

Ground Water Management on the Palouse Palouse Basin Aquifer Committee (PBAC)

Steve Robischon

Slides 1-40

Idaho Washington Aquifer Collaborative (IWAC)
Meeting

December 9, 2014

AGENDA

December 9, 2014 1:30 – 3:30 PM

Liberty Lake Sewer and Water District
22510 E. Mission Avenue, Liberty Lake, WA 99019

Welcome & Introductions
Agenda Additions or Revisions
Approval of Meeting Minutes 10.14.14
Financial Report

Old Business

- Our Gem Symposium 11/18/14 and Spokane River Forum Conference 11/19-20/14 – Feedback

New Business

Guest Speaker – Steve Robischon, Executive Director Palouse Basin Aquifer Committee. The Palouse Basin Aquifer Committee (PBAC) was formed in 1967 because of declining groundwater levels in municipal wells. The Palouse groundwater basin is the sole source of water for over 50,000 residents of Pullman, WA and Moscow, ID and outlying areas in both Whitman County (WA) and Latah County (ID). PBAC is a multi-jurisdictional, cooperative group with the mission of ensuring a safe and sustainable supply of water for the future. Steve will discuss the lessons learned by PBAC that may assist in the long term success of IWAC.

re
hopefully

Some History

TRUE'S PALACE HOTEL, PULLMAN.

Hotel helped Pullman grow

By Robert Luedeking

In November 1882 when the five members of the M.C. True family moved from Moscow to Pullman, they increased the population to 25. Mark True, who had hotel experience in Moscow and California, was induced to come to Pullman when Daniel McKenzie offered him four lots if he would build and operate a hotel in the new town.

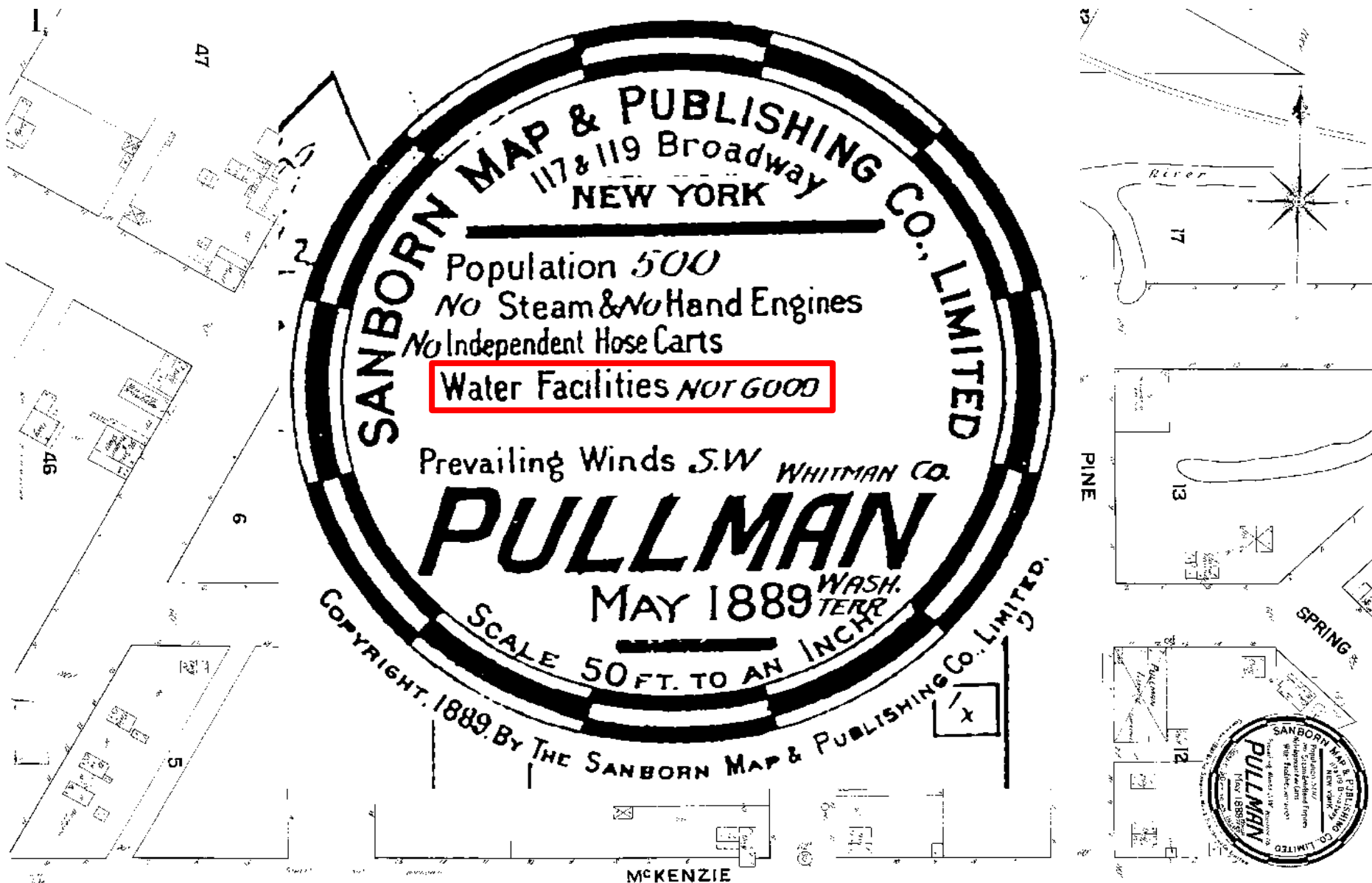


Moscow 1883

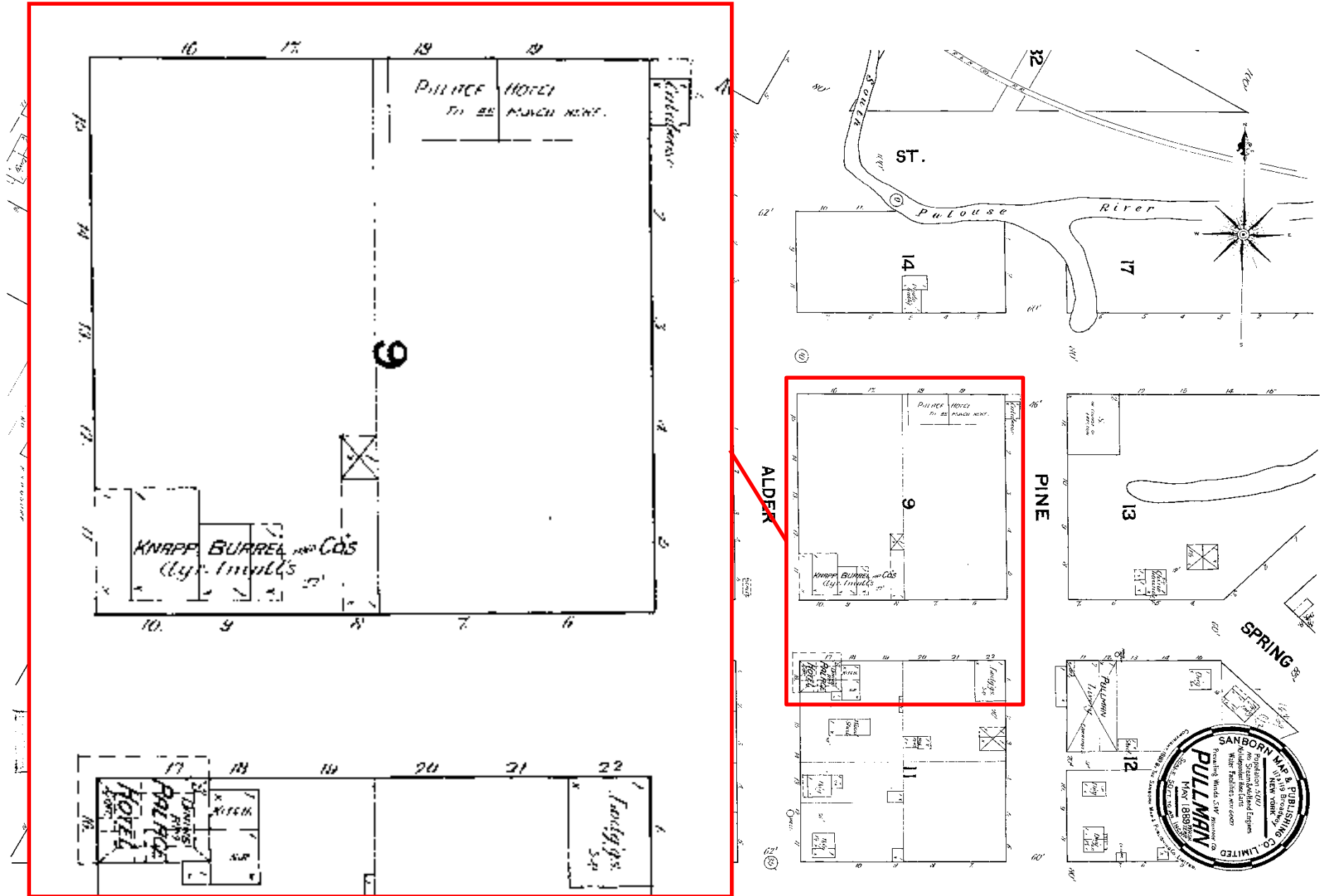
Map of Central Moscow – May 1889



Map of Central Pullman – May 1889



Map of Central Pullman – May 1889



Pullman Herald
May 25, 1889

At nine o'clock Friday morning,
the shrieks of the
whistle announced that
water had been struck. . .

