Name .....

By .....

Address .....

.....

.....

.....C/2055.....

Date filed .....

Priority .....

Action suspended until ....A 97....

.....on ext. db.....

Return to applicant .....

Date of approval .....

CONSTRUCTION

Date for beginning ....10-31-97....

Date for completion ....10-1-98....

Extended to .....

.....

Date for application of water ....10-1-99....

Extended to ....10/1/2055....

.....

PROSECUTION OF WORK

Form "A" filed .....

Form "B" filed .....

Form "C" filed .....

FINAL PROOF

Blank mailed .....

Proof received .....

Date certificate issued .....

Application No. ....G13521....

Permit No. ....G12976....

Certificate No. .....

Stream Index, Page No. ....2....

FEES PAID

Date	Amount	Receipt No.
10-1-93	550.-	10533
10-7-99	600.00	33670
3/26/03	100.00	58953
	Cert. Fee	

FEES REFUNDED

Date	Amount	Check No.

ASSIGNMENTS

Date	To Whom	Address	Volume	Page

REMARKS

SP*70900-119

CON PLAN (Y)/N

YEARS 1 YR

Russ
266

TALK TO CORBEY
ABOUT DAVE MEMO -
DO NOT NEED TO
RESEARCH FLOW IN DUCK SLOUGH FURTHER @
THIS POINT. TRY
W/ DAVE MEMO FIRST
R 7/25/96

State of Oregon
Water Resources Department

Interoffice Memorandum February 6, 2006

To: Water Rights File G-13521

From: Ground Water Hydrology Section (Sabrina White)

Subject: Status of wells listed as POAs on Permit G-12976

Summary:

Original Application

App #	Permit #	Well Log	Owner's Well Name
G-13521	G-12976	POLK 50392	BUENA VISTA 1
		NOT DRILLED *	BUENA VISTA 2

* Per letter received 5/3/2005—further development of well field has been temporarily suspended due to interference potential between the Buena Vista Well Field and the Luckiamute Domestic Water Cooperative Well Field.

CITY OF MONMOUTH
MONMOUTH, OREGON

CITY OF
MONMOUTH

WATER SYSTEM MASTER PLAN

REGISTERED PROFESSIONAL ENGINEER
13,250
OREGON
JULY 17, 1986
EDWARD P. BUTTS

EXPIRES: 12-31-01

Prepared By:
Stettler Company
Salem, Oregon
February, 2000

CITY OF MONMOUTH, COUNTY OF POLK

STATE OF OREGON

A Resolution Adopting a Water Master Plan for the City of Monmouth.)

RESOLUTION NO. 1381

WHEREAS, the Monmouth Public Works Department contracted with Stettler Company in July 1998 for the preparation of a Water System Master Plan; and

WHEREAS, said Water System Master Plan has been completed to the satisfaction of the Public Works Department; and

WHEREAS, once adopted, said Water System Master Plan will become the basis for identifying development needs, impacts, and requirements for the Monmouth Water System; NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MONMOUTH, OREGON, AS FOLLOWS:

Section 1. That the Water System Master Plan, dated February 2000, prepared by Stettler Company, a copy of which is on file in the office of the City Manager, is hereby adopted as the official Water System Master Plan for the City of Monmouth.

Adopted and approved by the City Council and signed by the Mayor: April 4, 2000.

MAYOR

ATTEST:

CITY RECORDER

2\monmouth\ResoWaterMasterPlan

Chapter Four
Water Requirements

Water Requirement

The City of Monmouth has utilized groundwater sources exclusively since the early 1980's. The current wells in use are Well #1 (Marion County Well) and Wells #4 and 5 (Independence 4th Street Wells). Water production and sales (metered consumption) for the period of 1995-1996 is summarized in Table 4-1.

Table 4-1
Yearly Water Production and Metered Sales (in Gallons)
1995-1996

Year and Well Number	Total Production	Metered Sales	Percentage of Unaccounted Water
1995- Population: 7,225			
Well #1	283,989,808 g		
Well #4	3,540,000 g		
Well #5	7,567,500 g		
1995 Total	**295,097,308 g**	272,036,664 g	7.8 %

Average Daily Demand: 808,486GPD- Average Per Capita Usage: 112 GPCD
Maximum Day Demand: 1,959,412 GPD (August 2, 1995)
Maximum Day/Average Day: 2.42
Maximum Day Per Capita Usage: 271 GPCD

1996- Population: 7,385			
Well #1	300,344,200 g		
Well #4	4,995,000 g		
Well #5	2,683,100 g		
1996 Total	**338,022,300 g**	**Not Available**	**NA**

Average Daily Demand: 926,088 GPD- Average Per Capita Usage: 125 GPCD
Maximum Day Demand: 2,353,180 GPD (August 23, 1996
Maximum Day/Average Day: 2.54
Maximum Day Per Capita Usage: 319 GPCD

Average Daily Per Capita Water demands for 1995 and 1996 average 118 GPCD, a typical value for communities with primarily residential water demands.

