharged.

2.4 Alternative Water Sources (Imported Water)

Water level declines in the **BASIN** have motivated studies of alternative sources of water for the area. Ebasco Services (1958) suggested that supplemental water supplies could be obtained using surface storage reservoirs in the **BASIN**. A number of water transfer schemes bringing water from outside the **BASIN** were also considered, ie., diversion from the Potlatch River near Julietta; diversion from the Clearwater River upstream from Lewiston; and diversion from the North Fork of the Palouse River. Stevens, *et al.* (1970) proposed six potential water supply sources: two diversion and storage schemes using the North Fork of the Palouse River; two schemes utilizing water from the Potlatch River; a scheme utilizing water pumped from Dworshak Reservoir; and a scheme of pumping water from Lower Granite Reservoir near Wawawai. Stevens, *et al.* (1973) also reported on a reconnaissance level feasibility study of a combined pumped-storage municipal water supply project near Union Flat and Almota Creeks.

Some of the above schemes as well as a number of proposed flood control projects for the Palouse River Basin are summarized in a recent reconnaissance study by the U.S. Corps of Engineers (1989). The proposed alternatives identified by the corps are shown in Figure 4. Ground water and municipal water supply concerns in the **BASIN** have not

been severe enough to motivate further study of these alternatives as of spring 1990.

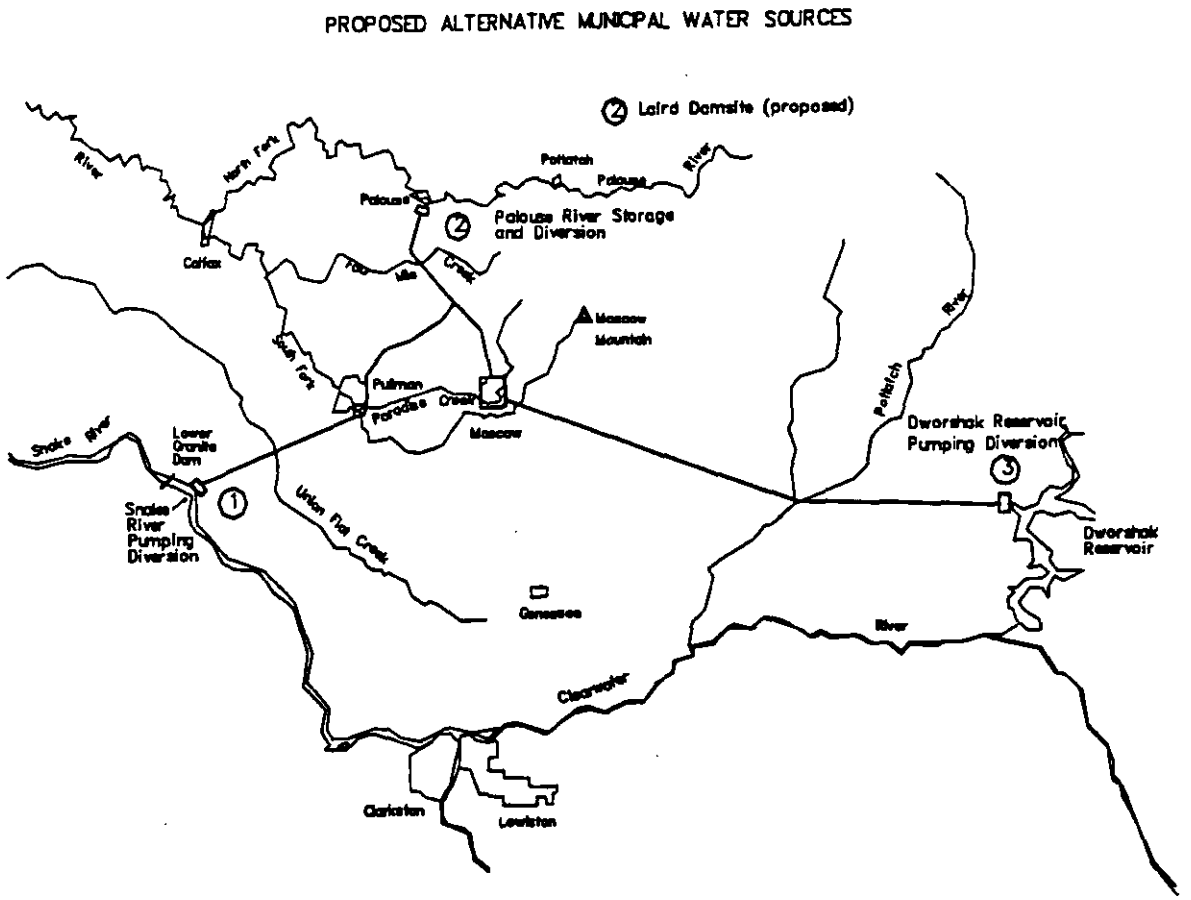


Figure 4. Proposed Municipal Water Supply Alternatives (as identified by the Corps of Engineers, 1989).

Chapter 3

Authority

3. AUTHORITY

3.1 General

The state governments of Washington and Idaho are charged with the administration of ground and surface water rights within their boundaries. Ground and surface waters are considered public property, and are "appropriated" in the form of "water rights". In the states of Washington and Idaho, water rights are obtained and protected in terms of a "prior appropriation" doctrine, such that a right that is "first in time" is "first in right". Water rights are generally established (through an application process) by diverting water that has not been previously appropriated and putting it to a beneficial use. In principle, the prior appropriation doctrine mandates that in periods or conditions of water shortage, "junior" (in time) water rights holders water supplies are reduced or terminated to protect the "senior" rights.

The appropriation of ground water is generally limited to the amount of natural recharge to the **BASIN** or aquifers. However, the natural recharge to a ground water system is often difficult or impossible to determine. As a result, a recharge criterion is rarely satisfactory for actually limiting ground water use. Instead, water use is generally limited on the basis of feasible or economic pumping lift and potential impairment to present or senior users. In conditions of over-appropriation of ground or surface water, junior water rights are generally regulated in favor of valid senior water rights.

3.2 Administration Under the Washington Code

In Washington, ground water use is limited to provide a "safe sustained yield" to existing water rights. The safe sustained yield criterion includes the protection of economic or feasible pumping lift and protection against impairment of present or senior users.

Washington code also allows for the designation of "Ground Water Management Areas" and "subareas". Ground Water Management Areas may be designated in areas of existing or potential water supply problems (either quantity or quality). The Ground Water Management Area Program in Washington is designed to promote ground water management at the local level with assistance (both administrative and financial) from the state.

Codes specific to ground water use in Washington are listed below.

- Appropriation doctrine for ground water--Revised Code of Washington (RCW) 90.44.010.
- Administration of Ground Water Rights--RCW 90.44 and Washington Administrative Code (WAC) 173-100.050.
- Ground water use limited so as to maintain a safe sustained yield--RCW 90.44.130.

- Prevention of ground water waste--RCW 90.44.110.
- Impairment of senior users--WAC 173.150.050.
- Definition of impairment--WAC 173.150.060.
- Determination of reasonable or feasible pumping lift--WAC 173.150.050.
- Adjudication of ground water rights--RCW 90.03.110 and 90.44.220.
- Ground Water Management Areas and Subareas--RCW 90.44.180 and 90.44.400.
- Ground Water Management Areas and Programs--WAC 173-100.050.
- Protection of upper aquifer zones--WAC 173-154.
- Protection of withdrawal facilities associated with ground water rights--WAC 173-150.
- Well drillers licensing and well construction programs--RCW 18.104.

3.3 Administration under the Idaho Code

Ground water in Idaho is managed using three principle criteria: 1) Ground water development or use must not exceed the average annual recharge to the basin; 2) existing ground water users must be protected in regard to reasonable pumping levels; and 3) a reasonable enforcement of relative priorities among users must not block full economic development of a ground water basin. In Idaho, the Director of Water Resources may restrict any water right application based on the above criteria.

Idaho code also allows for the designation of Ground Water Management Areas. A Critical Ground Water Area may be designated wherever or whenever the ground water supply is insufficient to provide for irrigation or other uses at the present rate of withdrawal. In a Critical Ground Water Area, the Director of Water Resources may deny future water right applications as well as terminate or reduce present use, in accordance with priority dates. Ground Water Management Areas may be designated in areas believed to be approaching the "Critical" stage. In such areas the Director may also deny future permit applications and reduce present usage. Ground Water Management Area designation can be brought about by a decree of the Director, while Critical Ground Water Area designation involves a public hearing procedure.

Codes specific to ground water use in Idaho are listed below.

- Appropriation doctrine for ground water--Idaho Code (IC) 42-103.

- Administration of ground water--IC 42-201.
- Ground water use limitation in regard to natural recharge--IC 42-.237a.
- Prevention of ground water waste--IC 42-237a.
- Protection of reasonable pumping levels--IC 42-226.
- Impairment of senior users--IC 42-226.
- Adjudication of water rights--IC 42-1406.
- Ground Water Management Areas--IC 42-233b.
- Critical Ground Water Areas--IC 42-233b.
- Recharge Districts--IC 42-4201A and 42-4202.

Chapter 4

The Pullman-Moscow Water Resources Committee

4. THE PULLMAN-MOSCOW WATER RESOURCES COMMITTEE

4.1 General

A Pullman-Moscow Water Resources Committee represented by Pullman, Moscow, University of Idaho, and Washington State University was formed in 1967 to undertake a cooperative effort in addressing the water supply problems being faced by the **ENTITIES**. Since its formation, the **COMMITTEE** has supported a number of studies of the local ground water resource and alternative sources of water for the **ENTITIES**. The **COMMITTEE** has worked in cooperation with the Washington Department of Ecology, the Idaho Department of Water Resources, the U.S. Geological Survey, and the U.S. Army Corps of Engineers on numerous water issues. The **COMMITTEE** has also retained various consultants on water supply issues or concerns. In 1988, membership of the **COMMITTEE** was extended to Whitman and Latah Counties. In 1989, a Resolution of Understanding was developed among the **COMMITTEE** and the State agencies whereby the **COMMITTEE** would, with assistance of the two States, develop the **PLAN** for the **BASIN**.

Member **ENTITIES** are outlined in Section 1.2. Representatives of the **ENTITIES** at the time of plan adoption are listed in Appendix E.

Costs of operating the **COMMITTEE** are borne by the **ENTITIES** and include salaries and consultant fees, clerical help, research and publishing costs, and other expenses. Costs are divided between the **ENTITIES** according to shares. The two cities and two universities have two shares each, while each of the counties has one share, for a total of ten shares.