. . . the water overflowed freely to
the great satisfaction of . . . the
interested citizens who soon
gathered in crowds to see the first
artesian well in Pullman

. . . the fact that artesian water
can be had so easily makes it
possible for Pullman to have . . a
system of water-works unequaled
in the territory.

ARTESIAN WELL.

Water Struck at a Depth
of 65 Feet.

A Constant Flow of 50
Gallons per Minute.

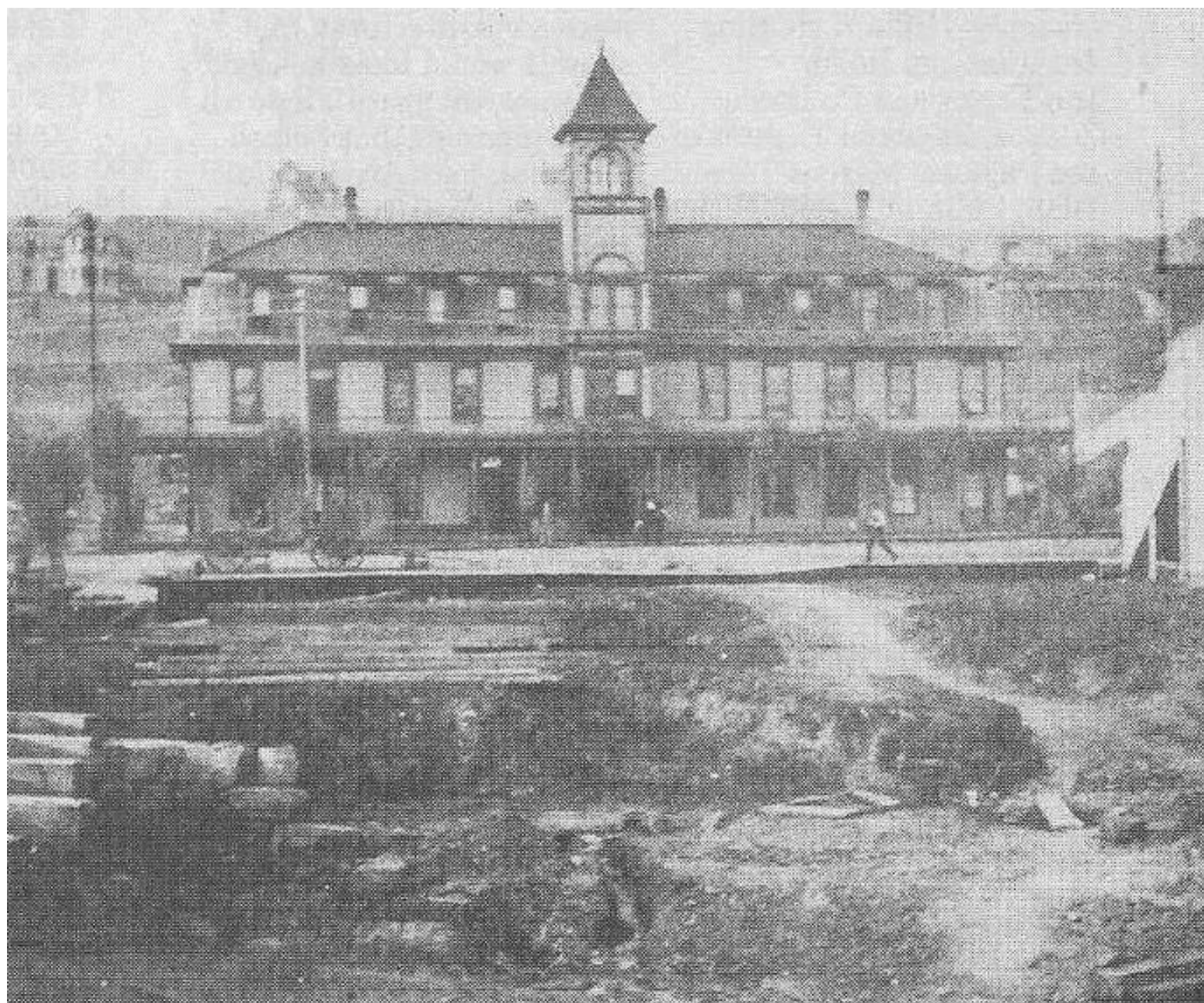
SUFFICIENT WATER FOR
FROM 3000 TO 8000 IN-
HABITANTS.

Other Wells Will be Bored for a Sys-
tem of Water Works.

For the past two weeks J. J. Shupe has been at work boring a well for M. C. True on his property on Main-st. where his new hotel will be built. The constant thud, thud of the drill was getting monotonous as it slowly bored through the hard rock. At nine o'clock Friday morning, the shrieks of the whistle announced that water had been struck and when the drill was withdrawn it at once came to the surface. After boring a few more feet through the sand the water overflowed freely to the great satisfaction of, not only Mr. True, but the interested citizens who soon gathered in

in crowds to see the first artesian well in Pullman. The hole is six inches in diameter, and the flow, by actual measurement, is 50 gallons per minute, or 72,000 gallons in 24 hours. In cities where water is supplied for water closets, etc., it is estimated that the consumption to each individual is 25 gallons a day; this well, then, will supply the needs of a town of 3,000 inhabitants. Although it has not yet been analyzed magnetic iron is one of its prominent component parts. Dr. Webb, who has tested it says: "If a steele knife be laid in the water for six hours (or, possibly, less) it will become so magnetized that a pen can be picked up with it." A temporary ditch conveys it to the South Palouse river. When piped it can be raised to a height of, at least, 30 feet above the ground which will enable Mr. T. to have water in every room in his hotel. The value of this well to the owner cannot be estimated, and the fact that artesian water can be had so easily makes it possible for Pullman to have, at small expense, a system of water-works unequaled in the territory.

Palace Hotel – ca 1891



Palace Hotel – ca 1906



Pullman Herald

July 5, 1889

The business portion of Pullman is again in smoking ruins.

. . . In two hours time nothing but charred and smoking embers remained of the handsome business blocks that had adorned our business streets

IN SMOKING RUINS.

TWO HOURS' WORK OF THE FIRE.

THE BUSINESS CENTER OF OUR HANDSOME CITY IN ASHES. LOSS \$250,000. EIGHT HORSES PERISH.

The business portion of Pullman is again in smoking ruins. Thursday afternoon, at 1:30 o'clock, fire was discovered in the rear of Lyle Bros. livery stable on Grand street, almost as soon as seen it had completely enveloped the barn and was spreading to the surrounding buildings, which were frame structures and burned like tinder. The wind was in the northwest when the fire started, but changed and swept the flames across the street and in two hours time nothing but charred and smoking embers remained of the handsome business blocks that had adorned our business streets. The six brick went with the rest and nothing is left but the blackened walls. Upwards of \$250,000 worth of property was destroyed, and the insurance covers about one-half of it.

burning of eight of the horses in the Lyle Bros. Stable. Of these two belonged to L. N. Wade, of Anota, two to J. E. Crabb, two to Lyle brothers, and one each to Andy Felt and Bryant Bros. The other horses were cut loose and made their escape although some were badly burned.

A fire was discovered by Barney Hattrup in the rear of his saloon and about fifty feet from the livery barn, and this was not soon extinguished than the stable was seen to be in flames. The appearance of the first fire indicated that it was purposely set, and the two breaking out at the same time is ample proof that it was incendiary. A party was suspected and persons were set to watch him, but by strategy he escaped their attention. Searchers were immediately started out after him and he was captured near Staley. He was given a preliminary examination yesterday afternoon, but on account of the absence of important witnesses the case was carried over till this morning. The fellow's name is E. Brownfield. He is now in the town "cooler." He protests his innocence, but circumstances are greatly against him.

During the fire Wm. Brabyn burst a blood vessel by over heating, W. R.

June 7, 1889

--- Moscow met with another destructive fire Thursday night.

—Moscow met with another destructive fire Thursday night. The fire commenced in the C. F. Hamlin building, and is supposed to have been incendiary. The buildings burned and the losses are as follows: George Howard, shoe shop, \$100, no insurance; W. H. Barnett, Growler Saloon and fixtures, \$800, insurance \$500; J. W. Lieuallen, grocery, \$4,500, insurance \$1,500; C. C. Lieuallen, two buildings, \$2,000, insurance, \$500; George Bremer, one bakery building, \$250, fully insured; McNiel bakery, \$3,000 damage; Latah Abrast Company, \$500, no insurance; W. O. Fallon, \$800, partly insured; telephone office, \$500; M. A. Rose, jeweler, \$500; C. F. Hamlin, \$2,000, insurance, \$900; McConnell, McGuire & Co., damage \$500; Star of Idaho printing office, damage \$150; Erickson Building, \$1,000, no insurance; Erickson, photographer, \$1,000, no insurance. Besides these there were several smaller losses.

Pullman Herald

August 3, 1889

The city dads believe that the town cannot afford to expend money at present on water works for protection against fire.

—The city dads believe that the town cannot afford to expend money at present on water works for protection against fire. The first duty of a town is self protection; fire is a town's worst enemy and every means should be employed to fight it when it comes. Two thousand dollars would be sufficient to thoroughly equipp us with the necessary means of protection. Will nothing be done until there is a surplus in the treasury sufficient to defray the expense? It is a false economy that puts off this important matter for a day. Every one acknowledges the need of accessible water in case of fire; then why not have it? It is easy to raise the money without making it a burden to anyone. Will the matter be indefinitely postponed until after the town is in ashes?