Data for the three years 1997, 1998, and 1999 were tabulated and evaluated separately to reflect the most recent actual water consumption. Table 4-2 indicates monthly production and billing for Years 1997-1999. Monthly values of billed water may be higher than production values for the same month due to timing differences in summary of data.

Table 4-2
Monthly Water Production and Metered Sales (in Gallons)
1997-1999

Month/Year	Well #1	Well #4	Well #5	Total Production	Metered Sales	Unaccounted Water (Percent)
January, 1997	23,810,200	0	0	23,810,200	17,554,886	
February, 1997	21,549,300	0	0	21,549,300	19,243,123	
March, 1997	21,637,400	0	0	21,637,400	18,153,137	
April, 1997	22,632,300	0	0	22,632,300	20,665,976	
May, 1997	29,834,400	0	0	29,834,400	22,351,138	
June, 1997	30,048,800	15,000	0	30,063,800	25,851,305	
July, 1997	38,063,100	6,394,000	2,064,100	46,521,200	32,455,496	
August, 1997	38,174,700	5,944,000	3,102,600	47,221,300	47,248,894	
September, 1997	26,735,800	0	0	26,735,800	32,946,595	
October, 1997	24,104,600	0	0	24,104,600	20,683,928	
November, 1997	22,492,700	0	0	22,492,700	19,536,167	
December, 1997	21,298,700	0	0	21,298,700	19,864,456	
1997 TOTALS	**320,582,00**	**12,353,000**	**5,166,700**	**338,101,700**	**296,561,101**	**12.3%**
January, 1998	22,837,400	0	0	22,837,400	17,599,872	
February, 1998	22,788,500	0	0	22,788,500	20,547,934	
March, 1998	22,264,600	0	0	22,264,600	17,068,395	
April, 1998	23,192,300	0	0	23,192,300	21,649,147	
May, 1998	27,782,900	0	0	27,782,900	21,451,802	
June, 1998	29,903,400	0	0	29,903,400	23,538,086	
July, 1998	48,330,900	2,675,000	1,422,100	52,428,000	33,234,897	
August, 1998	49,765,900	1,287,000	683,000	51,735,900	46,833,918	
September, 1998	40,072,600	0	0	40,072,600	45,301,176	
October, 1998	27,030,600	0	0	27,030,600	25,653,056	
November, 1998	25,173,900	0	0	25,173,900	20,383,972	
December, 1998	23,134,600	0	0	23,134,600	20,780,861	
1998 TOTALS	**362,277,600**	**3,962,000**	**2,105,100**	**368,344,700**	**314,043,118**	**14.8%**
January, 1999	24,917,800	0	0	24,917,800	18,851,769	
February, 1999	24,182,200	0	0	24,182,200	21,424,889	
March, 1999	24,859,100	0	0	24,859,100	17,236,209	
April, 1999	26,250,200	0	0	26,250,200	18,561,351	
May, 1999	28,462,600	0	0	28,462,600	21,451,802	
June, 1999	32,280,000	0	0	32,280,000	23,538,086	
July, 1999	45,703,000	0	0	45,703,000	33,234,897	
August, 1999	43,162,800	0	0	43,162,800	41,374,393	
September, 1999	40,321,200	0	0	40,321,200	48,650,264	
October, 1999	28,218,000	621,000	0	28,839,000	30,536,509	
November, 1999	20,159,000	369,000	0	20,528,000	22,791,889	
December, 1999	19,983,700	0	0	19,983,700	20,920,954	
1999 TOTALS	**358,499,600**	**990,000**	**0**	**359,489,600**	**321,380,534**	**10.7%**

Since water demands within a city vary from year to year due to seasonal, climatic, and economic factors, it is not uncommon to see substantial yearly differences in water consumption. In order to provide more statistically accurate future projections, water use demand and consumption data have been evaluated for the 3 Years 1997-1999. The values from these three years have been averaged and adjusted for population variances. These average values are used for water system projections for Years 2000-2020:

Table 4-3
1997-1999 Water System Statistics

Parameter	1997	1998	1999	3 Year Average	Design Values
Population	7,590	7,980	8,310	7,960	
Average Daily Demand (Sources)	926,306 GPD	1,009,164 GPD	984,884 GPD	973,451 GPD (676 GPM)	
Average Daily Demand (Sales)	812,496 GPD	860,392 GPD	880,495 GPD	851,128 GPD	
Average Yearly Unaccounted Water (Percent)	12.3%	14.8%	10.6%	12.6%	10%
Maximum Month	August	August	July	July-August	
Average Day during Maximum Month	1,523,268 GPD (1058 GPM)	1,668,900 GPD (1159 GPM)	1,474,290 GPD (1024 GPM)	1,555,486 GPD (1080 GPM)	
Maximum Day	2,271,000 g (8-15-97)	2,528,561 g (8-11-98)	2,223,280 g (7-16-99)	2,340,947 Gal (1,626 GPM)	
Maximum Day/Average Day	2.45	2.51	2.26	2.41	2.5
Minimum Month	December	March	December	NA	
Well #1-Average Operation Hrs/Day	16 (66%)	18.9 (78.8%)	17.7 (73.4%)	17.5 (73%)	
Well #1-Maximum Operation Hrs/Month	717.5 (July)	719.25 (August)	676.5 (July)	704 hrs/month	
Well #1- Average Maximum Operation Hrs/Day	23.15 (96%)	23.18 (96.6%)	21.8 (90.9%)	22.7 (94.6%)	
Average Summer Day	1,345,721 GPD (935 GPM)	1,567,788 GPD (1089 GPM)	1,404,270 GPD (975 GPM)	1,439,239 GPD (1000 GPM)	
Maximum Day/Average Summer Day	1.69	1.61	1.58	1.63	1.65
Average Summer Day/Average Day	1.45	1.55	1.43	1.48	1.5
Average Winter Day	744,410 GPD	754,339 GPD	821,768 GPD	773,506 GPD (537 GPM)	
Average Winter Day/Average Day	.80	.75	.83	.795	.80
Average Per Capita Day	122 GPCD	126 GPCD	119 GPCD	122 GPCD	125 GPCD
Per Capita Usage: Average Day During Maximum Month	200 GPCD	290 GPCD	177 GPCD	195 GPCD	200 GPCD
Maximum Per Capita Day	299 GPCD	316 GPCD	269 GPCD	295 GPCD	313 GPCD

Table 4-4 illustrates the distribution of water users in the City of Monmouth.

Table 4-4
Water Service Distribution (As of April, 1999)

Type of Account	Number of Services	Percent of Total
Single Family Residential	1,601	81.8%
Multi-Family Residential	213	10.9%
Commercial	80	4%
Institutional	45 (Western Oregon University)	2.3%
Irrigation	2	1%
City Services	5	.3%
Fire Protection	12	.6%
	Total: 1,958 Services	100%

Western Oregon University- Impact on Water Usage

Western Oregon University is the single largest consumer of water in the City of Monmouth. According to university officials, the current (2000) student enrollment of 4,515 is expected to rise significantly over the next ten years. Information received from the university projects Year 2010 student enrollment to be between 6,500-7,000. The following water usage data was obtained for Years 1998-1999 and reflect the most current data available:

Table 4-5
Western Oregon University
1998-1999 Water Consumption

Month/Year	Water Consumption (in Gallons)
January, 1999	1,753,536 g
February, 1999	3,393,751 g
March, 1999	2,879,351 g
April, 1999	2,618,898 g
May, 1999	3,593,242 g
June, 1998	3,535,272 g
July, 1998	5,403,702 g
August, 1998	9,430,186 g
September, 1998	8,513,512 g
October, 1998	4,814,427 g
November, 1998	3,653,905 g
December, 1998	3,127,014 g
TOTAL	**52,716,796 gallons**

Based on individual meter readings, the yearly irrigation demand by the university is approximately 14,400,000 gallons (27.3% of the total). This volume is typically consumed through the summer months of June, July, and August. The university has recently purchased 34 acres of additional land in anticipation of the projected 10 year growth. For planning purposes, the following criteria will be used:

Current Yearly Water Demand: 52,716,796 gallons
(-) Irrigation and landscape watering: <14,400,000 gallons>

Yearly Water Consumption: 38,316,796 gallons
38,316,796 gallons/4,500 students= 8,515 gallons/year/student
8515/365 days per year= 23.3 gallons per day/student-Use 25

In addition, irrigation demands are projected to double to accommodate the 15-20 acres planned to be added to the campus in the future. Based on current daily demands, future irrigation demands are projected to ultimately rise to 300,000 GPD (Year 2010).

Table 4-6
Western Oregon University
Maximum Projected Daily Water Use (in Gallons)

Year	Student Enrollment	Daily Water Use/Student	Total Domestic Use	Irrigation	Total
2000	4,500	25	112,500 GPD	160,000 GPD	272,500 GPD
2005	6,000	25	150,000 GPD	200,000 GPD	350,000 GPD
2010	6,500	25	162,500 GPD	300,000 GPD	462,500 GPD
2015	6,800	25	170,000 GPD	300,000 GPD	470,000 GPD
2020	7,000	25	175,000 GPD	300,000 GPD	475,000 GPD

Commercial/Industrial Water Use

As previously indicated, Western Oregon University is the largest single user of water in Monmouth. Review of meter reads and customer billings indicate a total of 80 commercial/industrial accounts currently exist in Monmouth. This amounts to 4% of the total connections. The actual water consumption from the commercial accounts averages 6%-7% of the total monthly consumption. This amount is fairly consistent and does not significantly vary through the year. This amount is negligible to the total and will therefore by included within the per capita usage. The average commercial account water consumption is also very close to a typical dwelling unit. Even though there is dedicated industrial zoned land available for future growth, at this time no industrial facility that consumes appreciable amounts of water is proposed or contemplated in Monmouth. In the absence of specific criteria, future commercial and industrial water usage will be included within the projected per capita demands. The city is advised that any future industrial concern that may use over 1000 gallons per day per developed acre will need to be addressed individually. For the proposed 142 acres of Industrially zoned land in the northeast area of the city, this value equates to a population equivalent of 454 (based on Maximum Day Demand). Each acre, therefore, of industrial water usage (@ 1000 GPD/Acre) will equal 3.2 residents of equivalent maximum water use.