4.2 Intergovernmental Agreements

Several intergovernmental agreements have been executed by the **ENTITIES** for purposes such as retaining consultants, determining operating budgets, and defining membership. Specific purposes of the Intergovernmental Agreement of 1988 (which superseded previous agreements) are listed below:

1. Coordinate planning to assure a long-range supply of water to the **ENTITIES**.

2. Update and expand the data base already begun during earlier studies.

3. Encourage conservation in order to extend the useful life of the aquifers.

4. Investigate alternative sources of water which can meet the incremental increases in demand of the region.

5. Educate and advise the **ENTITIES** and the public on the quality and quantity of the public water supplies serving Pullman, Moscow, and the surrounding area.

6. Act as a liaison between the **ENTITIES** on water resource concerns.

7. Promote communication between the **ENTITIES**, the Washington State Department of Ecology, and the Idaho Department of Water Resources (see Appendix for full document).

4.3 Role of the Executive Secretary

In 1988 the paid position of an Executive Secretary for the **COMMITTEE** was established. Specific duties of the Executive Secretary are summarized below:

1. To maintain a data base of information on the **BASIN** ground and surface waters, including pumping records and copies of reports written on the **BASIN** over the past 100 years.

2. To serve as a liaison between the two state water agencies and the **COMMITTEE**.

3. To serve as an advisor to the **COMMITTEE** concerning technical aspects of proposed future studies.

4. To provide continuity to the **COMMITTEE**.

5. Perform administrative services of the **COMMITTEE** including minutes and mailings.

6. Aid the **COMMITTEE** in formulating an action plan for the **ENTITIES** (see Appendix for full document).

4.4 Resolution of Understanding

Specific Objectives agreed upon in the Resolution of Understanding of 1989 among the **ENTITIES** and the state water agencies are listed below:

1. The **COMMITTEE** will pursue funding to conduct and promote studies and research relative to improving knowledge of the water resources of the **BASIN**.

2. The **COMMITTEE** will prepare a management plan for the **BASIN** in cooperation with the two state agency parties, The Washington State Department of Ecology and the Idaho State Department of Water Resources, which will address both water quantity and water quality concerns.

3. The **COMMITTEE** will prepare, as an initial step in the development of the management plan a principal work plan and time schedule which will outline the concerns and issues to be studied. This work plan will indicate the party or parties with responsibilities for each task and an estimated schedule for completion of each task.

4. The **COMMITTEE** will encourage public involvement in the development of the **PLAN** through public hearings and education programs.

5. The **COMMITTEE** will facilitate the implementation of the **PLAN** in concert with the member **ENTITIES** (see Appendix for full document).

4.5 Committee Role - Past, Present, and Future

The **COMMITTEE** has provided a coordinated effort among the **ENTITIES** in addressing water supply concerns and issues for the **BASIN**. This effort has resulted in a number of studies being performed in cooperation with other government agencies and private consultants. This effort has also resulted in the charge for the **COMMITTEE** to develop the **PLAN**. The **COMMITTEE** will continue to coordinate cooperative management of the **BASIN** ground water resources, and act as an advisory and oversight body in the implementation of the **PLAN**. The **COMMITTEE's** role pursuant to the **PLAN** is discussed in greater detail in Section 6.3.

Chapter 5

General Basin Characteristics

5. GENERAL BASIN CHARACTERISTICS

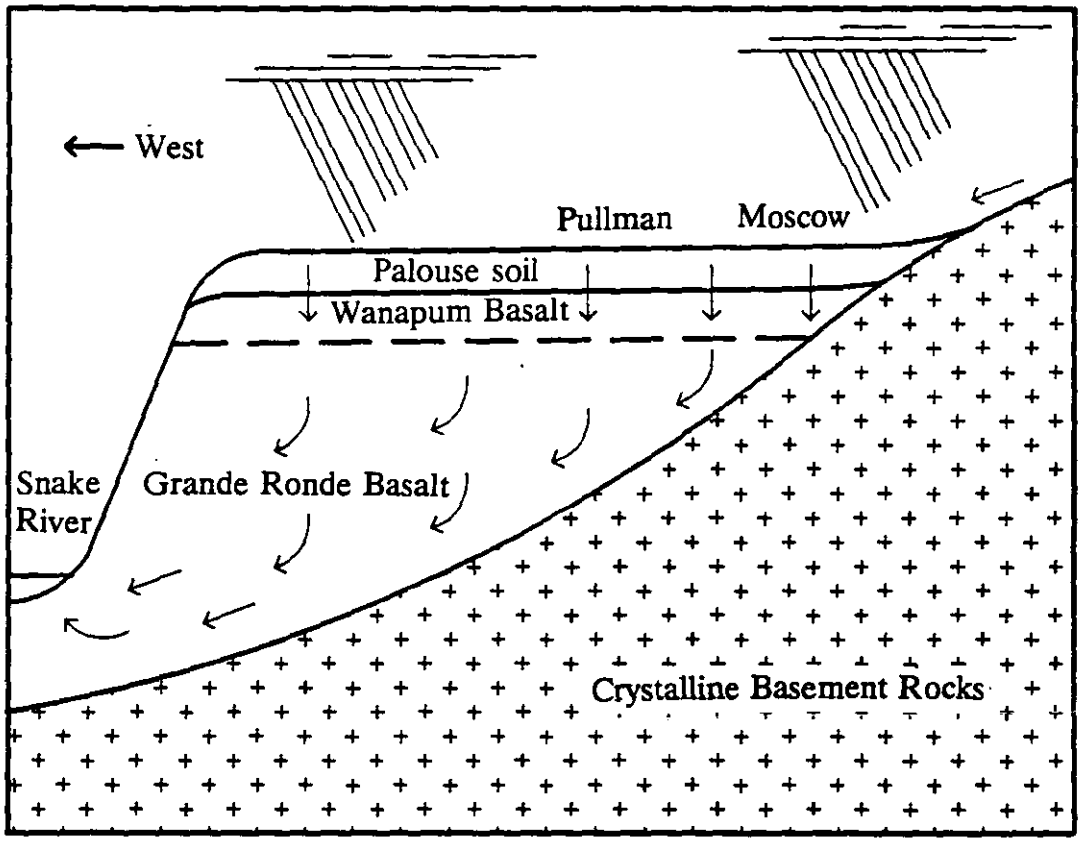
5.1 General

For effective ground water management, it is essential that water managers, water users, decision makers, and the general public have a basic understanding of the **BASIN** aquifers, as well as the general response of the aquifers to pumping or usage. In this chapter, basic characteristics of the **BASIN** aquifers are explained, as well as observed responses of the aquifers to pumpage and recharge. Also included in this chapter are historical and current information on the **BASIN** ground water system.

5.2 Ground Water Flow and Storage in the Pullman-Moscow Basin

Ground water in the **BASIN** originates as precipitation in the form of rain or snow (Figure 5). Some of the precipitation runs off directly and leaves the **BASIN** as stream flow. Precipitation that does not run off directly infiltrates into the soil, and may move downward, laterally, or may be stored in the soil for consumptive use by surface vegetation. Water that is not used consumptively by plant cover moves further downward and may form saturated zones in the soil. From the soil water table, the water may continue to move downward toward the basalt formations or laterally toward streams in the area. Streams that lie above the water tables may also lose water into the ground water system. Wells can be drilled into the soil water tables, but generally yield relatively small amounts of water due to the low soil permeability.

Ground water that reaches the basalts generally is stored in or travels through voids in the basalt and inter-lying sedimentary deposits. These voids may be in the form of cracks and joints in the basalts or spacing around individual grains in the sedimentary deposits. Model studies of the **BASIN** supported by field investigations suggest that the general direction of ground water flow is downward and toward the west. Some of the ground water near the surface of the basalt formations may move into streams in the **BASIN**. Ground water that is deeper in the aquifers moves toward and eventually discharges into the Snake River, seeps out along the Snake River canyon walls, or moves farther westward toward the Columbia basin. The movement of ground water toward the west and downward in the aquifers is the result of a potential or hydraulic gradient in those directions. Water levels in wells generally decline or are deeper in the aquifers to the west.



Cross-section not to scale

Figure 5. Conceptual Representation of Surface and Ground Water Flow in the Pullman-Moscow Basin.

The basalt flows terminate near the eastern edge of the **BASIN** east of Moscow. Where there is no basalt, ground water is believed to flow along the westward sloping granitic basement formation and enter the basalt aquifers at the basalt-basement interface (Figure 5). Exact ground water flow paths and travel times in the **BASIN** are not known. In the Moscow area, the shallow Wanapum Basalt layer plays a more important role in the ground water system. Effective ground water management in the Moscow area will need to consider the somewhat distinct (and yet interconnected) behavior of the upper Wanapum and deeper Grande Rhonde Basalt zones of the aquifers.

5.3 Ground Water Response to Usage

Under natural conditions, a balance exists between the amount of ground water being discharged from a basin (in this case to the Snake River, streams in the **BASIN**, or toward the Columbia Basin), and the recharge or amount of water coming into the **BASIN** in the form of precipitation or percolation from streams or other water bodies. When ground water is pumped (or removed artificially) from a ground water system, the natural balance is interrupted.

When water is pumped from a well, the water level, or corresponding water pressure near the well, is lowered, or drawn down (Figure 6). This draw-down provides the pressure gradient that causes the ground water to flow toward and into the well. Draw-down due to pumping is greatest near the pumping center and decreases outward. As pumping from the well continues, the extent of the lowered water levels expands, forming a cone of depression around the well or pumping center. This cone of depression expands until a new equilibrium condition is reached. The new equilibrium condition generally results in:

- a decrease in natural discharge from the **BASIN**;
- a decrease in the amount of ground water stored in the **BASIN**; and
- an increase in **BASIN** recharge.

In the **BASIN**, pumping withdrawals may result in decreased discharge to streams in the area, decreased discharge to the Snake River, and decreased ground water flow westward toward the Columbia Basin. Since surface water usage in the **BASIN** is minimal, such changes in discharge are not of primary concern.