Moscow Mirror
September 13, 1889

The people of Moscow voted to bond the town for thirty thousand dollars to be used in building water works . . .

If a system requiring pumps is accepted, the salaries of engineers, wood etc. will create a heavy tax on the town . . .

The people of Moscow voted to bond the town for thirty thousand dollars to be used in building water works, last Monday. The town is in need of water and now that the citizens have shown their willingness to become responsible for the construction, it behooves the town trustees to see that the very best is given for the money expended. That is accept a plan that will be of less expense after it is in working order. If a system requiring pumps is accepted, the salaries of engineers, wood etc. will create a heavy tax on the town, but if an artesian well is bored or water brought from the mountains, the expense will be trifling.

Moscow Mirror
May 9, 1890

On Wednesday afternoon the steam drill struck an immense stream of water . . .

There is sufficient water running away from the well to supply the town for all purposes.

It cannot hereafter be said that Moscow is without water for it is to-day (sic) better situated than if it had a small river coursing by it, for nothing can be better than pure water.

A GUSHER!!
A YOUNG RIVER!
Wm. Ladd & Co. the Lucky Finders
of a Well Which Flows 160
Gallons of Water a Minute.
On Wednesday afternoon the steam
drill struck an immense stream of water
in Wm. Ladd's well at a depth of about
eighty feet, in soft or porous rock. The
force of the water upward was so great
that a drill weighing twelve hundred
pounds struck with little force. The
force of the water has cut out a large
cavity around the piping and is rushing
away like a small river. There is suffi-
cient water running away from the well to
supply the town for all purposes. It is
said that it is the biggest and strongest
flow on the coast and will equal the famous
Dakota well's with but two exceptions. It
cannot hereafter be said that Moscow is
without water for it is to-day better situ-
ated than if it had a small river coursing
by it, for nothing can be better than pure
water.

Moscow Mirror
May 9, 1890

No town in the northwest should have better lawns and nicer shrubery . . .

Last year some residents of the neighboring towns jeered at Moscow . . . The laugh is now on the other side.

The Palouse country will soon become noted for its artesian wells.

Pullman has two . . . and Moscow takes the lead with four . . .

No town in the northwest should have better lawns and nicer shrubery than Moscow. She has the soil, location and surroundings to make it, besides having a small river of artesian water for all purposes.

Last year some residents of the neighboring towns jeered at Moscow, saying it would never amount to anything as it had no water. The laugh is now on the other side. Moscow can now supply its neighbors and have some to spare.

The Palouse country will soon become noted for its artesian wells. Pullman has two, one flowing about fifty and the other sixty gallons per minutes and Moscow takes the lead with four, three of which flows from twenty-five to fifty gallons per minute while the fourth one forces out a six inch stream equal to fifty inches of running water.



Pullman Herald
May 2, 1891

The Agricultural College and
School of Science come to . . .

The City of Flowing Wells



PULLMAN WINS.

The Agricultural College and School of Science come to The City of Flowing Wells.

The Vedder property is the accepted site. Only one-third of a mile from postoffice.

Building will be commenced in a short time. A Richly endowed Institution.

"The fight is over. Whitman wins. Pullman gets the agricultural college and school of science. Throw cheers for the little star of the Palouse!"

The above was a telegram received last Monday morning, from F. H. Letterman, one of the delegates who had been looking out for the county's interests at Olympia, that sent a thrill of joy throughout all Whitman, and the thrill was especially thrilling in Pullman, the favored spot.

For eighteen months Whitman county has been presenting her claims as the most suitable place for the location of the institution, and the claim was recognized.

Pullman Herald
May 2, 1891

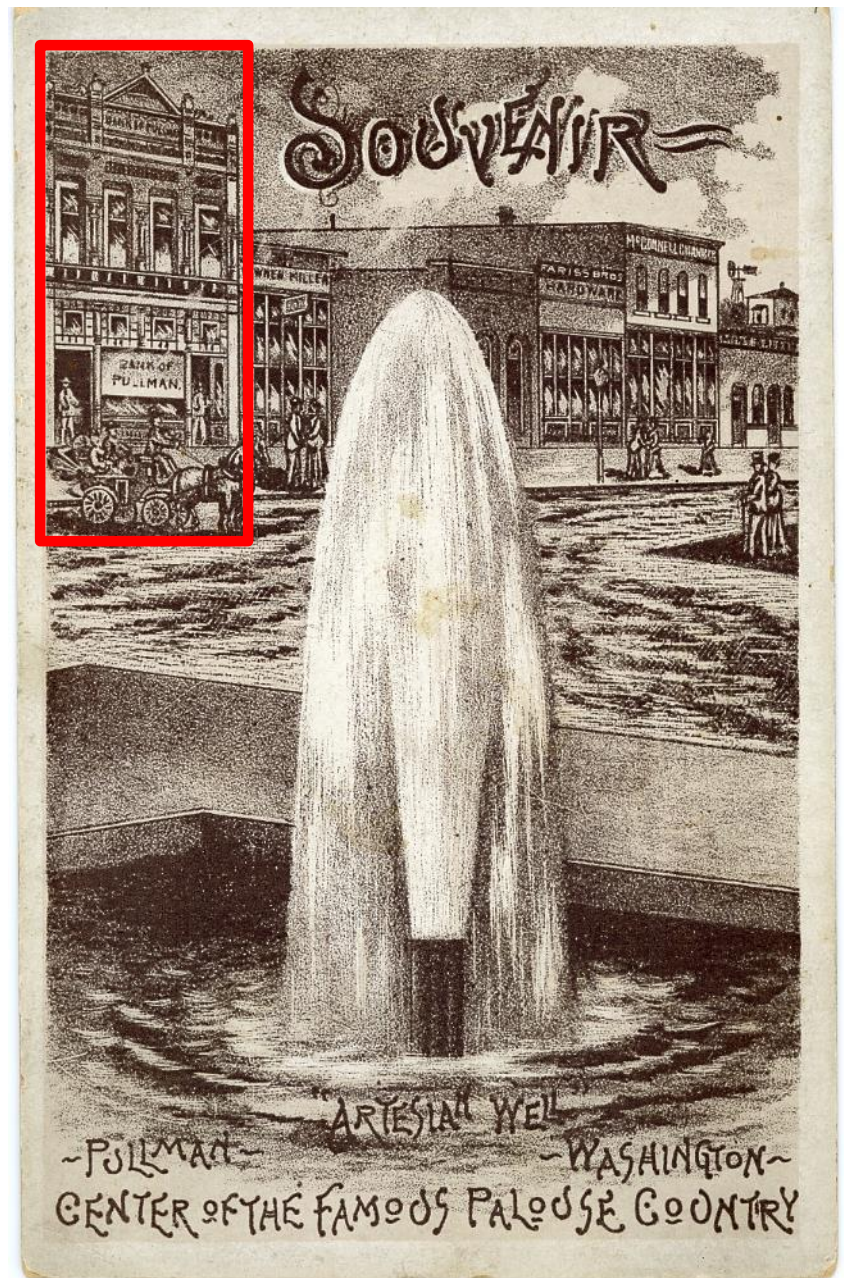
The people of Moscow are
delighted because Pullman has
been chosen . . .

The friendliest feeling is
entertained by the citizens of
Moscow for those of Pullman.

They both are of the same
enterprising blood.

Moscow, Idaho, April 23.—(Special correspondence)—The people of Moscow are delighted because Pullman has been chosen as the site of the Washington Agricultural College. This city has the University of Idaho and is certain to secure the Agricultural College of the state. The view taken here is that the two towns will be important educational centers; the country tributary to both will develop and prosper, and each of the young cities will flourish. The friendliest feeling is entertained by the citizens of Moscow for those of Pullman. They both are of the same enterprising blood.