Based on previously stated population and Western Oregon University projections, the following values will be used for planning purposes:

Table 4-7
Projected Water Demands: 2000-2020

	2000	2005 (1)	2010 (1)	2015 (1)	2020 (1)
Design Population	8,376	9,710	11,256	13,049	15,128
Average Daily Demand (3)	1,047,000 GPD	1,253,750 GPD	1,457,000 GPD	1,691,125 GPD	1,954,000 GPD
Average Summer Demand	1,570,500 GPD	1,900,625 GPD	2,300,500 GPD	2,644,688 GPD	3,039,500 GPD
Maximum Daily Demand (2)	2,621,688 GPD	3,116,730 GPD	3,713,128 GPD	4,282,337 GPD	4,938,064 GPD
Peak Hour (4)	4,550 GPM	5,413 GPM	6,450 GPM	7,440 GPM	8,600 GPM

(1) Years 2005-2020 reflect increased daily demand to accommodate projected Western Oregon University (WOU) and city growth
(2) Maximum Daily Demand is based on 313 gallons per capita/day plus the WOU growth factor
(3) Average Daily Demand is based on 125 gallons per capita/day
(4) Peak Hour Demand is assumed to be 2.5 x Maximum Day Demands

Required Source Capacity

Future required capacity is dependent on several factors. Among these are: duration of consecutive maximum days, source reliability, type of water use, and available storage. In the case of Monmouth, historical records indicate few incidents of consecutive or long term maximum day demands. Typically, maximum yearly water demands are incurred for a maximum of 3-4 consecutive days followed by a period of more typical summer demands. Source reliability has generally been excellent with few power or equipment failures. The city's current active storage of 5,000,000 gallons is adequate to accommodate up to two days of current maximum day demands. Future planning, however, must consider the existing common transmission pipeline (and possible failure) used by all wells and the fact that only three wells are available for all needed demands. For example, a prolonged failure or severe contamination of the Marion County well would result in a catastrophic event. To lessen this potential, new sources should be adequately spaced so that contamination of one source will have little or no impact on the others. The new Buena Vista well is located in the American Bottom region of Polk County, approximately three miles from the Marion County and Independence wells. This spacing provides a good measure of source reliability. Another area of concern is related to the use of only 2-3 high capacity wells to provide all of the needed capacity. To alleviate this concern, minimum well capacities will be based on any three of the future total of five wells (excluding the Fourth Street wells) providing an average summer day demand. The distribution of flow between the wells is also sufficient to provide maximum day demands with 24 hour a day pumping even with the loss of any single 700-800 GPM well. This design criteria fits well with available well capacities from new wells in the Buena Vista well field. If a coincidental failure of the Marion County Well occurs on a maximum day, the differential will be drawn from current and proposed future water storage.

Given the above conditions, for the purposes of this report, the following values will govern:

Table 4-8
Required Total Source Capacity: 2000-2020

	2000	2005	2010	2015	2020
24 Hrs/Day Pumping	1,820 GPM	2,165 GPM	2,580 GPM	2,775 GPM	3,430 GPM
20 Hrs/Day Pumping (recommended)	2,200 GPM	2,600 GPM	3,100 GPM	3,570 GPM	4,115 GPM

From Table 4-8, the value shown at 20 hours per day of source pumping provides reserve flow necessary for possible pump failure or coincidental fire demand and will be used for forecasting purposes.

Fire Flow

The City of Monmouth is located within the Polk County Fire District No. 1 for fire protection and is served from the main station located between Independence and Monmouth. Table 4-9 indicates needed and available fire flows for various locations within the city. These flows are based on normal fire flow requirements for specific structure or development classifications and are based on testing performed by ISO in March, 1998.

Table 4-9
Required Fire Flows

Location	Required Fire Flow (GPM)	Available Fire Flow (GPM)	Classification
Bentley and Martin Way	1250	2300	Residential
West Orchard Drive	750	7000	Residential
South Pacific and Madrona	750	1350	Commercial
Sacre Lane and Church St (WOU)	3500	2100	Institutional
Monmouth and Church St	3000	2400	Commercial/Institutional
West Church Street	3500	2000	Commercial/Instructional
East Church Street	3500	2600	Institutional

As seen in Table 4-9, past fire hydrant flow testing performed by ISO(March, 1998) indicated a maximum deliverable flow rate of 2,600 GPM @ 20 psi residual pressure in the Church Street Area. The minimum required flow in this area is 3,500-4,000 GPM. Due to the high exposure of a potentially large fire at the WOU campus, this area of the city is regarded as the most serious current fire flow deficient area in the city. After careful analysis and computer modeling, however, it is believed that this deficiency in flow is a function of the distribution system and undersized pipe to this area.