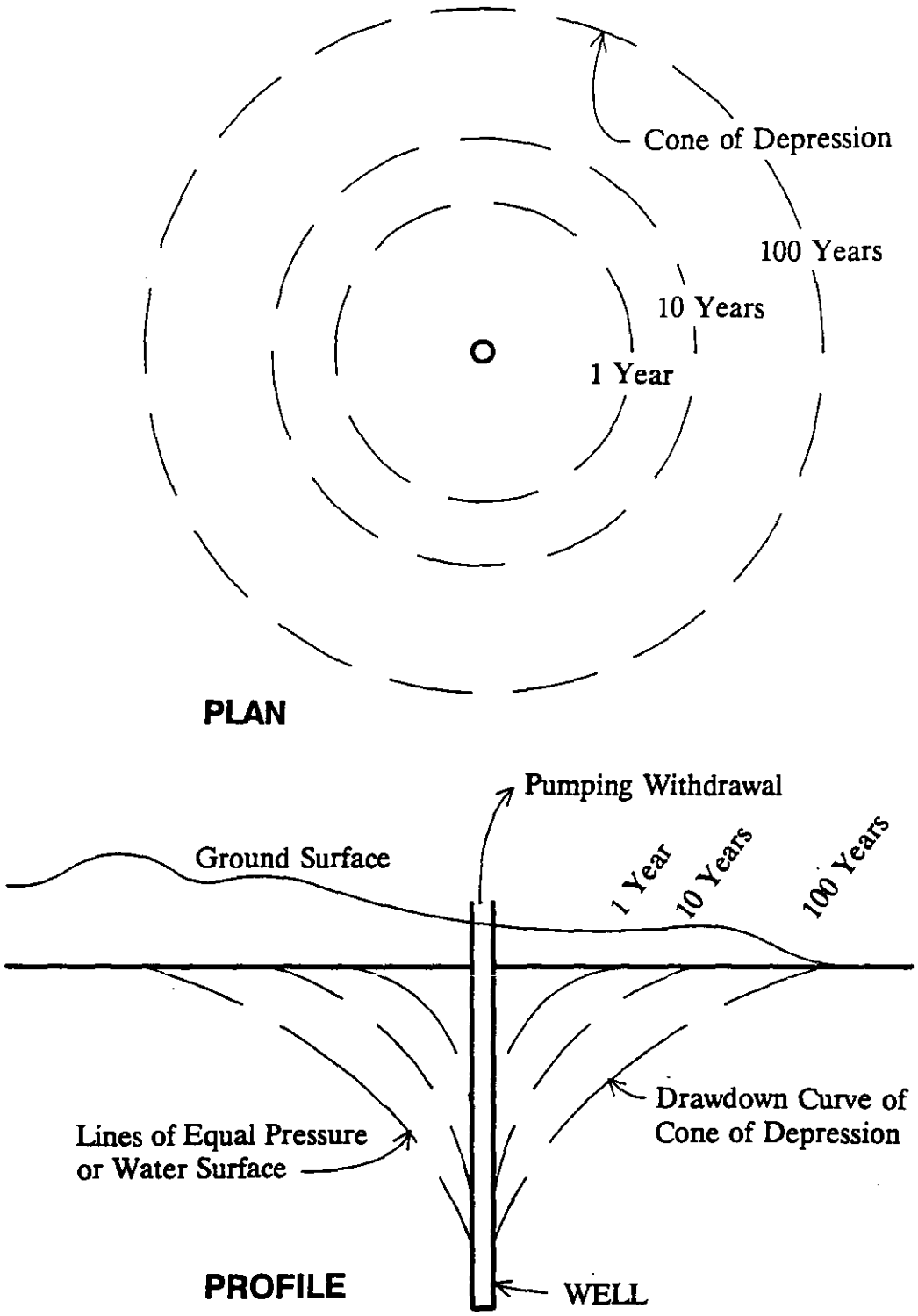


Figure 6. Conceptual Representation of Draw-down of Water Levels Over Time Around an Area of Constant Pumping.

The cone of depression caused by pumping always lowers the ground water levels or pressures around the well, regardless of the amount of recharge. Some ground water storage will always be lost with pumping. In areas where there are several wells operating at significant withdrawal rates, for example in or around a municipality, the effects of pumping several wells will be similar to that of a single well, ie., water levels will be drawn down throughout and around the area containing the wells. The area containing and surrounding the wells will always experience some water level decline. In the **BASIN** this effect can be seen by the reduced water levels in and around the two major cities, with the declines decreasing outward. Ground water levels farthest from the major pumping centers have experienced the smallest declines, and in some places may approximate pre-development conditions.

In some basins, a lowering of the ground water table can actually cause a greater amount of water to be recharged to the basin as excess surface water is diverted into the ground water system by the water level change. This effect, however, does not appear to play a significant role in the **BASIN**. Studies are presently underway at the University of Idaho in regard to ground water recharge from area streams (see Ralston and Li, 1989).

The response of a ground water system to pumping is more complicated than diversion of surface waters. The effects of surface water diversions are generally observed immediately and generally occur only in the downstream direction. The effects of ground water withdrawals, on the other hand, are not confined to a single direction. In fact, pumping may affect water levels in a basin in all directions. Furthermore, the time required for pumping effects to reach various points in a ground water system often takes years. In this regard, ground water management may be difficult, and model studies can play an important role.

As long as the discharge (both natural and pumping) from a basin is less than the recharge, water level declines (the time-lag effect notwithstanding) will be roughly proportional to the pumping amount. When the discharge from a basin exceeds the natural recharge, ground water levels will continue to decline, and ground water will be mined or depleted, even when pumping is held constant. Careful monitoring and analysis of ground water levels in an area are important to assure that such a condition does not develop.

Recent modeling studies of the Pullman-Moscow ground water basin [Lum *et al.* (1990)] suggest that mining is not occurring and that declining water levels are the result of increased pumping rates. This result needs to be further investigated by additional model studies.

5.4 Present Basin Conditions

Present (1990) water levels in principal wells in the **BASIN** are at an elevation of about 2260 feet (above mean sea level) for Pullman, and 2250 feet for Moscow. Due to topographical differences between and

within the cities, water levels are approximately 75 to 250 feet below the land surface in the Pullman/Washington State University wells, and some 300 feet below the surface in the Moscow/University of Idaho wells.

Figure 7 shows the historical combined pumping of Pullman, Moscow, Washington State University, and the University of Idaho. Pumping volumes are averaged over 5-year periods and, therefore, do not directly reflect year-to-year variations. Figure 8 shows more recent pumping withdrawals for the **BASIN**. Withdrawals by the city of Pullman are combined with Washington State University; Moscow withdrawals are combined with those of the University of Idaho. As the figures indicate, pumping withdrawals have generally stabilized for both communities over the last 15 years.

Figures 9 and 10 show historical ground water levels in the Pullman and Moscow areas. Water levels in the Moscow area have stabilized (as of 1985-1989), while water levels in Pullman continue to show some decline.

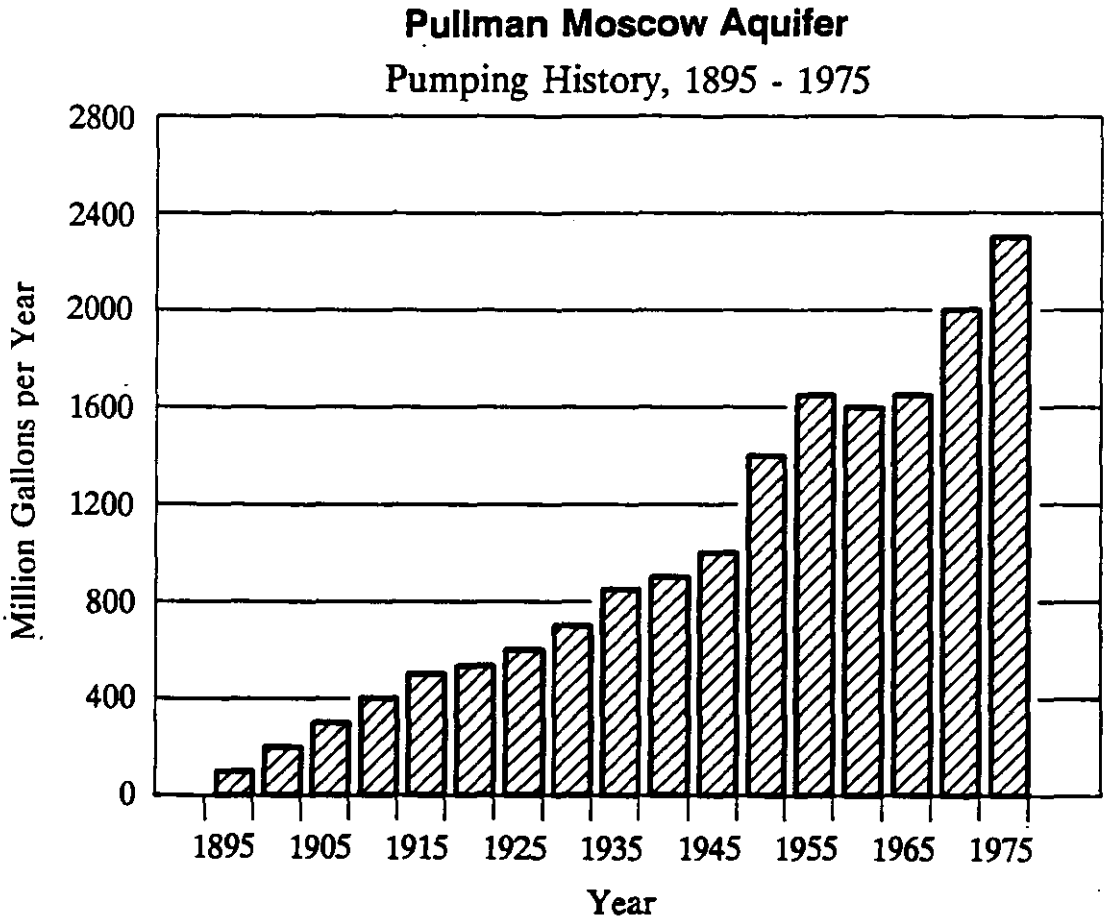


Figure 7. Historical Pumping Withdrawals in the Pullman-Moscow Area (Data from Lum, et al., 1990, Figure 9).