Crawford Well
May 1890

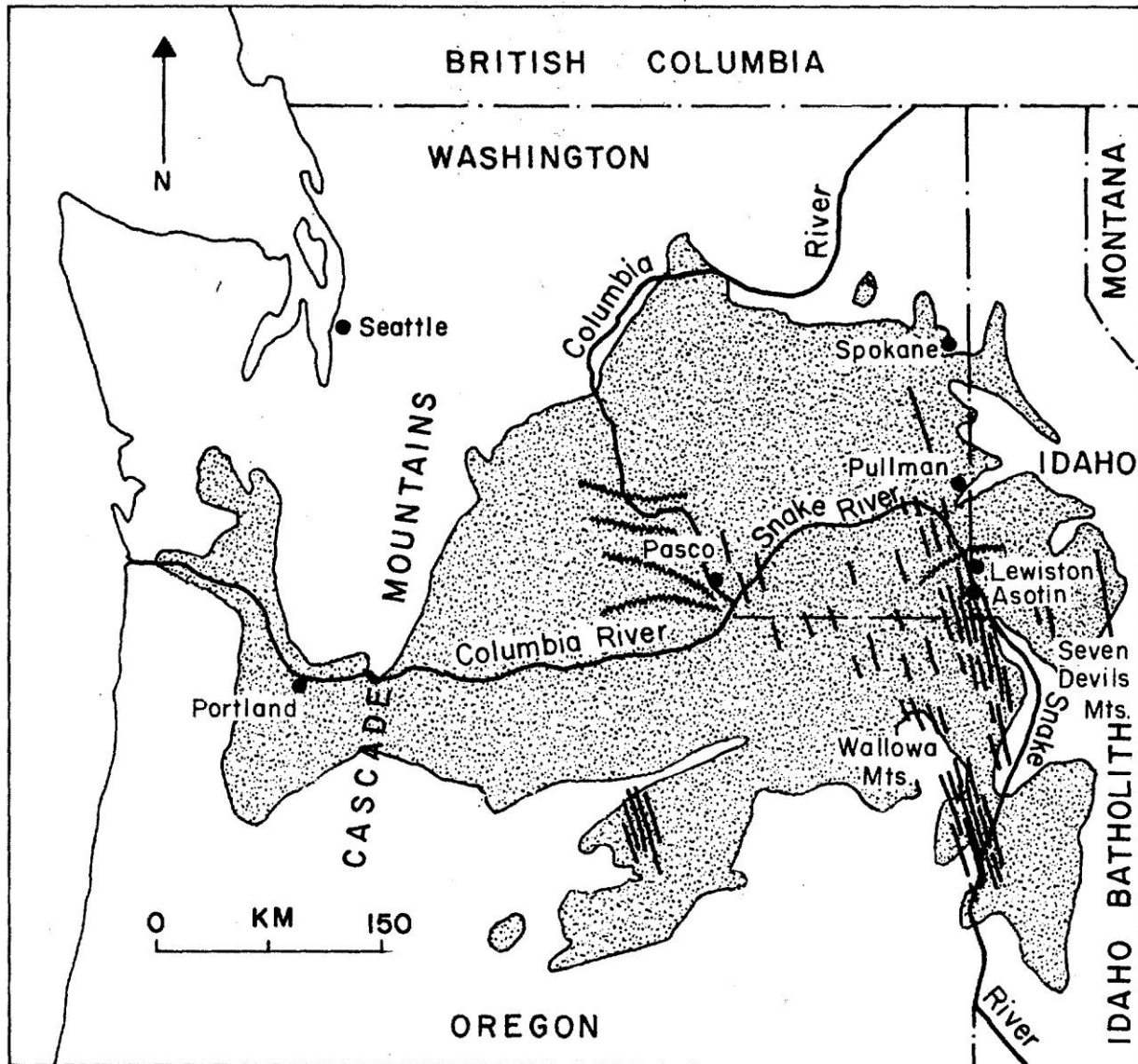


Laney (1923)

The report indicates that there exists at Moscow a sufficient artesian supply to take care of the needs of the City of Moscow for many years and that by proper means this can be made available for municipal use at reasonable cost; also that the apparently alarming decrease in the pumpage from the municipal wells is found to be due to easily explainable causes and to have but little bearing on the ultimate supply. In these conclusions I concur fully.

The report indicates that there exists at Moscow a sufficient artesian supply to take care of the needs of the City of Moscow for many years . . .

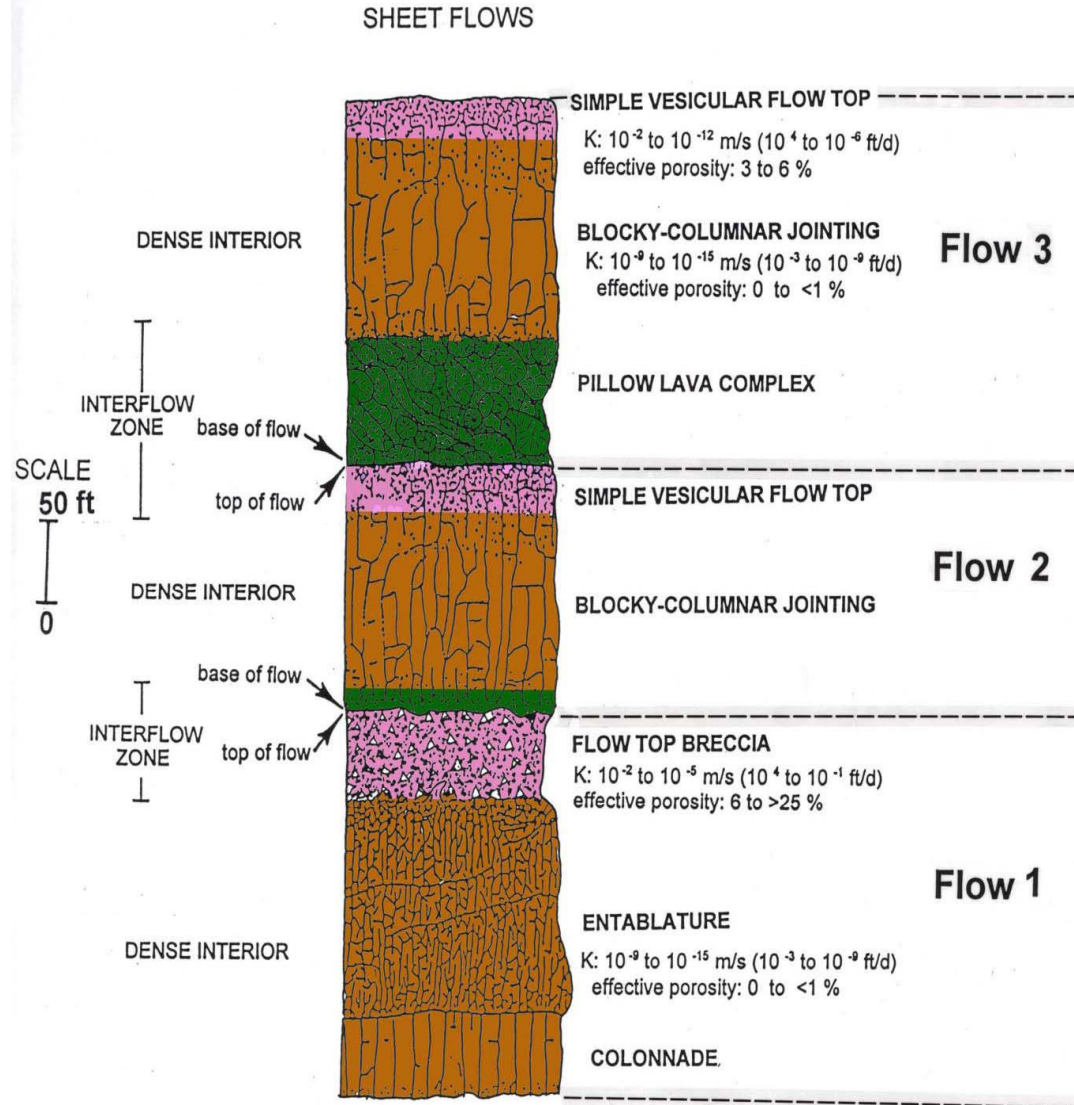
A Little Geology



A Little More Geology

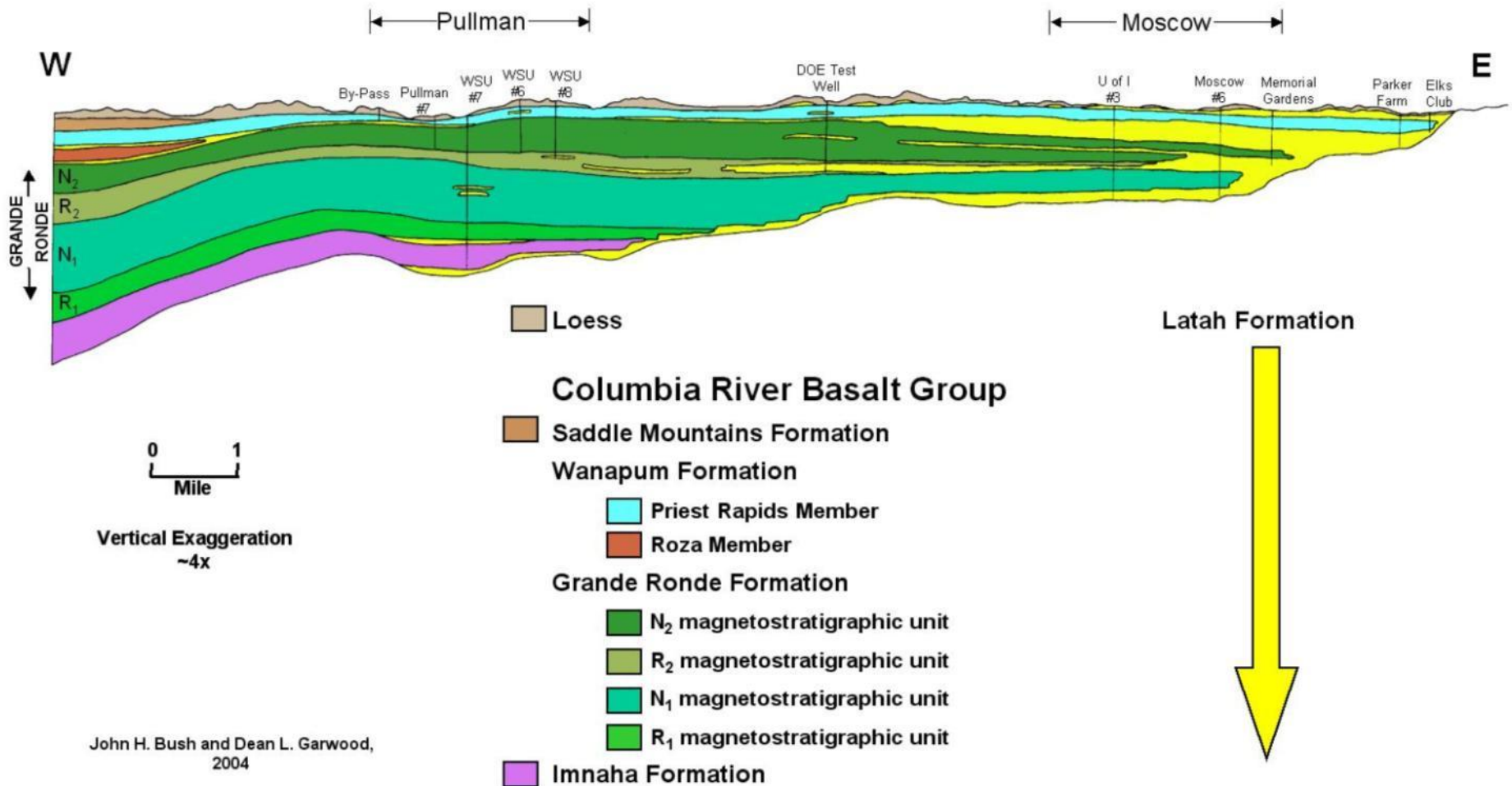
COLUMBIA RIVER BASALT GROUP FLOWS FOR THE NORTHERN COLUMBIA PLATEAU INCLUDING THE CHanneled SCABLAND					
<i>Age (mya)</i>	<i>Formation</i>	<i>Member</i>	<i>Number of Flows</i>	<i>Area in Square Miles</i>	<i>Volume in Cubic Miles</i>
6	Saddle Mountains	Lower Monumental	1	170	4
8.5		Ice Harbor	4	830	18
		Buford	1	220	5
10.5		Elephant Mountain	2	5,190	105
12		Pomona	1	8,710	180
		Esquatzel	1	1,050	17
		Weissenfels Ridge	4	470	5
13		Asotin	1	2,490	53
		Wilbur Creek	2	1,190	17
		Umatilla	2	5,830	170
	Total Saddle Mtns		19	11,800	574
14.5	Wanapum	Priest Rapids	3	22,120	670
		Roza	4	15,580	310
15.3		Frenchman Springs	21	26,930	1,540
		Eckler Mountain	8	2,350	41
	Total Wanapum		36	37,050	2,561
15.7-15.6	Grande Ronde	7 members (N2)	33	44,190	6,690
15.9-15.7*		4 members (R2)	45	45,450	12,740
16-15.9*		2 members (N1)	15	39,510	7,530
16.5-16		4 members (R1)	27	37,320	8,680
	Total Grande Ronde		120	57,530	35,640
	GRAND TOTAL		285	43,820	39,308