Discussions with Mark Stevens of Polk County Fire District indicated that Monmouth has been included with Independence, Rickreall, and the rural Luckiamute Water Cooperative to create an aggregate classification. Much of the criteria used to classify the Polk County Fire District is based on response time, dispatch methods, and available fire fighting equipment as well as water supply. During this discussion, the Fire District expressed the desire for up to 3,500-4,000 GPM supply in Monmouth, particularly in the downtown core area and Western Oregon University. Since ISO does not improve the rating of a city for fire flow above 3,500 GPM, this flow was felt to be the highest practical flow currently required in Monmouth.

For hydraulic modeling analysis, this value will be used during Year 2000 analyses. Year 2020 fire demand is assumed to be 4,000 GPM, reflecting the actual population requirement. Actual flow based on ISO population equivalents and storage requirements are calculated below and will be used for storage requirements.

The City currently has a Class 3 Fire Protection Rating as established by the Insurance Services Office (ISO). This rating is regarded as an excellent rating for a community such as Monmouth. This level of rating provides the same insurance premium to homeowners of residential property for all Class 3, 4, and 5 ratings (the lower the number relates to a better class rating). Class 1 and 2 ratings are difficult to obtain and unrealistic for this location. Drastic improvements to the water system to further lower the City's Fire Protection Rating, therefore, will not result in an appreciable reduction in fire insurance premiums and is most likely not feasible due to the current limitations associated with non-water supply issues, i.e. fire department response time, available equipment, etc. During evaluation of the system, the highest projected instantaneous fire flow demand would most likely occur within the downtown core area or at Western Oregon University. Since many of the existing structures in these areas are older wood or brick frame buildings with close spacing between structures, a very high fire flow (> 3000 GPM) could feasibly be required to fight a large conflagration in this area. Fortunately, most of the campus buildings within Western Oregon University are reportedly sprinkled and the likelihood of a very large and sustained fire at this institution is considerably less than with unsprinkled buildings.

Assumed fire flow demands, in the absence of specific criteria, is based upon population numbers. For planning and hydraulic modeling purposes, the following equation will be used to approximate the present and future fire flows (values will be used for both present and future population equivalents).

$$Q(GPM) = 1020 \sqrt{P} (1 - .01\sqrt{P}) \quad (1)$$

Where P = Population in Thousands

For 2020 Projected Population of 15,000

$$Q(GPM) = 1020 \sqrt{15} (1 - .01\sqrt{15}) = 3800 \text{ GPM}$$

Monmouth Fire Flow duration: 4 hrs - Total Volume: 4000 GPM X 60 mins/hr X4 hrs = 912,000 gallons.

For planning purposes, a Year 2020 fire flow of 4000 GPM will be assumed over a 4 hour duration $\cong$ 1,000,000 gallons.

(1) American Insurance Association

Chapter Five
Future Water Sources

Future Water Sources

Groundwater

The current total permitted capacity under valid permits (5,328 GPM) is adequate to supply all projected water demands through the Year 2020, however, the existing source capacity (1,600 GPM) does not fulfill this requirement. Currently, the wells are operated continuously or as needed to maintain water in the reservoirs. A new control system, proposed in the first phase of improvements will allow automatic operation of all wells, optimizing source capacity and reliability.

The Marion County Well produces the highest quality of water of all existing sources, with low levels of iron, manganese, and hardness. The risk at this site associated with the river crossing, nitrates, and proximity to agricultural activity, however, necessitates the implementation of redundant source capacity.

For planning purposes, each existing well in the Independence Field will be limited to an average flow of 150 GPM (300 GPM total). Wells #4 and #5 each have levels of iron as well as past detections of regulated and unregulated organic contaminants (1). The only other current ground water source available to the city is the Marion County well. This shallow well has good yield (over 1,000 GPM), but contains elevated levels of carbon dioxide requiring treatment and periodic elevated Nitrate levels.

The recently drilled Buena Vista Well #1, located in the American Bottom region, has good yield (1000 GPM) and acceptable water quality. The major concern associated with the use of this site is the presence of iron and manganese. As outlined in other sections of this report, the iron and manganese levels from this well is considerably higher than the suggested limit. Nearby wells utilized by the Luckiamute Water Cooperative, however, do not contain the same high level of these elements. It is anticipated that continuous or long term pumping will allow water with higher aesthetic quality to be induced to the new well field. The author of this report has observed this phenomenon occur at other wells and believes this may also occur at this site. To avoid the initial expense of complicated iron removal equipment, the Buena Vista well should be equipped with sequestering injection equipment for the first 2-3 years of operation. The city's reliance on this well will be minimal for the first 3-5 years of operation which will afford the opportunity to pump the well as necessary to hopefully lower iron levels. If iron and manganese levels do not fall to acceptable levels within this time span, the city may opt to install filtration equipment for permanent removal of these elements.