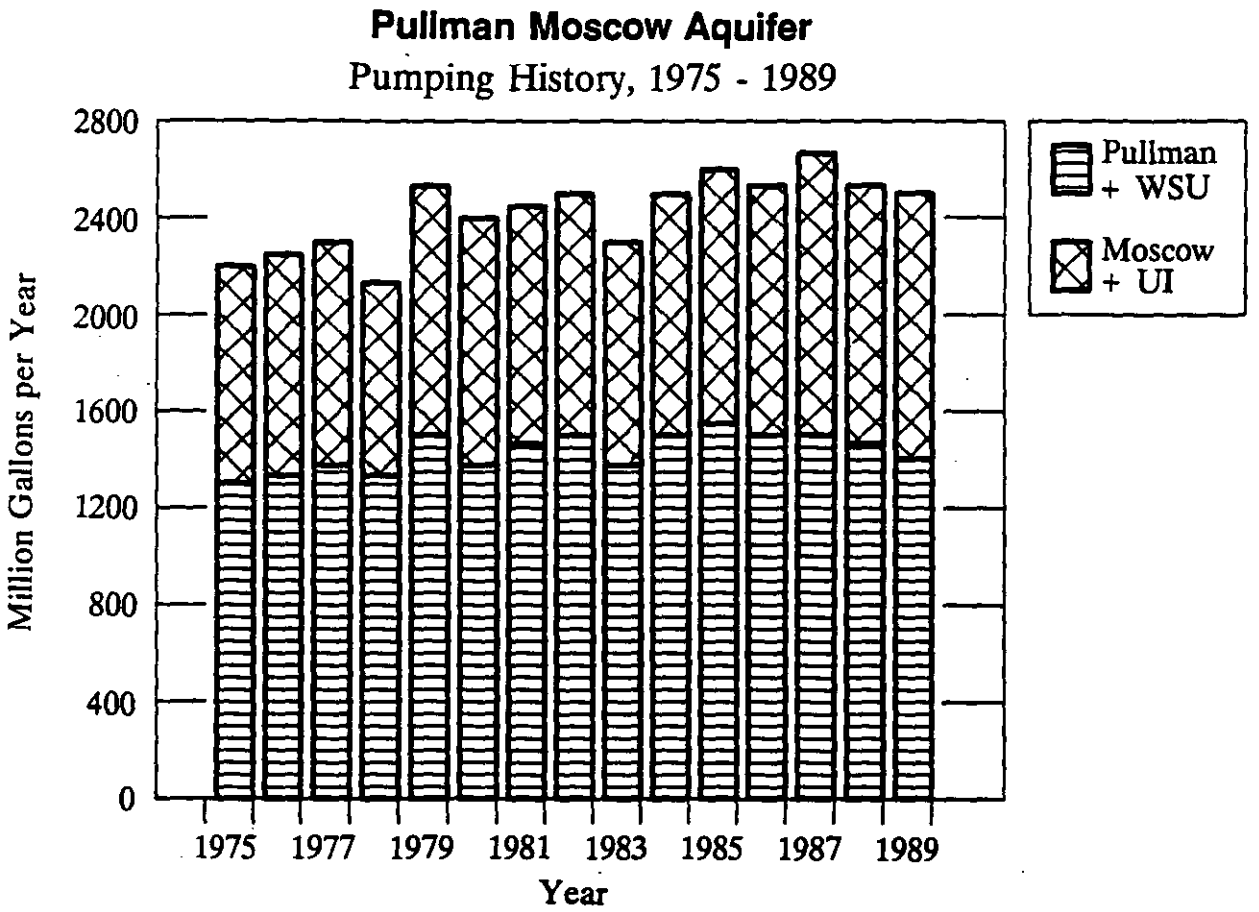


Figure 8. Recent Withdrawals in the Pullman-Moscow Area (Data from Pullman-Moscow Water Resources Committee).

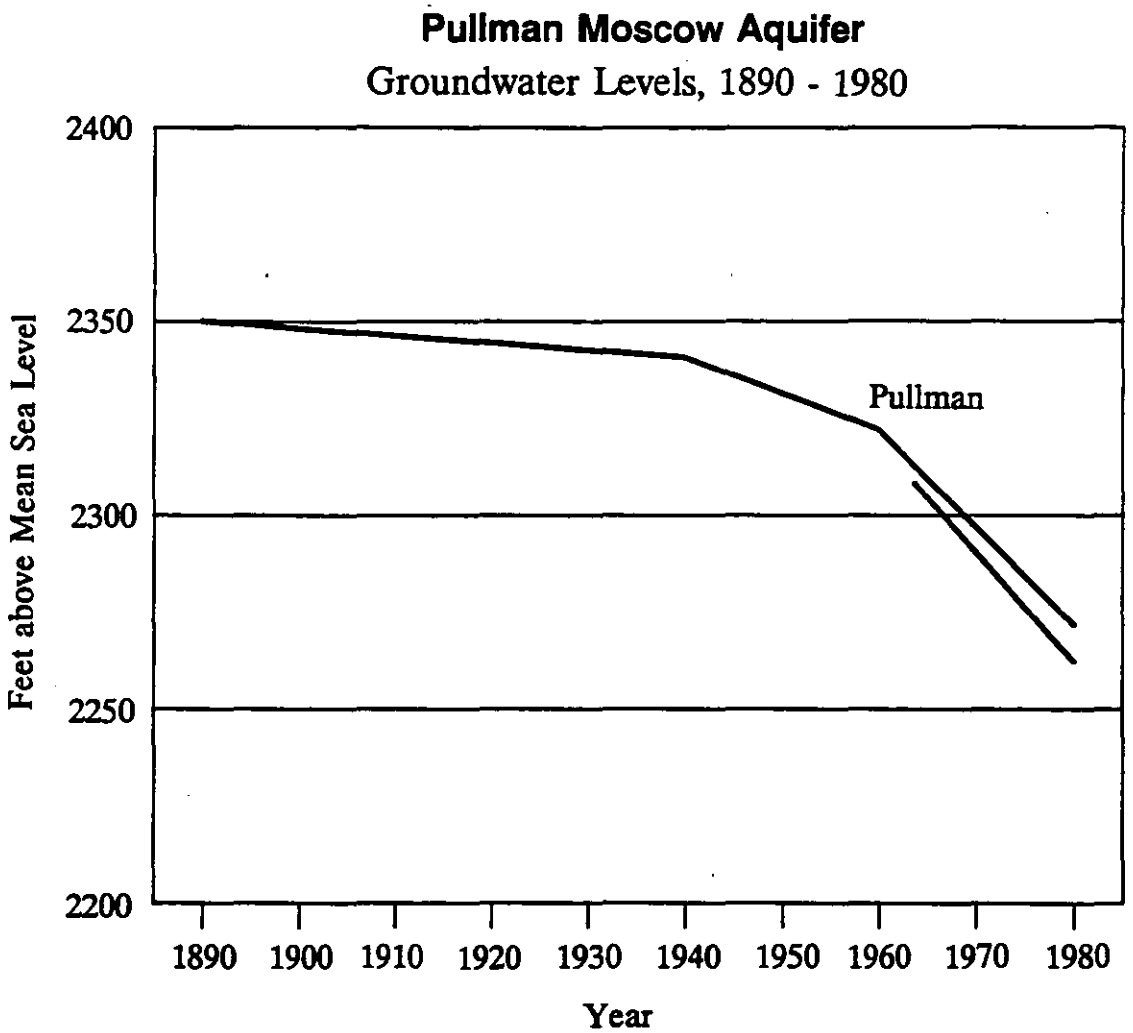


Figure 9. Historical Ground Water Levels in the Pullman-Moscow Area (Adapted from Lum, et al., 1990).

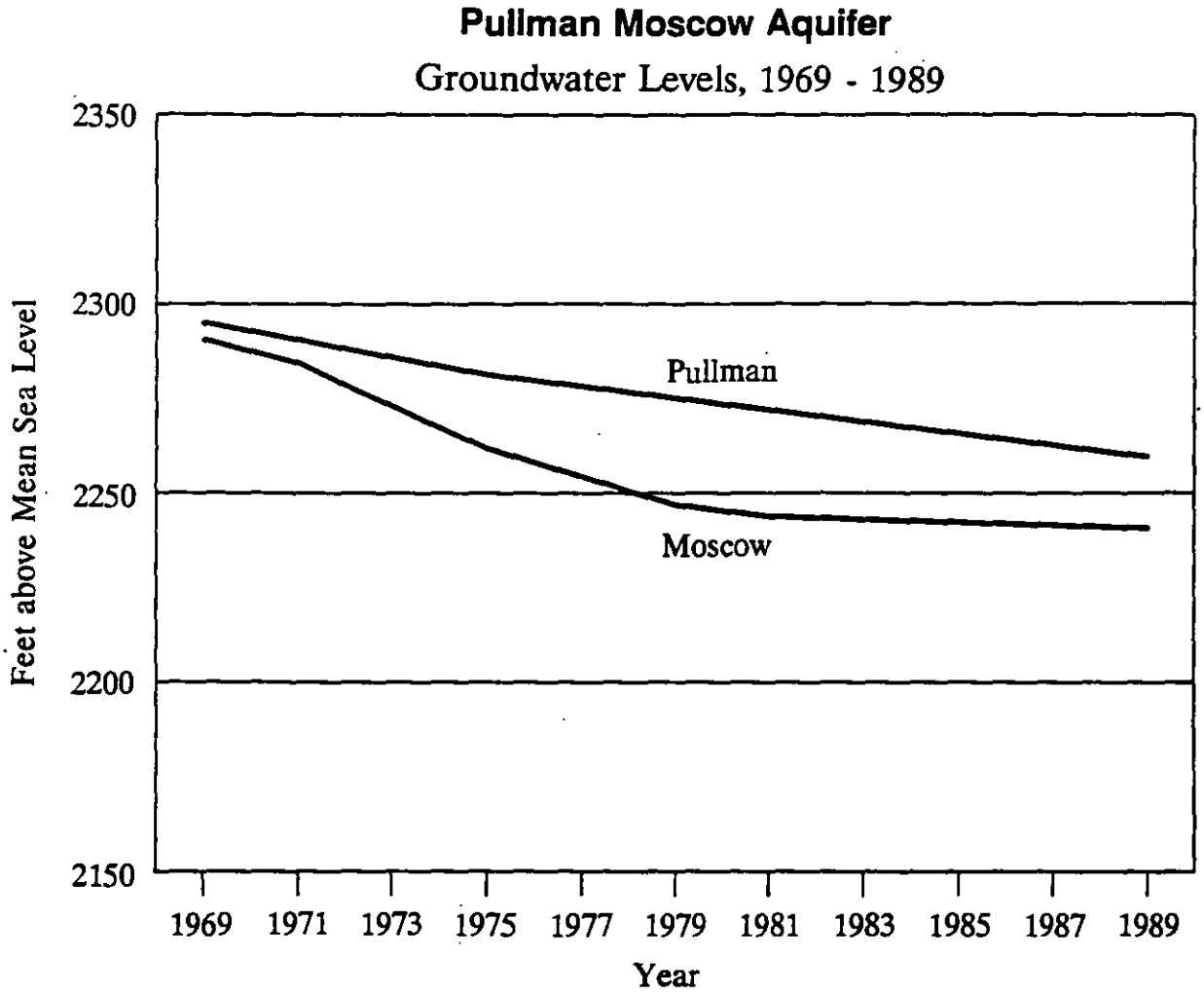


Figure 10. Recent Ground Water Levels in the Pullman-Moscow Area (Data from the Pullman-Moscow Water Resources Committee).

Chapter 6

Groundwater Management Program

6. GROUND WATER MANAGEMENT PLAN

6.1 Overview

Successful management of the Pullman-Moscow ground water resource requires the utilization of an effective management plan. This chapter describes the role of the **COMMITTEE** and its goals and actions. Also in the chapter are the stated action plans of the **ENTITIES** for achieving the goals of the **PLAN**. The need for educational programs and conservation activities are addressed in the following paragraphs. Provisions for annual reviews of these adopted plans, reporting procedures, data maintenance, and recommended research for the **BASIN** are also set forth.