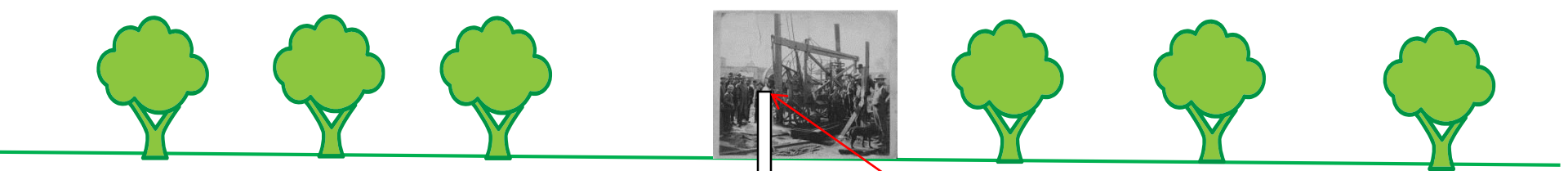
A Little More Geology



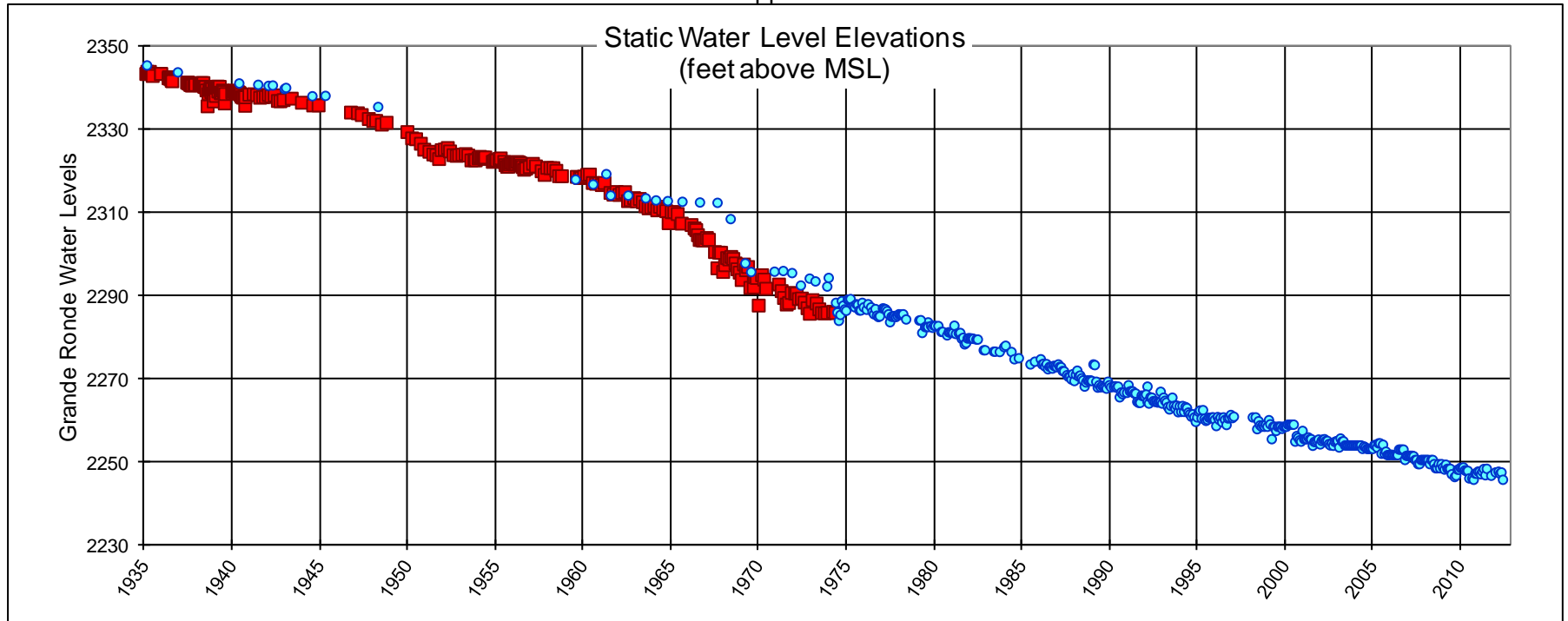
A Little More Local Geology

GEOLOGIC CROSS-SECTION MOSCOW-PULLMAN, IDAHO-WASHINGTON





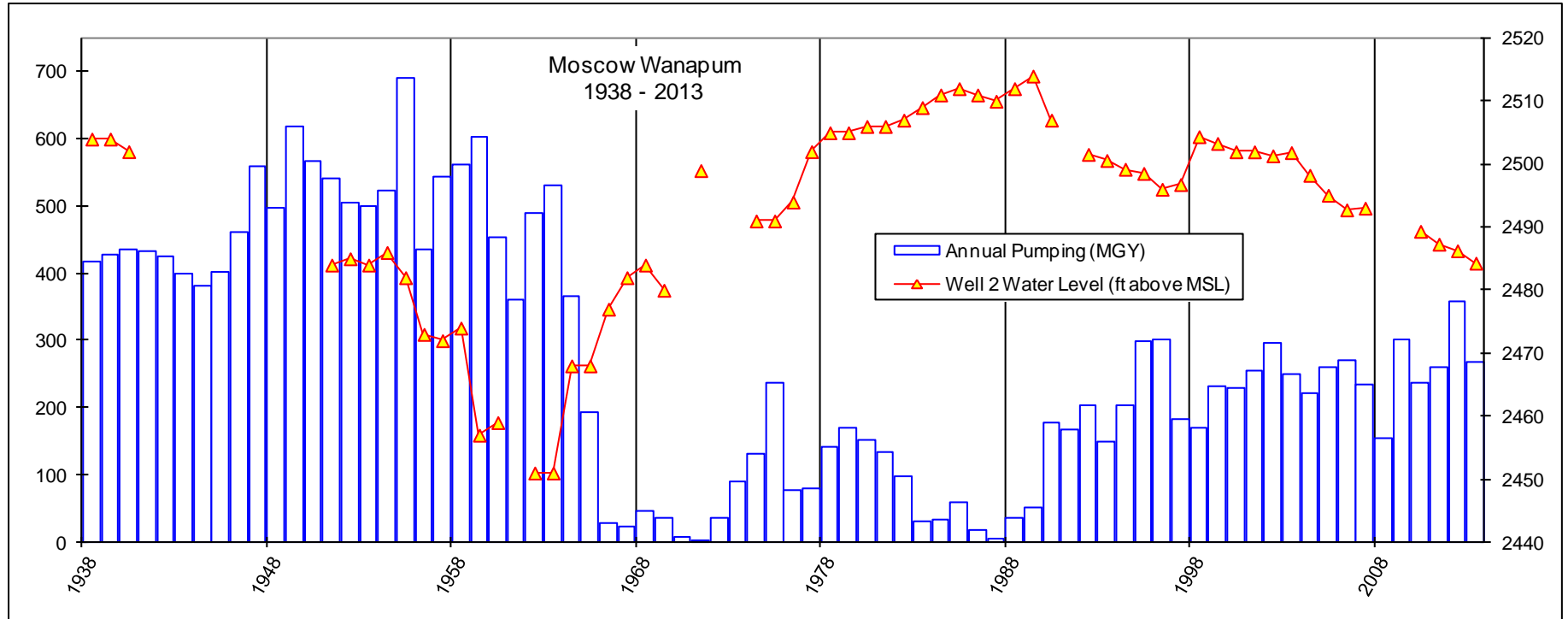
1890 Water Level



2013 Water Level

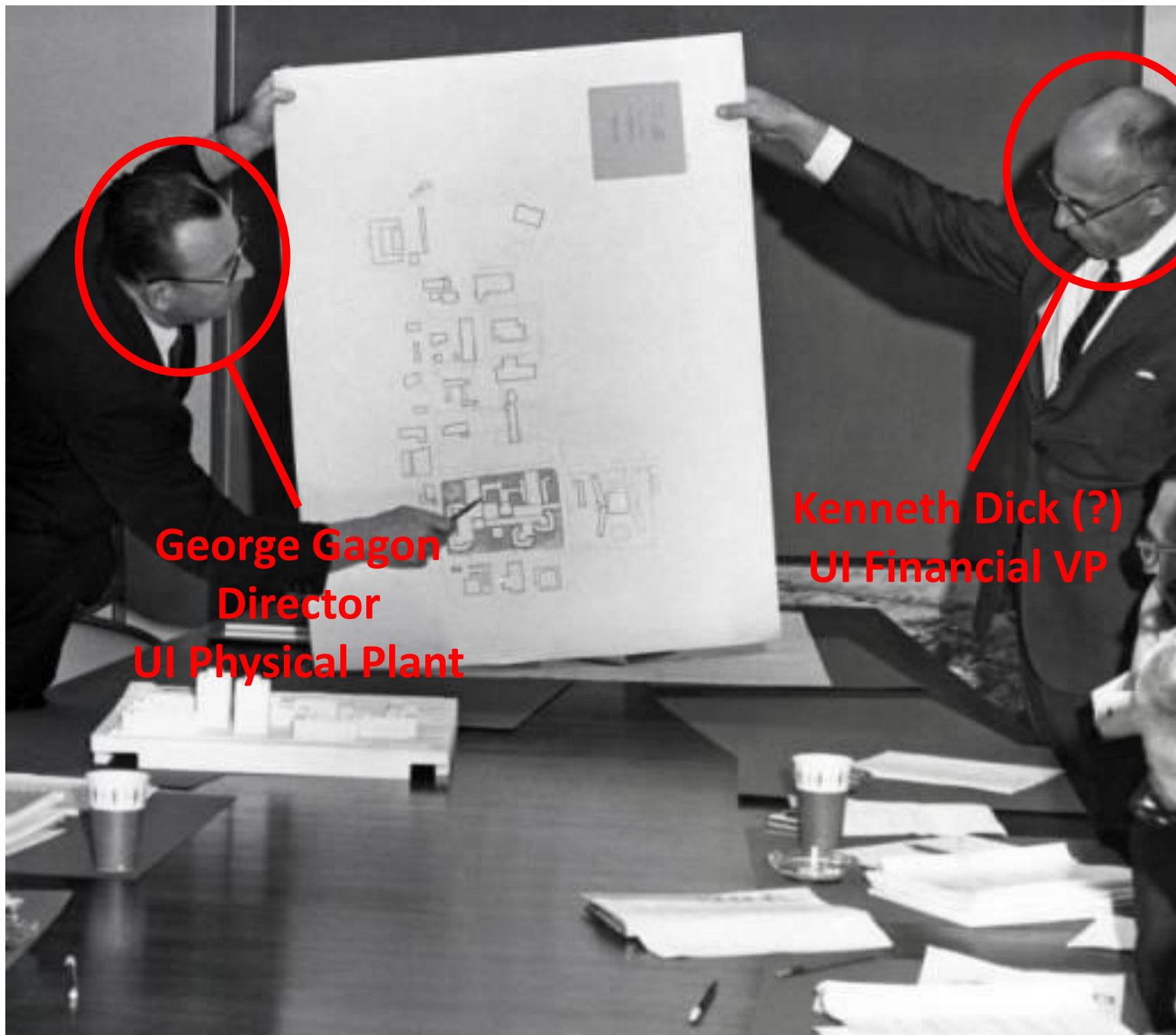
A Little Local Hydrology

Water Levels – Upper Aquifer, Long-Term



A Little More Local Hydrology





George Gagon
Director
UI Physical Plant

Kenneth Dick (?)
UI Financial VP

REPORT

Meetings

Following review of the domestic water supply problems with The Regents at the 2 March 1967 meeting, three meetings have been held with the four governmental, institutional units concerned with the local problem.

13 March 1967 University of Idaho Student Union.
Review of concepts and philosophy.

3 April 1967 University of Idaho Student Union.
Review of possible sources of water and selection
of Potlatch River as best source.

11 April 1967 On site inspection of Potlatch River.

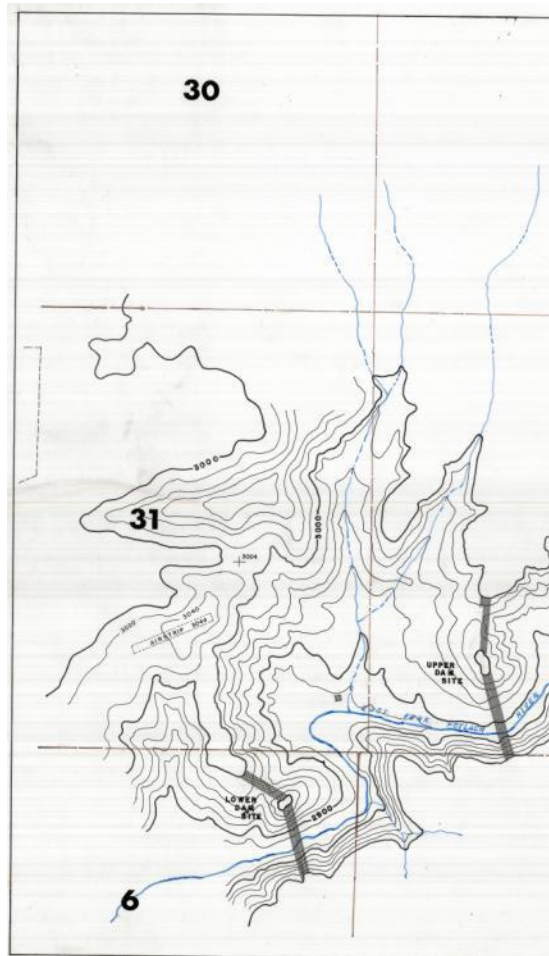
Participating Parties

1. City of Pullman
Joe Street
Larry Larsen
2. Washington State University
Dr. E. Roy Tinney, Director, State of Washington
Water Research Center
Jim Crosby
3. City of Moscow
Marvin Kimberling
Richard Day
4. University of Idaho
George Gagon
Kenneth A. Dick