Based on the criteria established in Table 4-8, the current recommendation is to immediately pursue development of the Buena Vista well field. This is felt to be the highest priority as additional source capacity is presently needed as well as a back-up source to the Marion County Well. Later phases of the study periods include development of additional wells in the Buena Vista well field to accommodate projected growth. For planning purposes, the following schedule is recommended:

(1) In 1994, traceable levels of Petachlorophenol (PCP) were detected in Well #4.

Table 5-1
Recommended Groundwater Source Development Schedule

	2000	2001	2005	2010	2015	2020
Marion County Well #1	1400 GPM	1200 GPM	1200 GPM	1300 GPM	1200 GPM	1200 GPM
Well #4	250 GPM	150 GPM	-----	-----	-----	-----
Well #5	150 GPM	150 GPM	150 GPM	150 GPM	-----	-----
Buena Vista #1	----	900 GPM	900 GPM	900 GPM	800 GPM	700 GPM
Buena Vista #2	----	----	700 GPM	700 GPM	700 GPM	700 GPM
Buena Vista #3	-----	-----	-----	-----	700 GPM	700 GPM
Marion County #2	----	----	----	----	----	800 GPM
Total Available Capacity (1)	1600 GPM	2400 GPM	2950 GPM	3050 GPM	3550 GPM	4100 GPM
Total Required Capacity (2)	2200 GPM	2300 GPM	2600 GPM	3100 GPM	3570 GPM	4115 GPM
Net Reserve (+) Deficit (<>)	<400 GPM>	+100 GPM	+350 GPM	<50 GPM>	<20 GPM>	<15 GPM>

(1) Based on 20 Hour per day of pumping
(2) Based on Maximum Day Demand

The above schedule reflects a progressive implementation of new wells from the Buena Vista well field and little or no changes in flow from the Marion County Well. Due to the known water quality concerns from this well, as well as constraints on space and well limitations, an increase in flow from this site is not feasible. A program to optimize the capacity of the Buena Vista well field and transmission pipeline, resulting in progressive expansion of this source is recommended. The later years of the study period also include development of a second Marion County Well. This well, to be located adjacent to the existing well, will provide an additional measure of source and well field redundancy. As previously outlined, Wells #4 and 5 are not planned in future projections due to the relatively low capacities and uncertain water quality from these wells. To avoid well interference between wells in the Buena Vista well field, a reduction in flow from each well is anticipated as additional wells are developed. This results in a total well field capacity of 2100 GPM, 588 GPM less than permitted.

Given the hydrogeology of this area, however, it is believed that lowering the yield from each well and combining more wells to produce the total water required, will provide long-term advantages to the wells and well pumps. A discussion of local hydrogeologic characteristics and recommended well construction standards can be found in later sections of this chapter.

Water Right Implications

To satisfy the proposed groundwater development schedule, the City will not need to obtain and secure additional water rights, only application to modify existing rights will be required. The city currently holds valid permits for 5 CFS (2240 GPM) for the Marion County well and 6 CFS (2688 GPM) for the Buena Vista wells. Both of these permits are for year round use. These permitted flows are far in excess of the required capacity and only the points of diversion will need to be modified. The existing Marion County permit allows withdrawl from two wells, which is the planned maximum number from this well field. The Buena Vista permit, however, projects total withdrawl from 2 wells also. The total permitted flow cannot realistically be obtained from two wells and the permit will need to be modified for the ultimate use of three wells. The city may also wish to pursue the transfer of existing Teal Creek surface water rights to the Buena Vista well field.

Since the Teal Creek source is not anticipated to be utilized anymore, transfer to groundwater rights may be the most logical use of these unused water rights. In all cases, the City should endeavor to retain any and all previous priority dates on pre-existing permits.

Surface Water Development

According to information obtained from the Water Resources Department and the Willamette Basin Plan (Nov. 1994), surface water for municipal use is available from the Willamette River at Independence and from the Teal Creek source. The amount of water available via water rights allocation from the Willamette River is far in excess of the projected water demands for Monmouth through the study period. The feasibility of re-developing the Teal Creek water source, however, is very limited. Historical data from the city and the Water Resources Department indicates a seasonal depletion of available water from this source, particularly during the summer. The Teal Creek springs are known to substantially dry up or endure severe depletion during late summer months. In addition, this source has severe turbidity events that often occur during periods of sustained precipitation and runoff. Further reliance on the Teal Creek source will require some method of storage to protect against periods of low water availability. The cost associated with treatment, storage, and transmission of this source to the city is felt to be economically excessive. Given the high cost of development and treatment of surface water, public resistance, the possible risk of contaminants due to local agricultural practices and upstream wastewater discharges, and the availability of adequate groundwater; development or use of any surface water source is not recommended at this time. During the past 10 years, several discussions have occurred in which the feasibility of a regional water authority supplying the Willamette River water to the cities of Dallas, Monmouth, and Independence has been explored. At this time, the political and economic limitations of this possibility are great and future planning utilizing this potential is not felt to be justifiable.