6.2 Role of the Committee

The role of the **COMMITTEE** is to encourage **ENTITIES** to implement the **PLAN**. The **COMMITTEE** will also monitor the success of the **ENTITIES** in carrying out their action plans and achieving the goals of the **PLAN**. Each **ENTITY** will be expected to adopt an action plan, interfacing with the stated goals of the **PLAN**. The **COMMITTEE** will provide guidance related to water-use plans, conservation strategies relative to water use, implementation policies, and the preparation of local ordinances or zoning regulations.

6.2.1 Education and Information Exchange

One of the key functions of the **COMMITTEE** will be to provide a forum for the exchange of successful and effective management policies, strategies, and techniques among the **ENTITIES** and other interested groups and governing bodies. Public involvement and education in **BASIN** water management issues are extremely important. The success of public education and the level of participation in conservation and other water resource issues will be assessed annually. It will be incumbent upon the members of the **COMMITTEE** to keep abreast of effective water resource management practices and articulate these concepts to the **ENTITIES** and their constituents. Action plans will be revised as new techniques for managing the ground water and better understanding of the basin ground water system become available.

6.2.2 Data Base

It shall be the responsibility of the **COMMITTEE** to continue to gather, maintain, and evaluate a data base of well locations, water consumption, and water levels for the **BASIN**. The **COMMITTEE** will develop a program of

data monitoring and analysis to better evaluate the ground water system response to consumption patterns. From this information, the **COMMITTEE** will ascertain **BASIN** water consumption and water level data in conjunction with the goals of the **PLAN**. Furthermore, the **COMMITTEE** will begin accumulating information and data related to monitoring the quality of the ground water. State and Federal water management agencies will be consulted and worked with in order to maximize effective data gathering and analysis.

6.2.3 Research

Many research projects have been completed over the past decade in the hopes of better understanding the **BASIN** configuration. From this research has evolved a conceptual view of the aquifers system with the acceptance of the USGS **MODEL**. To further refine the **MODEL**, the **COMMITTEE** will continue to acquire, maintain, and upgrade information as it relates to the ground water system.

This research will need to continue to be a cooperative effort with state, federal, local, and private sources. Over the course of the next several years, the **COMMITTEE** will establish research priorities essential to furthering the understanding of the **BASIN**.

Research regarding the **BASIN** will be conducted in the following main areas:

- Model studies to evaluate the effects of various alternative management strategies on the aquifer;
- Field investigations to better determine the geologic and hydrogeologic characteristics of the **BASIN**; and,
- Economic or cost-feasibility studies of various alternative conservation measures and incremental water supply sources.

These research areas are outlined in greater detail in Appendix D. It will be the responsibility of the **COMMITTEE** to prioritize actual research needs, set budgets for such activity, and identify and solicit revenue sources.

6.2.4 Annual Reports

The **PLAN** will be reviewed at least annually by the **COMMITTEE**. The **COMMITTEE** will be responsible to see any annual adjustments or changes in the **PLAN** are endorsed by the governing state agencies and adopted by the **ENTITIES**.

6.2.5 Five-Year Plan Review

At the end of each five-year cycle a detailed **PLAN** review will be made and the **PLAN** will be modified as necessary to reflect the changing needs of the **ENTITIES** and the **PLAN**. The goals, recommended strategies, and

research priorities will be evaluated in regard to changing physical, economic, social, and political conditions of the Pullman-Moscow area. These revisions will be implemented based upon updated **BASIN** information, the success of particular management strategies, and input from public hearings. The adoption and implementation of any changes to the **PLAN** will be done with the full review of the **ENTITIES** and the two state agencies.

6.2.6 Reporting

The **COMMITTEE** will provide five year progress reports summarizing the success of the **PLAN**. The report will be made available to the public, the **ENTITIES**, and the state agencies detailing the progress made on each of the **PLANS'** goals as well as the success of the **ENTITIES** in implementing this action plan. Furthermore, water usage and water level trends in the **BASIN** will be documented in relationship to the **MODEL** and the target goals of the **PLAN**.

6.3 Goals of the Committee

The following goals and their expanded definitions form the foundation of the **PLAN**. The **ENTITIES** are to include in their respective action plans strategies for attaining the goals of the **PLAN**. The action plans combined with the **COMMITTEE's** goals form the substance of the **PLAN**.

- GOAL -

- **TO PROVIDE FOR FUTURE BENEFICIAL USE OF THE BASIN GROUND WATER WITHOUT DEPLETING THE BASIN AQUIFERS WHILE PROTECTING THE QUALITY OF THE WATER.**

  The primary goal is to insure that a stable ground water level is maintained in the **BASIN** aquifers. The **COMMITTEE** adopts the standard that the two universities and the two cities shall attempt to limit their annual aquifer pumping increases to one percent (1.0%) of their pumping volume based on a five (5) year moving average starting with 1986. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average for the two universities and the two cities. These initial limits on pumping rates are based upon historical data and water levels predicted by the **MODEL**. An estimate of the dispersed county pumping will be made based on an average per capita use for all county residences within the **BASIN** boundaries. Latah and Whitman counties will attempt to limit pumping increases from the **BASIN** aquifers to 125% of the estimated 1990 pumping levels. Further refinement of the **MODEL** will be necessary to establish acceptable limits on long term pumping rates which will confirm a stable water level for future users. The **COMMITTEE** will update the **MODEL** periodically and acceptable pumping levels may be modified upward or downward upon agreement by the **ENTITIES**.

- GOAL -

- **TO PROMOTE A PROGRAM OF PUBLIC EDUCATION AND AWARENESS REGARDING BASIN GROUND WATER MANAGEMENT ISSUES.**

  The **COMMITTEE** shall pursue and develop a program of public education to encourage conservation and reuse of water. Programs soliciting public support for committee activities and efforts to stabilize the water level will be developed.

- GOAL -

- **TO PROMOTE CAREFUL MONITORING AND ANALYSIS OF THE GROUND WATER LEVEL AND USAGE DATA FOR THE BASIN.**

  The **COMMITTEE** shall continue to maintain records of the ground water levels and usage data collected on the **BASIN.**

- GOAL -

- **TO CONTINUE TO EXPLORE POSSIBLE SUPPLEMENTAL WATER SOURCES FOR ANTICIPATED AND POTENTIAL FUTURE WATER USE IN THE BASIN.**

  The **COMMITTEE** shall pursue the development of a Least Cost Plan **(LCP)** for providing supplemental water which will be completed within three years after the date of acceptance of this **PLAN** by all six **ENTITIES** and the states. The **LCP** shall evaluate potential incremental sources of water for the region and the relative costs of such sources. The information documented in the **LCP** shall be used in refining a course of action to insure an adequate long term water supply for the **ENTITIES.** The **LCP** shall be updated when the **COMMITTEE** determines there is just cause for an update.

- GOAL -

- **TO REVIEW AND MAKE RECOMMENDATIONS ON ALL WATER USE OR LAND USE APPLICATIONS WHOSE ANTICIPATED IMPACT ON THE GROUND WATER SYSTEM POTENTIALLY LIES OUTSIDE THE STATED GOALS OF THE PLAN OR POLICIES ADOPTED BY THE MEMBER ENTITIES.**

- GOAL -

- **TO REVIEW AND MAKE RECOMMENDATIONS RELATIVE TO THE DEVELOPMENT OF AN AGREEMENT FOR WATER TRANSFERS ACROSS THE STATE LINE.**

6.4 Role of the Entities

Responsibility of implementation of the **PLAN** rests with the **ENTITIES.**

6.4.1 Plan Adoption

Each **ENTITY** will incorporate the **PLAN** into their respective city or county comprehensive plan or university development plan.

6.4.2 Plan Implementation

In conjunction with the **PLAN**, each **ENTITY** has developed an action plan supporting the goals of the **PLAN.** The action plan adopted by each **ENTITY** is enumerated in the following paragraphs. Each **ENTITY** reserves the right to modify and improve its individual action plan as it deems appropriate. However, each modification shall be made in accordance with the provisions of the **PLAN.**

Specific reference to the issue of *Growth and Potential Developers* will be addressed in each **ENTITY's** action plan as follows:

1. Incorporate into each **ENTITY's** comprehensive plan anticipated growth rates and corresponding water usage increases with strategies for meeting the water needs of the community, county, or university.

2. Adopt regulations requiring developers to provide water conservation, re-use, and recycling plans along with anticipated use and impact statements before their developments are approved. (See Washington interim guidelines for major water users.)

ACTION PLANS OF THE ENTITIES

Moscow Action Plan

The following is the action plan of the City of Moscow. It specifically supports the goals of the COMMITTEE as appropriate for this ENTITY, as stated in the PLAN, and as referenced below. In no case is this action plan intended to be in conflict with the PLAN.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the City of Moscow proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (745 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (700 mgy to 875 mgy).
- Continue summer/winter differential water rates.
- Require developers to project water use.
- Participate in programs that offer free water conserving devices to customers.
- Create a conservation fund with a four cents/1,000 gallon surcharge to customers to pay for those devices, to fund research projects

recommended by the **COMMITTEE**, and hire assistance to implement programs.

- Adopt local codes requiring new water users to utilize water conserving appliances, ie., smaller toilet tanks, etc.
- Meter city use of water.
- Calibrate consumer meters.
- Address water issue in Comprehensive Plan.
- Participate in education programs, ie., schools, bill stuffers, cable T.V.
- Encourage recycling at building permit level for major water users.
- Continue to make city wastewater treatment plant (WWTP) effluent available to the University of Idaho.
- Continue use of WWTP effluent for irrigation at WWTP.
- Establish demonstration projects utilizing low water requirements - landscaping parks utilizing low irrigation trees and shrubs.
- Continue 24 hour daily recordings of water levels and pumpage.
- Continue submitting data to the **COMMITTEE** computer program in timely manner (monthly.)
- Assure the ground water quality is protected in the **BASIN** by:

  Reviewing any project with possible recharge to the aquifers.

  Complying with or exceeding State and EPA water quality standards for discharge into streams.

  Regulating toxic and hazardous waste storage to create strict standards to prevent contamination of aquifers.

  Prohibiting chemical dump site over the aquifers.

  Continuing compliance with EPA regulations regarding underground storage tanks.