UI/Moscow Domestic Water Supply Report (1968)

In the Spring of 1967, a series of meetings was held with the four governmental and institutional units concerned with the domestic water supply problems participating. The participating parties were the City of Pullman, Washington State University, the City of Moscow, Idaho, and the University of Idaho. From these meetings agreement was developed and endorsed by all four parties on the following points:

6. A non-profit corporate entity, owned by the four parties to construct and operate the system, should be developed.
7. Enabling legislation in both Idaho and Washington, would be necessary, and should be developed for consideration at the 1969 legislature.



NOTICE OF APPLICATION FOR PERMIT TO APPROPRIATE THE PUBLIC WATERS OF THE STATE OF IDAHO

In Accordance with the Provisions of Section 42-203, Idaho Code

NOTICE IS HEREBY GIVEN, that the REGENTS OF THE UNIVERSITY OF IDAHO of Moscow, Idaho has made application No. 42127 on May 15, 1967, to appropriate 33.91 cubic feet per second of the east fork of the Potlatch River and the Potlatch River, for domestic purposes for the University of Idaho.

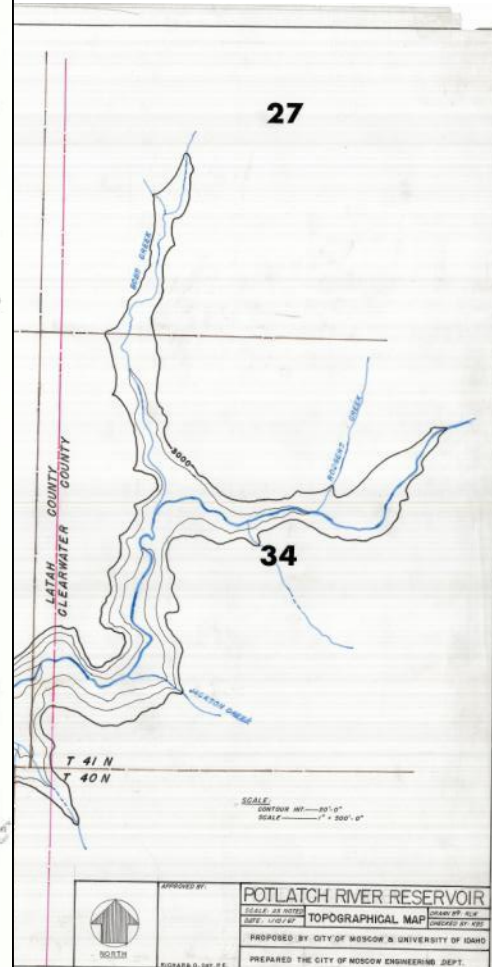
That the points of diversion are located in: 1) SW 1/4, Sec. 32, T. 41 N, R. 1 E, and 2) NW 1/4, Sec. 34, T. 40 N, R. 1 W. B. M.