Local Hydrogeology

The City of Monmouth is located in a broad synclinal trough (valley) known as the Willamette Valley. The Willamette Valley was formed 30-60 million years ago through a downward folding of the subsurface layered rock formation. The material at the surface over much of the valley is a sandy to clayey silt that settled from ponded water. This silt, known as Willamette Silt, is comprised of a permeable fine-grained deposit that transmits water readily to the underlying alluvium (sand and gravel) formation. The alluvial deposits and silts underlying the Monmouth area were largely derived due to erosion and runoff from surrounding mountains. These deposits consist of layers of clay, silt, and sand and gravel. This alluvium material, chiefly consisting of sand and gravel, is also referred to as an unconsolidated material and provides the available groundwater for Monmouth, Independence, and nearby agricultural wells. Water percolates through the pores of sand and gravel by head created from the recharge point. Sand and gravel, due to its available pore spacing, is a much better conveyor of water to a well than clay or sandstone which does not permit water to transmit as easily.

Marion County and Independence Wells

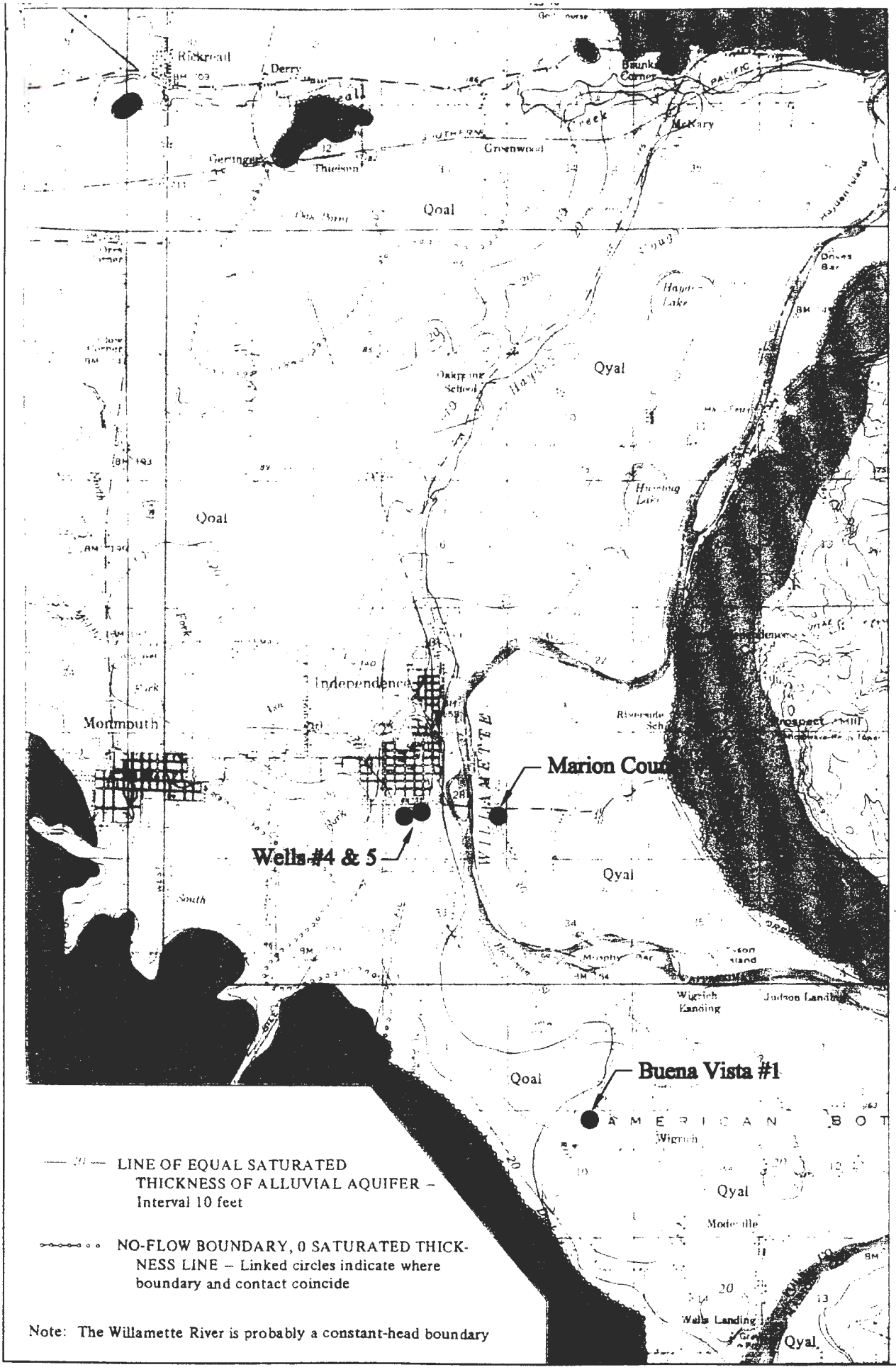
Near Corvallis Road, the sand and gravel beds are hydraulically continuous and can exceed a saturated thickness of 10 - 45 feet covering tens of square miles, generally within the Willamette River floodplain. Properly constructed wells in these deposits can typically obtain yields of 100 to over 500 gallons per minute. The yield of an individual well, however, can vary significantly depending on the distance from the Willamette River, thickness of aquifer, and amount of cementation (binding together) that occurs within the formation. The alluvium in the Monmouth/Independence area is often referred to as "younger or older alluvium". The terms "younger" or "older" alluvium refer to the relative geologic age of deposition of each of these types of alluvium. Younger alluvium has been more recently deposited and is constantly subject to washing and regrading of material due to the action of the Willamette River during floods. The older alluvium is established alluvium that underlies the younger alluvium and/or Willamette silt.