Pullman Action Plan

The following is the action plan of the City of Pullman. It specifically supports the goals of the COMMITTEE as appropriate for this ENTITY, as stated in the PLAN, and as referenced below. In no case is this action plan intended to be in conflict with the PLAN.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the City of Pullman proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (827 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (767 mgy or 959 mgy).
- Address water use in City's Comprehensive Plan and Zoning Code.
- Require new development to submit projected water use.
- Enact most stringent code available regarding low flow plumbing fixtures for new construction and remodel building permits.
- Participate in programs that offer users flow restrictors and toilet dams to reduce consumption.
- Consider increasing user rates during summer irrigation periods to discourage wasteful practices.

- Install low water use landscaping at all City facilities and install more efficient irrigation systems.

- Require installation of low water use landscaping on all new commercial and multi-family developments.

- Enact a conservation surcharge on all users with revenues dedicated to educational efforts including **COMMITTEE** sponsored research projects.

- Distribute conservation information through mailings to users, T.V., radio, and newspaper advertisements.

- Construct low irrigation demand landscaping demonstration projects on city owned sites.

- Continue membership in **COMMITTEE** with funding for studies and research projects.

- Continue input to the **COMMITTEE** of city's monitoring efforts. Develop usage data by user class ie., residential, single family, multi-family, commercial, institutional, industrial.

- Comply with all State and Federal regulations pertaining to hazardous materials, storm water disposal, solid waste disposal, sewage sludge disposal, non-point source, household contributions, and well construction and abandonment.

The following is the action plan of Latah County. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Latah County proposes the following goals apply to all land under the authority of County government:

- Estimate the dispersed/county pumping based on an average per capita use for all county residences both within the **BASIN** boundaries and for the full county.
- Latah County will attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 figures. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average.

Work with the Planning and Building Department to:

- Provide educational brochure with building permits promoting water conservation, low water use landscaping, and general sensitivity to the Pullman-Moscow Aquifer.

- Encourage use of low water volume fixtures. Consider offering a financial incentive for conservation devices at the time of application for permit of new construction.

- Encourage well registration for purposes of data collection.

Establish water conservation policies at all facilities and/or properties managed by Latah County. These policies shall pertain to irrigation practices and physical features of construction.

Refine the county emergency response plan to handle disasters which could affect ground water contamination.

Encourage the development and implementation of water and power conservation programs developed by governmental agencies and private industry.

Endorse and provide funding for water research projects.

Work with the County Cooperative Extension Office and Soil Conservation Service District to develop an outreach program for water quantity and quality education.

Seek assurances of ground water quality in conjunction with solid waste disposal sites. This will include baseline monitoring of present and future solid waste disposal sites.

Regulate development on or the drainage of wetlands not regulated by definition by the Army Corps of Engineers.

Regulate developments which could jeopardize water quality.

Use a land use procedure, for example a "conditional use permit," for developments which propose to use water supplies in the day-to-day operation of a non-residential or commercial venture.

Use the **COMMITTEE** to conduct a preliminary recommendary hearing prior to the above mentioned County proceeding in the case of a land use with a dependence on water use for successful operation of a commercial venture.

Updated Comprehensive Plan will reflect water conservation and protection goals.

Develop a local well-head protection ordinance.

Recognize riparian zones within the County and offer protection through ordinance or conditional use permit review.

Define and support programs for protection of water quality as administered by the North Latah Health District and the state agencies with local authority in this field.

Amend the Zoning Code to require Conditional Use Permits for projects with water impacts.

Apply water protection program standards to the whole county.

Whitman County Action Plan

The following is the action plan of Whitman County. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Whitman County proposes to:

- Estimate the dispersed county pumping based on an average per capita use for all county residences within the **BASIN** boundaries. Whitman County will attempt to limit significant pumping increases from the **BASIN** aquifers.
- Review and, if necessary, amend the county comprehensive plan and zoning policies to address quantity and quality concerns.
- Promote conservation practices and use of water saving devices for <u>all</u> water users (no matter what type of source.)
- Encourage the use of water saving devices for all new construction via hand-outs with the building permit.
- Continue to encourage all public water purveyors to meter all services within their systems by Department of Health.

- Promote wise landscaping and "water" uses with information from Washington State University Extension and SCS.

- Support the **COMMITTEE** in pursuing research projects.

- Require all new public drinking water wells to install static level measuring devices at the time of pump installation. All existing public drinking water sources, if not already so equipped, will be retrofitted with such a measuring device at the time of pump/hardware removal (for any reason.)

- Require pump head measuring and monthly recording of the pumping volumes as part of the annual report.

- Support the identification of critical recharge areas within the county.

- Assure that new developments comply with State agency regulations for ground water and surface water protection (ie. Washington State Department of Ecology, etc.)

University of Idaho Action Plan

The following is the action plan of the University of Idaho. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, the University of Idaho proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986. This average will begin at 353 mgy plus the new allocation for well #5 of 48 mgy for a total of 401 mgy. At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average. (1981-1985 average is 301 times 125% equals 376 mgy plus 48 mgy from well #5 for a total allocation of 424 mgy.)
- Continue to switch domestic irrigation from wells #3 and #4 to the recycled water irrigation system.
- Submit an application to the State of Idaho for permission to switch water sources for select programs from wells #3 and #4 to well #5 and future shallow wells.
- Continue to install best available conservation technology in new facilities and building remodels.

- Increase recharge through infiltration via land application of stream runoff and recycled water at various places around the University of Idaho campus.

- In selected areas of campus, provide demonstration sites for research and testing of xerophytic grasses, shrubs, flowers, and other landscaping which require less water.

- Financially support the **COMMITTEE'S** educational efforts.

- Supplement the **COMMITTEE's** educational program with distribution of appropriate information on campus water use and conservation.

- Make public all successful University of Idaho water conservation demonstration projects which can be copied by the public or other **ENTITIES.**

- Continue to supply **COMMITTEE** with monthly data on ground water pumping and recycled water irrigation volumes.

- Comply with all State and Federal regulations pertaining to hazardous materials, storm water disposal, solid waste disposal, sewage sludge disposal, non-point sources, and well construction and abandonment.

Washington State University Action Plan

The following is the action plan of Washington State University. It specifically supports the goals of the **COMMITTEE** as appropriate for this **ENTITY**, as stated in the **PLAN**, and as referenced below. In no case is this action plan intended to be in conflict with the **PLAN**.

COMMITTEE Goals:

- To provide for future beneficial use of the **BASIN** ground water without depleting the **BASIN** aquifers while protecting the quality of the water.
- To promote a program of public education and awareness regarding **BASIN** ground water management issues.
- To promote careful monitoring and analysis of ground water level and usage data for the **BASIN**.
- To continue to explore possible supplemental water sources for anticipated and potential future water use in the **BASIN**.
- To review and make recommendations on all water use or land use applications whose anticipated impact on the ground water system potentially lies outside the stated goals of the **PLAN** or policies adopted by the member **ENTITIES**.
- To review and make recommendations relative to the development of an agreement for water transfers across the state line.

In support of the **COMMITTEE** goals and activities, Washington State University proposes to:

- Attempt to limit annual aquifer pumping increases to one percent (1.0%) of the pumping volume based on a five (5) year moving average starting with 1986 (642 mgy). At no time shall the accumulated total pumping exceed 125% of the 1981-1985 average (702 or 877 mgy).
- Convert irrigation to computer controlled automatic systems on 70-90% of all turf within 10 years.
- Eliminate 20 GPM of cooling water to the drain within three years.
- Financially support the **COMMITTEE** activity.
- Install water meters on its major water users.
- Supplement the **COMMITTEE**'s educational program with distribution of appropriate information on campus.
- Report all appropriate water data to the **COMMITTEE** for analysis.

- Set a goal of no increase in withdrawal rate for the next two years to test the **MODEL** with actual data.

- Protect the ground water quality by:

  Maintaining good landscape practices and reviewing chemical use.

  Monitoring and/or eliminating all underground storage tanks containing chemicals.

  Continued monitoring of the old hazardous waste site.

  Monitoring sewer systems and correcting any deficiencies (leaks, cross connections, etc.) noted.

  Monitoring existing septic tank systems and properly citing future systems.

  Insuring that proper well construction procedures are followed.

  Complying with all State and Federal regulations pertaining to ground water and surface water quality.

Bibliography

BIBLIOGRAPHY

Barker, R.A., 1979, Computer simulation and geohydrology of a basalt aquifer system in the Pullman-Moscow Basin, Washington and Idaho: Washington Department of Ecology Water-Supply Bulletin 48, 119 p.

Bloomsburg, G.L., "Ground Water Management across a State Boundary - Idaho/Washington," prepared for the Idaho Water Users Association, Water Law Seminar, December, 1988.

Bloomsburg, G.L., Department of Agricultural Engineering, University of Idaho, 1990 (personal communication).

Bockius, S.H., 1985, Geophysical mapping of the extent of basaltic rocks in the Moscow groundwater basin: M.S. Thesis, University of Idaho, Moscow, Idaho, 83 p.

Bouwer, H., Groundwater Hydrology, McGraw-Hill, 1978.

Breckenridge, R.M. "Geology of the Palouse," Geo-Note 9, Idaho Geological Survey, University of Idaho, Moscow, Idaho, May 1986.

Brown, J.C., 1976, Well construction and stratigraphic information: Pullman test and observation well, Pullman, Washington: College of Engineering Research Report 76/15-6, Washington State University, Pullman, Washington, 35 p.

Cotton, W.R., Jr., 1982, Hydrochemistry of ground water near Pullman, Washington: M.S. Thesis, Washington State University, 89 p.

Crosthwaite, E.G., "Basic Ground Water Data for the Moscow Basin, Idaho," Open-file Report, U.S. Geological Survey, in cooperation with the Idaho Department of Water Resources.

Ebasco Services, Incorporated, 1985. "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 p.

Eyck, G.T. and C.C. Warnick, "Catalog of Water Reports Pertinent to the Municipal Water Supply of Pullman, Washington and Moscow, Idaho - a Summary," Idaho Water Resources Research Institute, Moscow, Idaho, 1984.

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

Hall and Associates, Ruth Dight, and Applied Geotechnology, Inc.,"Ground Water Resource Protection," A Handbook for Local Planners and Decision Makers in Washington State, Prepared by King County Resource Planning, in Cooperation with the Washington State Department of Ecology, December 1986.

Jacob, C.E., "Flow of Ground Water," in Engineering Hydraulics, H. Rouse, ed., John Wiley and Sons, 1950.

Jones, R.W. and S.H. Ross, "Detailed Ground Water Investigation of Moscow Basin," Research Technical Completion Report, Project A-011-IDA, Idaho Water Resources Research Institute, University of Idaho, Moscow, Idaho, June 1969.

Jones, R.W. and S.H. Ross, "Moscow Basin Ground Water Studies," Pamphlet No. 153, Idaho Bureau of Mines and Geology, Moscow, Idaho, March 1972.