That the place of use is the University of Idaho, City of Moscow, Idaho.

That any protests against the approval of this application must be filed in the Department of Reclamation at Boise, Idaho, within forty (40) days from the date of this notice, and such protest shall state the name and address of the protestant, and shall clearly set forth his objection to the approval of said application.

Dated this 1st day of December 1967.

R. KEITH HIGGINSON,
State Reclamation Engineer
Dec. 9, 16, 1967



University's Water Rights Request Criticized

By WALKER ROBERTS

Tribune Staff Writer

The communities of Kendrick, Juliaetta and Bovill are rising in bewildered protest to combat what appears to be a mutual threat, vaguely understood.

The University of Idaho at Moscow recently published legal advertising pursuant to obtaining water rights on the Potlatch River. The university desires 22.51 cubic feet of water per second from the East Fork of the Potlatch River and the Potlatch River proper.

Prior to publication of this notice, say residents of this massive coulee gouged into the fringes of Palouse Prairie by the Potlatch, they had heard nothing that would alert them to the desire of the university for water. Chairman of Ken-

now under study by the Army Corps of Engineers, the Bureau of Reclamation and the Soil Conservation Service. Detailed studies would still have to be made on flow, storage capacity and such but a high priority was given to the Potlatch as a source of water.

"The water is of high quality, the area concerned has no pollution problems, there are few habitations in the immediate upstream area and the site for the storage area would be on state property."

Careful Review First

Gagon said that water rights would be given to the university only after careful review of the factors involved.

Robert Magnuson, Kendrick village clerk, said he under-

stood that the university intended to take the water near Bovill. Bovill is almost 25 miles from Moscow.

Idaho Wildlife Federation District 2 took a stand on the issue at a recent meeting at Kendrick. The decision was to actively oppose taking water from the creek and request a hearing on the issue by the Bureau of Reclamation at Boise.

The Kendrick Village Board is drafting a letter of protest to the bureau which should arrive prior to the Dec. 26 deadline established by the legal advertisement. Juliaetta residents are drafting petitions and Bovill residents are actively trying to draft petitions and a letter of protest from the city government.

Draws Attention

It was W. L. McCreary, pub-

July 9-3, August 3-2 and September 6.

Felton had no averages or totals of water volume. He said that the flood period lasted slightly less than 1 1/2 months and that the sample year was average or slightly below in water volume.

The Potlatch River and its tributaries drain about two-thirds of Latah County. Its branches drain from the divide shared with the drainage of the North Fork of the Clearwater River and roughly forming the eastern boundary of the county. It reaches about 15 miles northeast of Bovill to the divide shared with the St. Joe River drainage. On the west it meets the Palouse River and the Clearwater forms the southern and eastern boundary.

precedent as it would have been constructed purely for recreation and wildlife by the Bureau of Reclamation.

Stuart Murrell, Idaho Fish & Game Department official at Lewiston, said that Idaho water laws do not recognize recreation and wildlife as a legitimate use for water. He said he felt it was obvious that it was a legitimate use, considering its value for attracting tourist and area recreation.

McCreary drew attention to existing water rights and suggested that allowing the university quantiles of water in the magnitude it suggested might well be impossible if existing water rights were respected. He listed nine parties whose water rights he had con-

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The communities of Kendrick, Juliaetta and Bovill are rising in bewildered protest . . .

Prior to publication of this notice, say residents . . . they had heard nothing that would alert them to the desire of the university for water.

Crowd Is Not Convinced On U of I Water Right Filing

KENDRICK — About 100 less-than-hostile, but not quite convinced, area resident-land-owners, met in the high school cafeteria here Monday night to discuss circumstances surrounding the University of Idaho's recent filing for water rights on the Potlatch River.

Townspeople from Kendrick, Deary, Bovill and Juliaetta recently sent letters of opposition to the granting of the right by the Bureau of Reclamation.

The Monday meeting was called by the Latah Soil & Water Conservation board, who invited George Gagon, U of I physical plant director, Marvin Kimberling, Moscow's administrative assistant and Richard Day, Moscow's city engineer, to explain their views on the matter.

don't use and protect our water rights in our county...we may find people in Washington (taking) those rights and we may have no rights when the day comes we need them for our own use," Kimberling said.

Lester Clemm, conservation board chairman, said the district is presently "making an effort...to inventory reservoir sites, and future sites," and added a map of such sites should be available in the spring.

Clemm said numerous Idaho counties have problems in the area of water, that "the demand is huge...who has priority?"

Clemm added that the Wildlife Service "is talking of a reservoir in this area...to reactivate steehead and trout fishing," taken away by recent dam con-

the study?) That will show who benefits."

Gagon said he didn't know who would pay for the study; "that's a problem."

Mel Hamilton of Juliaetta said "it doesn't take an engineer to see what's available" on the river, saying that "a sparrow could walk across it (at certain times) and not get its feet wet."

School Needs

(Continued From Page 1)

Two rooms, 324 and 315, in the high school building are really not satisfactory except for special classes."

He pointed out that of the 25 academic classrooms in use on

Gagon said the university's regents are concerned the university's water supply (wells) could run dry in the future and force the institution to go to a surface water supply.

He said the Potlatch River site, east of Bovill, was "first choice" because of the quality of water and the fact that it's a downhill run into Moscow.

Gagon noted the state's reclamation engineer "made a mistake" in publishing the filing for the right only once (on Dec. 15) and, because of that, has extended the protest deadline until Jan. 10, after which there will be a public hearing on the filing, with no specific date yet set for that.

Throughout the evening, Gagon noted on several occasions: "I think you've shot us down, to be frank with you...I wouldn't worry very much (about the right being granted.)"

Gagon also said the university "had no intent" to be secretive about filing for the water right and that it "had no idea it would be treading on anybody's toes" by doing it.

He further noted the protest over the filing "make the chances of getting the water rights...very, very doubtful."

struction.

A Deary woman wanted to know who would conduct the university's feasibility study, stating that the university had a "vested interest" in the matter.

Gagon told her an outside firm would do the study and, answering other parts of her question, noted water use per individual is increasing and the state's reclamation engineer had told him there were a "number of prior rights" on the river "but he didn't say how many."

W. L. McCreary, publisher of the Kendrick newspaper, said "what puzzled me was the apparent secrecy with which this was handled...the published

(notice of filing) said nothing of the City of Moscow or Pullman, only the University of Idaho."

Gagon said the university hadn't intended to be secretive and added "if you interpret it (that way), I'm sorry."

Sylvia H. Ross, geologist for the Idaho Bureau of Mines and Geology, said the Pullman, Washington State University had been dropped because "it's illegal to transport water across a state line."

She added that the City of Moscow's being included in the university's filing also raised a question

- 1969

How Long Will the Water Last? (Jones and Ross)

-17-

Billions of Gallons

<u>Artesian Zone</u>	<u>In Storage 1965</u>	<u>Consumption 1965-2000</u>	<u>In Storage 2000</u>
Upper	36.9	?	?
Middle	86.7	10.5	76.2
Lower			
Minimum	184.0	39.6	144.4
Optimum	252.8		213.2
Totals, Middle and Lower Zones			
Minimum	270.7	50.1	220.6
Optimum	349.5		299.4

The water in storage is adequate to meet the needs of Moscow Basin past the year 2000. Pumping levels in wells will be 50 to 80 feet deeper in the year 2000. The 220 to 300 billion gallons remaining in storage at the year 2000 should meet the needs of the basin until at least 2050 and perhaps until 2100.

These figures are based on the assumption that no recharge takes place. If recharge does take place, pumping levels will not be the same as predicted by the models. The effect of recharge, and of other factors, on the model aquifers is still under study.

REFERENCES CITED

Chang-Lu, Lin, 1967, Factors affecting ground-water recharge in the Moscow basin, Latah County, Idaho. Washington State University, Master of Science Thesis in Geology, 86 p.

Crosby, J.W. III, and Chatters, R.M., 1965, Water dating techniques as applied to the Pullman-Moscow ground-water basins. Washington State University, College of Engineering Bull. 296, 21 p.

... should meet the needs of the basin
until at least 2050 and perhaps until 2100.

- 1969

Status Report

The results of the studies during the past year . . have not materially changed the concepts regarding municipal water supply. The findings of the groundwater investigation were inconclusive. The various agencies and geologists consulted have differing opinions on its feasibility; however, the consensus is that groundwater would only be a temporary solution.

FPI study has been initiated on Paradise Creek, which will cover the reach between the mouth and the state line.

6. Foundation exploration and mapping of the Harvard damsite were completed. Estimates of water supply (runoff) at the Harvard and Laird sites have been revised. Cost estimates for the Harvard site have been revised, based on the results of foundation explorations, and a review of the Laird cost estimates is underway. Cost versus yield relationships for the Harvard site have been prepared, and project formulation studies have been initiated.

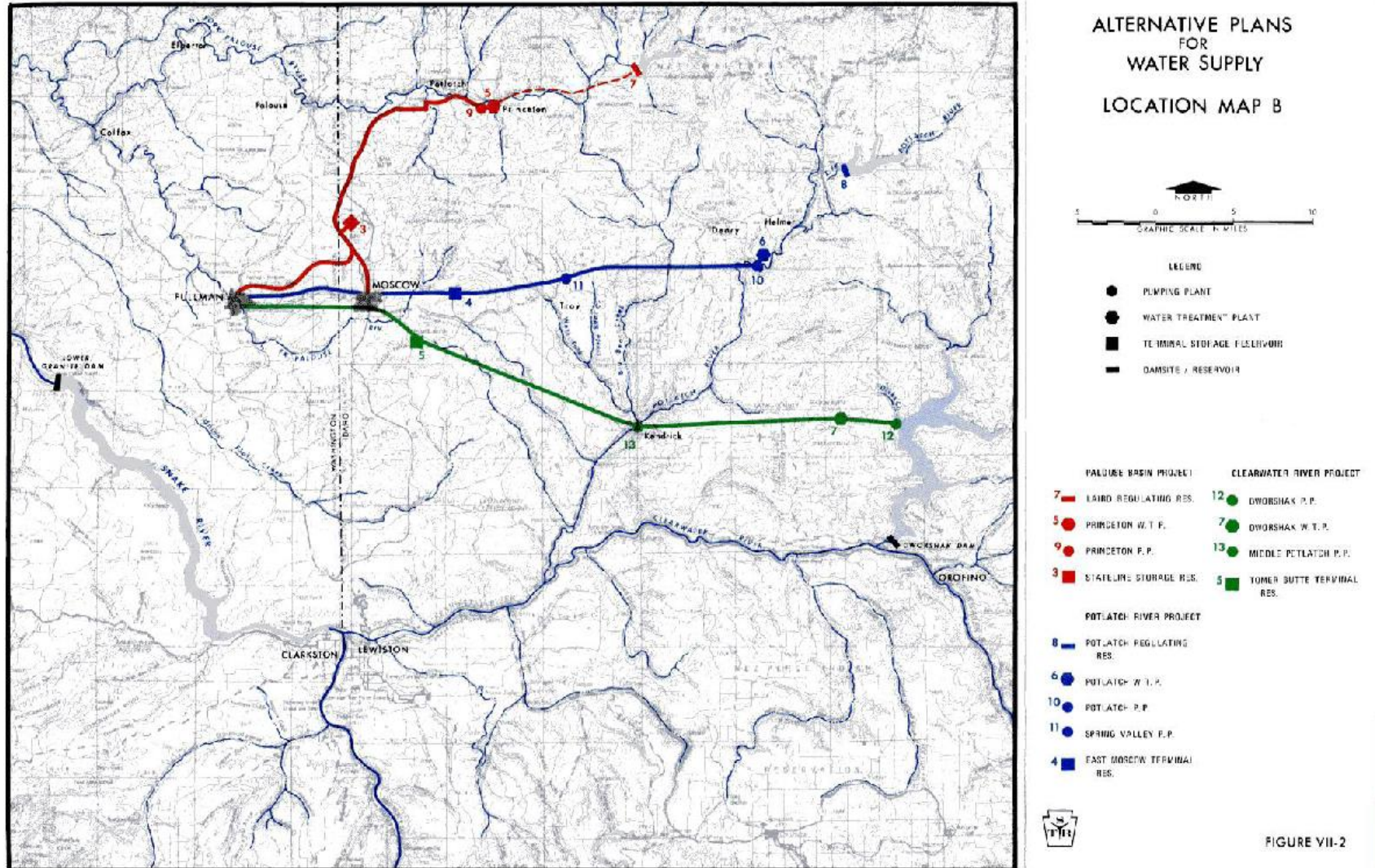
7. We have been advised by the Bureau of Reclamation that irrigation benefits would be realized from reservoir storage on the North Fork Palouse River. The unit value assigned to irrigation water will determine the optimum reservoir capacity.

8. Monetary benefits for water quality control, other than downstream fishing, have not been established.

9. The results of the studies during the past year (September 1968-69) have not materially changed the concepts regarding municipal water supply. The findings of the groundwater investigation were inconclusive. The various agencies and geologists consulted have differing opinions on its feasibility; however, the consensus is that groundwater would only be a temporary solution. The Snake River is the least costly surface source that will assure a dependable, long-range supply. The benefits creditable to a reservoir on the North Fork Palouse River will be the difference in pumping and pipeline costs between the North Fork and the Snake Rivers.

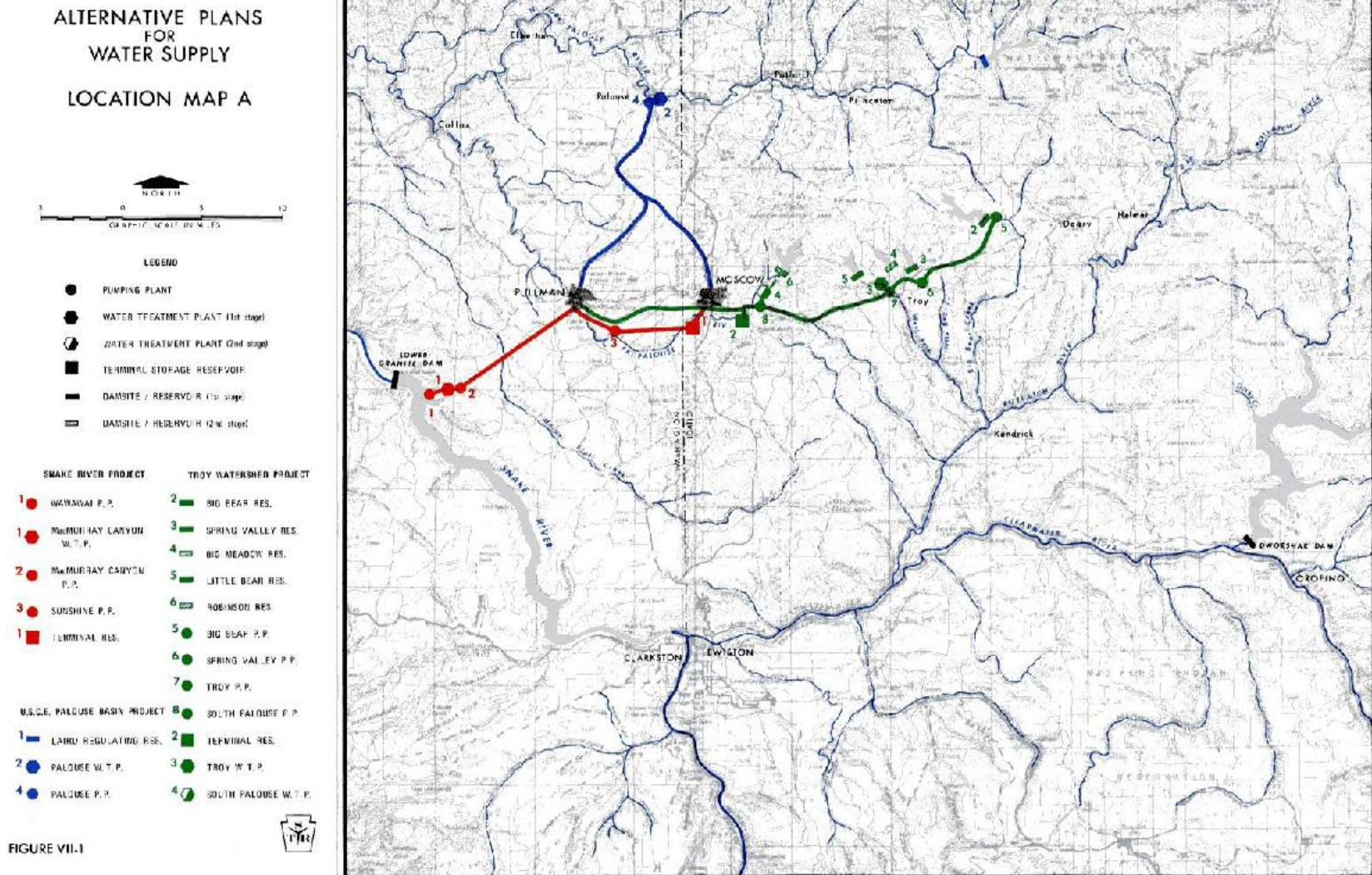
• 1970

Water Supply Study (6 potential projects)



• 1970

Water Supply Study (6 potential projects)



- 1970

Water Supply Study (6 potential projects)

TABLE 7-9
SUMMARY OF CAPITAL COSTS (\$1,000)

\$14,682,000 in 1970 ⇒ \$90,734,760 in 2014

<u>Alternative Project</u>	<u>First Stage</u>	<u>Second Stage</u>	<u>Third Stage</u>	<u>First Year Annual Costs</u>
Snake River	\$ 9,014	\$ 4,772	\$ 896	\$ 1,143
Palouse River Basin	\$14,600	\$ 345	\$ 4,062	\$ 1,457
Troy Watershed	\$14,544	\$ 9,149	\$ 5,572	\$ 1,435
Potlatch River	\$15,555	\$ 683	\$ 8,194	\$ 1,516
Clearwater River	\$14,498	\$ 683	\$ 9,506	\$ 1,556
USCE-Palouse Basin	\$12,260	\$ 301	\$ 3,068	\$ 907