Jones, R.W., S.H. Ross, and R.E. Williams, "Feasibility of Artificial Recharge of a Small Ground Water Basin by Utilizing Seasonal Runoff from Intermittent Streams, A Preliminary Study of Artificial Recharge of Ground Water in Moscow Basin, Latah County, Idaho," paper presented at the Sixth Annual Symposium on Engineering Geology and Soils Engineering, Boise, Idaho, April 1968.

Klein, D.P., Sneddon, R.A., and Smoot, J.L., 1987, A Magnetotelluric study of the thickness of volcanic and sedimentary rock in the Pullman-Moscow Basin of eastern Washington: U.S. Geological Survey Open-File Report 87-140, 30 p.

Lin, C., "Factors Affecting Ground-Water Recharge in the Moscow Basin, Latah County, Idaho," Masters thesis, Washington State University, 1967.

Lum, W.E., J.L Smoot, and D.R. Ralston, "Geohydrology and Numerical Model Analysis of Ground Water Flow in the Pullman-Moscow Area, Washington and Idaho," Water Resources Investigations Report 89-4103, U.S. Geological Survey, 1990.

Ralston, D.R., "Guide for the Location of Water Wells in Latah County, Idaho," Information Circular, Idaho Bureau of Mines and Geology, Moscow, Idaho, November 1972.

Ralston, D.R. and E.J. Bruhl, "Ground Water Appropriation under the Appropriation Doctrine," Research Technical Completion Report 14-08-0001-G1219-02, Idaho Water Resources Research Institute, University of Idaho, Moscow, Idaho, 1988.

Ralston, D.R. and T. Li, "Analysis of Ground Water Recharge from Paradise Creek at the University of Idaho Ground Water Research Site: Part I," prepared for the Pullman-Moscow Water Resource Committee, November, 1989.

Ralston, D.R., D.L. Grant, H.L. Schatz, and D. Goldman, "Analysis of the Impact of Legal Constraints on Groundwater Resource Development in Idaho," Pamphlet No. 158, Idaho Bureau of Mines and Geology, University of Idaho, Moscow, Idaho, September 1974.

Ralston, D.R. and J.L.Smoot, "Ground Water in the Pullman-Moscow Area - A Water Supply for the Future?" Idaho Water Resources Research Institute, University of Idaho, Moscow, Idaho (undated).

Ringe, L.D., 1968. Geomorphology of the Palouse Hills, southeastern Washington:
M.S. Thesis, Washington State University, Pullman, Washington, 73 p.

Rosa, J.M., "Water Yield Maps for Idaho," ARS 41-141, Agricultural Research Service, U.S. Department of Agriculture, in cooperation with the Idaho Agricultural Experiment Station, 1968.

Ross, S.H., "Contributions to the Geohydrology of Moscow Basin, Latah County, Idaho," Masters Thesis, University of Idaho, Moscow, Idaho, 1965.

Russell, I.C., "A Reconnaissance in Southeastern Washington," U.S. Geological Survey, Water Supply Paper No. 4, 1897.

Smoot, J.L. and D.R. Ralston, "Hydrogeology and a Mathematical Model of Ground Water Flow in the Pullman-Moscow Region, Washington and Idaho," Idaho Water Resources Research Institute, University of Idaho, Moscow, Idaho, April 1987.

Sokol, D., "Interpretation of Short Term Water Level Fluctuations in the Moscow Basin, Latah County, Idaho," Pamphlet No. 137, Idaho Bureau of Mines and Geology, November 1966.

Stevens, Thompson, and Runyan, 1970, " Water Supply Study," Report prepared for the Pullman-Moscow Water Resources Committee by Stevens, Thompson, & Runyan, Inc., Boise, Idaho.

Stevens, Thompson, and Runyan, "A Report on the Feasibility of Union Flat Creek Pumped Storage," prepared for the U.S. Army Corps of Engineers, Walla Walla District, by Stevens, Thompson, and Runyan, Inc., Boise, Idaho, 1973.

Sutter, R.J. and G.L. Corey, "Consumptive Irrigation Requirements for Crops in Idaho," Bulletin 516, University of Idaho, College of Agriculture, 1970.

Theis, C.V., "The Source of Water Derived from Wells - Essential Factors Controlling the Response of an Aquifer to Development," *Civil Engineering*, May 1940.

Tullis, E.L., "Contributions to the Geology of Latah County, Idaho," Geological Society of America Bulletin, Vol. 55, 1944.

U.S. Army Corps of Engineers, "Palouse River Basin, Idaho and Washington, Reconnaissance Study (Preliminary)", Walla Walla District, March 1989.

U.S. Geological Survey, "Ground-Water Problems in the Vicinity of Moscow, Latah County, Idaho," Water Supply Paper 1460-H, 1960.

Warnick, C.C., Statement for the Hearing on Ground Water Allocation Problems and Policy of Washington House Ecology Committee's Subcommittee on Water Resource Management at Spokane, Washington, August 19, 1975.

Washington State Department of Ecology, "Guidelines for Development of Ground Water Management Areas and Programs," August 1988.

Washington State Department of Ecology,"Procedures Manual, for the Ground Water Management Areas Program," prepared by the Ground Water Management Areas Team, for use by the Ground Water Management Areas Team and Local Agencies, Draft of March, 1989.

Williams, R.E. and D.W. Allman, "Factors Affecting Infiltration and Recharge in a Loess-Covered Basin," *Journal of Hydrology* Vol. 8, 1969.

Appendix A

Intergovernmental Agreement

APPENDIX A

INTERGOVERNMENTAL AGREEMENT

(Pullman-Moscow Water Resources Committee)

THIS AGREEMENT is entered into by the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University (hereinafter sometimes referred to as the Entities) to be effective the first day of August, 1988 or as soon thereafter as the requirements set forth in Paragraph XIV are accomplished.

WITNESSETH:

WHEREAS, the water supply in Latah County, Idaho, and Whitman County, Washington, is an important regional concern; and,

WHEREAS, the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University deem it in the public interest to work jointly and cooperatively on water resource problems and issues; and,

WHEREAS, the Entities are authorized to enter into and carry out this Intergovernmental Agreement pursuant to the provisions of Idaho Code Sections 67-2326 et. seq., and Chapter 39.34 of the Revised Code of Washington; now, therefore

IT IS HEREBY AGREED by and between the Entities as follows:

I. Committee Established: In order to carry out the purposes established in this Agreement, the Entitles hereby agree to the establishment of a committee to be known as the Pullman-Moscow Water Resources Committee (PMWRC).

II. Membership: The PMWRC shall consist of twelve appointed members with two members each representing the following Entitles: the City of Pullman, Washington; the City of Moscow, Idaho; the County of Whitman, Washington; the County of Latah, Idaho; the University of Idaho; and Washington State University. Each member shall serve at the pleasure of the Entity which appoints that member for a term of two years with the 1st term beginning on August 1, 1988.

III. Purpose: The purposes of this Agreement are to:

(A) coordinate planning to assure a long-range supply of water to the entities;

(B) retain the momentum and continue to update and expand the database already begun through previous studies;

(C) encourage conservation to promote the life of the aquifer serving the Entities;

(D) investigate continuing and/or alternate sources of water;

(E) educate and advise the entities on the quantity and quality of the public water supply for the water basin serving the Cities of Moscow, Pullman, and the surrounding area;

(F) act as liaison between the Entities on water resource concerns; and

(G) promote communication between the Entities, the Washington Department of Ecology, and the Idaho Department of Water Resources.

IV. Powers: The PMWRC shall have the power to:

(A) collect and disseminate statistics and other information;

(B) allocate expenditures of funds contributed by the Entities;

(C) designate one of the Entities as a depository for funds and for the administration of those funds;

(D) hire personnel (by written agreements setting forth all duties and compensation) who will serve at the pleasure of, and whose duties will be determined by, the PMWRC;

(E) enter into legal and financial agreements, but only after any such agreements have been reviewed and approved by the Entities;

(F) apply for and administer grants; and

(G) work with the Entities in educating the public.

V. Officers and Voting:

(A) One member shall serve as Chairperson, one member shall serve as Vice Chairperson, and one member shall serve as Secretary. One member may serve as Treasurer and this office may be combined with the office of Secretary if the PMWRC so chooses.

(B) Each member of the PMWRC shall have one (1) vote. In the event of a tie vote, the issue shall fail.

(C) Entities may select alternate members in a manner considered appropriate by the selecting Entity. In the event that an appointed member of the PMWRC will be unable to attend a meeting of the PMWRC, the Entity represented by that appointed member may be represented by that appointed member. Alternate members representing absent appointed members shall have the same privileges as appointed members; provided, however, that no Entity shall have more than two votes on the business coming before the PMWRC.

VI. Meetings and Election of Officers:

(A) The PMWRC shall hold meetings at such times and places as set forth in its by-laws.

(B) The PMWRC shall annually elect its officers as set forth in its by-laws.

(C) The quorum necessary for the PMWRC to transact business or elect officers shall be constituted when seven members or a majority of the members representing the Entities entitled to vote in accordance with the provisions of Paragraph VII (D)are present at the meeting.

VII. Financing:

(A) Annually the PMWRC shall establish a budget for the ensuing operating year, which budget shall be established in sufficient time to allow each Entity to budget its contribution for the ensuing operating year.

(B) Contributions are due and payable from each entity with one half of the amount due on July 1st and the remaining one half on January 1st of the following year of each year of this Agreement. The funding ratio for contributions for administration and projects which uniformly impact all Entities shall be as follows:

The University of Idaho, Washington State University, the City of Moscow, and the City of Pullman, shall each, as its contribution, pay twenty (20) percent of the operating budget of the PMWRC;

The County of Latah and the County of Whitman shall each be responsible for ten (10) percent of the operating budget of the PMWRC.

(C) This funding ratio may be altered for the funding of specific projects according to the interests and benefits of each participating entity. Altered funding ratios shall be approved by each Entity participating in the altered funding ratio.

(D) Any Entity not current in the payment of a contribution shall lose all voting rights until such time as that Entity is current in contributions for that operating year.

VIII. Duration: This Agreement shall have a term of ten years from and after August 1, 1988, unless the PMWRC is sooner dissolved as set forth in Paragraph XI (A).

IX. Annual Report: The PMWRC shall report on its activities to each Entity on an annual basis.

X. By-Laws: The PMWRC may adopt, amend or repeal by-laws, in whole or in part which are not inconsistent with the terms and conditions of this Agreement, by a majority vote at any regular or special meeting of the PMWRC. A majority vote for the purposes of adopting, amending or repealing by-laws means a majority of all members of the PMWRC qualified to vote in accordance with the provisions of Paragraph VII (D) and not a majority of a quorum.

XI. Dissolution and Disbursement of Funds and Property:

(A) Any Entity may automatically withdraw from the PMWRC by submitting a written statement setting forth its intent to withdraw to the remaining Entities at least sixty (60) days prior to the effective date of its withdrawal.

(B) The PMWRC shall be dissolved through a written agreement approved by a majority of the Entities or through the withdrawal of three of the participating Entities.

(C) Any surplus funds or property remaining at the time of dissolution shall be distributed to the Entities in the proportion to the amount of money each Entity had contributed to the PMWRC budget during the one-year period (365 days) prior to the dissolution. If it is impossible to distribute such property, it shall be sold as surplus property of auctioned off with the proceeds disbursed as set forth in this Paragraph (C).

XII. Real Property: The PMWRC may neither acquire nor hold real property.

XIII. Expenditures: The disbursement of funds contributed by the Entities and received from other sources shall be managed by one of the Entities to be designated by the PMWRC which may, from time to time, be changed by a majority vote of all Entities participating in the membership of the PMWRC qualified to vote in accordance with the provisions of Paragraph VII (D) and not a majority of a quorum.

XIV. Filing and Effective Date: Copies of this Agreement shall be filed with the Pullman City Clerk, Whitman County Auditor, the Secretary of State of the State of Washington, the Moscow City Clerk, the Latah County Auditor, and the Secretary of State of the State of Idaho prior to its entry into force. This Agreement shall be effective upon execution by the Entities and the accomplishment of all filing requirements as provided herein subject to the approval of the Secretary of State for the State of Idaho as provided for in Section 67-2329 Idaho Code.

XV. Repealer: As between the City of Pullman; the City of Moscow; the County of Whitman, Washington; and the County of Latah, Idaho; all earlier agreements between them relating to water supply and the Pullman-Moscow Water Resources Committee that have not already terminated by the passage of time or the completion of their purpose(s) are hereby revoked and terminated, and specifically the following inter-local agreements shall be automatically terminated on the effective date of this Agreement, to-wit:

(A) Agreement for Engineering Services Water Supply Study Pullman-Moscow Water Resources Committee.

Dated: January 15, 1970

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University
Stevens, Thompson & Runyan, Inc.

(B) An Agreement Relating to a Water Study for Pullman-Moscow Region.

Dated: February 11, 1970

Signatories: Washington State University
University of Idaho
City of Pullman
City of Moscow

(C) An Agreement Relating to the Pullman-Moscow Water Resources Committee.

Dated: October 30, 1972

Signatories: Washington State University
University of Idaho
City of Pullman
City of Moscow

(D) An Agreement Relating to the Pullman-Moscow Water Resources Committee.

Dated: July 11, 1974

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University

(E) Contractual Agreement between the City of Pullman, acting for the Pullman-Moscow Water Resources Committee and Washington State University on behalf of the College of Engineering.

Dated: August 13, 1974

Signatories: The City of Pullman acting for the Moscow-Pullman Water Resources Committee

Washington State University

(F) An Agreement Relating to the Pullman-Moscow Water Resources Committee (Study of aquifer serving Pullman/Moscow area).

Dated: January 30, 1985

Signatories: City of Pullman
City of Moscow
University of Idaho
Washington State University

IN WITNESS WHEREOF, the parties to this Agreement have caused it to be executed to be effective the day and year first set forth above, and each signatory represents that he or she is authorized to sign this Agreement.

CITY OF PULLMAN, WASHINGTON

/s/ _____
Mayor

ATTEST:

/s/ _____
Financial Director

CITY OF MOSCOW, IDAHO

/s/ _____
Mayor

ATTEST:

/s/ _____
Clerk

WHITMAN COUNTY, WASHINGTON

/s/ _____
Commissioner

/s/ _____
Commissioner

/s/ _____
Commissioner

LATAH COUNTY, IDAHO

/s/ _____
Commissioner

/s/ _____
Commissioner

/s/ _____
Commissioner

WASHINGTON STATE UNIVERSITY

/s/ _____
Title

Approved as to Form:

/s/ _____
City Attorney of Pullman

/s/ _____
Whitman County Prosecuting Attorney

/s/ _____
Assistant Attorney General
Representing Washington
State University

UNIVERSITY OF IDAHO

/s/ _____
Title

/s/ _____
City Attorney of Moscow

/s/ _____
Latah County Prosecuting Attorney

/s/ _____
Attorney for the Regents of
the University of Idaho

Appendix B

Resolution of Understanding

APPENDIX B

RESOLUTION OF UNDERSTANDING
between
PULLMAN-MOSCOW WATER RESOURCES COMMITTEE
IDAHO DEPARTMENT OF WATER RESOURCES
WASHINGTON DEPARTMENT OF ECOLOGY
1989

WHEREAS, the Pullman-Moscow Water Resources Committee composed of representatives of Pullman, Moscow, University of Idaho, Washington State University, Whitman County and Latah County has an interest in the protection and management of the ground water resources of the Pullman-Moscow basin; and

WHEREAS, the Idaho Department of Water Resources and Washington Department of Ecology have the legal authority and the technical expertise to administer and regulate water law in their respective states, and the responsibility and desire to participate and assist in the management of the ground water resources; and

WHEREAS, there is evidence to show that the potential exists for the overuse of quality ground water resources within the basin; and

WHEREAS, a ground water management plan developed and implemented in concert with public needs and interests and in accordance with state and local laws, rules and regulations can serve to avert the overuse of the ground water resources in the basin; and

WHEREAS, the parties to this Resolution are desirous of developing and implementing such a ground water management plan; and

WHEREAS, the parties hereto are authorized to enter into this Resolution of Understanding for the purposes stated herein.

NOW, THEREFORE BE IT RESOLVED that the parties to this Resolution do agree to the following:

The Idaho Department of Water Resources (IDWR) and Washington Department of Ecology (WDE) agree to commit sufficient staff time to assist in the completion of such tasks as may be appropriate. IDWR and WDE further agree to pursue the implementation of a coordinated Washington-Idaho ground water management plan for the Pullman-Moscow basin in accordance with their respective state law policies.

The Pullman-Moscow Water Resources Committee (PMWRC) agrees to work with the state agencies and to serve as the forum for input from local governments, interest groups and private citizens.

Specific obligations of the Committee are as follows:

1. PMWRC will pursue and administer funding to conduct and promote studies and research relative to improving knowledge of the water resources of the basin.

2. PMWRC will prepare a management plan for the basin in cooperation with the two state agency parties (IDWR and WDE), which will address both water quantity and water quality concerns.

3. PMWRC will prepare as an initial step in the development of the management plan a principal work plan and time schedule which will outline the concerns and issues to be studied. This work plan shall indicate the party or parties with responsibilities for each task and an estimated schedule for completion of each task.

4. PMWRC will encourage public involvement in the development of the water management plan through public hearings and education programs.

5. PMWRC will facilitate the implementation of the ground water management plan in concert with the member entities of the Committee.

BE IT FURTHER RESOLVED, this Resolution shall be effective upon execution by all parties and accomplishment of the filing requirements and approvals as may be necessary. This Resolution shall remain in effect until the completion of the ground water management plan or until any party to the agreement terminates its participation by written notice of termination to the other parties.

This Resolution can be amended at any time by written notice to all parties, except that action by the Committee at a regularly scheduled meeting and notice to IDWR and WDE shall satisfy the written notice for PMWRC or Committee members.

/s/ _____
Pullman Date

/s/ _____
Moscow Date

/s/ _____
Washington State University Date

/s/ _____
University of Idaho Date

/s/ _____
Whitman County Date

/s/ _____
Latah County Date

/s/ _____
Washington Department of Ecology Date

/s/ _____
Date

I d a h o Water Resources

Appendix C

Public Input

APPENDIX C

PUBLIC INPUT

In October of 1989 a community workshop was held in Pullman to allow public participation in the identification of ground water concerns and their possible solutions. The workshop was beneficial in that it allowed people in the Pullman-Moscow area to voice concerns and suggestions and to become better informed on the **BASIN** ground water problems or issues. From the workshop, it became apparent that:

1. community people do want to become involved in **BASIN** ground water issues,

2. the public is in need of more information regarding the **BASIN** ground water system, and,

3. the public is in favor of water conservation in the **BASIN**.

Community participation in the **PLAN** development and adoption will be furthered through public input via the member entities, another community workshop (October 1991), and a public hearing (November 1991).

Appendix D

Suggested Research

APPENDIX D

SUGGESTED RESEARCH

Areas of research that will aid effective management of the **BASIN** are outlined below:

1. Field investigations

    a. Geologic studies;

    b. Flow path and flow time studies;

    c. Soil percolation (lysimeter) studies;

    d. Studies of the recharge from (or discharge to) streams in the **BASIN**;

    e. **BASIN** discharge to streams and rivers in the **BASIN** and seepage to the Snake River canyon;

    f. Artificial recharge using recharge ponds or reservoirs and recharge wells; and

    9. Soil recharge enhancement and erosion reduction studies;

2. Model studies

    a. Acquisition of a computer ground water **MODEL**; for convenient use by the **COMMITTEE** and **ENTITIES**;

    b. Study of the sensitivity of **MODEL** output to **MODEL** input, particularly in areas where relatively large uncertainties exist in the input data;

    c. update and upgrade the **MODEL** as appropriate to accommodate updated input information or changing computational or output needs; and

    d. use the **MODEL** to evaluate alternative management strategies or scenarios.

3. Feasibility studies

    a. Conservation, re-use, and recycling methods;

    b. Alternative surface water sources, including water storage within the **BASIN** and water transfers from outside the **BASIN**;

    c. Inter-entity water transfers;

d. Alternative ground water sources;

e. Split uses of upper and lower aquifers water; and,

f. Dual water systems for irrigation with lower quality water.

Appendix E

Committee Representatives

APPENDIX E

COMMITTEE REPRESENTATIVES

(1990 - 1991)

Pullman

Jim Hudak, Director of Public Works, City of Pullman

_____, City Council

AI Halvorson, City Council (from 1989 to January 1991)
Laurie Sauer, _____ (from February 1991 to present)

Moscow

Gary Presol, City Engineer, City of Moscow

Mardi Baron, City Council

Whitman County

Maggie McGreevy, County Commissioner

Jim Nebel, County Health Department

Latah County

Pam Peterson, County Planner

Nancy Johansen, County Commissioner

Washington State University

Joe Spoonemore, Director, Physical Plant

Ken Abbey, Assistant Vice President, Business (from 1988 to September 1990)
Craig Benjamin, Energy Manager, Physical Plant (from October 1990 to present)

University of Idaho

Ken Hall, Director, Physical Plant

Larry Kirkland, Energy Engineer, Physical Plant