The younger alluvium bounds the Willamette River to the east and extends roughly to Corvallis and Buena Vista Roads to the west. This type of alluvium is characterized by high production wells due to good hydraulic connection with the Willamette River and lack of cementation. Water from the younger alluvium, however, also generally has higher levels of iron, manganese, and hardness and is more susceptible to Nitrates and contamination due to the shallow depth and lack of overlying sealing material. Annual recharge to the younger alluvium is established to be between 8"-15". The Marion County Well is an example of a well constructed in the younger alluvium. Information obtained from the draft report, "Monmouth-Independence Drinking Water Protection Area Delineation Report," OAWU, 1998; indicates recharge to the Marion County well occurs from the south-southeast. This area is heavily agricultural in practice and elevated nitrate levels periodically observed at the Marion County well may be the result of the application of nitrogen fertilizers often used in agricultural practices. Completion of this report is strongly recommended and the city should begin a recharge area inventory and delineation as soon as possible to assist in long-term protection of this specific well. The older alluvium is located generally west of Corvallis and Buena Vista Roads and underlies virtually all of the city including Wells #4 and 5. This type of alluvium does not yield the high flows common to the younger and shallower alluvium but it does generally have a higher degree of aquifer protection. The older alluvium is dependent on direct precipitation and inter-zonal leakage from the younger alluvium for recharge. The older alluvium is known to be at its thickest and most extensive point in the vicinity of the Independence South Well Field which accounts for the higher proportional yield from these wells as opposed to other wells in the older alluvium. In the area around Independence, sand-and-gravel beds in younger alluvium are continuous and hydraulically connected with sand-and-gravel beds in the adjacent older alluvium. When pumping is applied, the two units respond as a continuous aquifer. Discontinuity, cementation, and hydraulic losses, however, account for the difference in yield between these two formations. The older alluvium is typically overlain by 15 to 45 feet of clay and silt that provides good wellhead protection when proper well construction practices are employed.

Underlying the younger and older alluvium is semi-consolidated and consolidated shale (claystone), sandstone, and basalt materials. Wells in these formations are not productive ($\leq$ 50 GPM) in this area for municipal purposes and encountering salt water is a definite potential, particularly in wells below 120' in depth. For these reasons, exploration of groundwater below 100' in depth is not recommended.

Buena Vista Well Field

Due to the anticipated high reliance on the Buena Vista well field, a separate discussion of the available capacity and limitations of this field is warranted. As evidenced on Figure 5-1, the Buena Vista well, constructed in 1997, is on the fringe of the younger alluvium. The younger alluvium (Qyal), indicated by the lighter shade of yellow, is the most productive and permeable of the two alluvial aquifers in the area. Since the well is located in such close proximity to the older alluvium, it is possible that the elevated iron and manganese levels are due to the influence of water from the older alluvium as well as the underlying consolidated formations. Due to the relatively low levels of sodium and chloride, the actual amount of influence from the underlying shale and sandstone formations is not considered to be significant at this time. Additional development of wells at the Buena Vista site must be planned and executed carefully to avoid well interference, excessive iron, manganese, and nitrate/nitrite levels, and overpumping. After activation of the Buena Vista well #1, the city should embark on a 1-2 year monitoring program (Table 5-3) to provide needed background data for proper selection and design of the additional well sites. A competent hydrogeologist should be consulted to optimize the site selection and design capacity of future wells. Upon receipt of the hydrogeologist's report the city should proceed towards the acquisition of additional land (preferably to the east of the existing well) as soon as possible. This acquisition is vital to insure adequate well spacing to prevent well to well interference or interference between the Buena Vista well and nearby irrigation or Luckiamute wells.



SATURATED THICKNESS AND HYDROLOGIC BOUNDARIES OF THE SAND AND GRAVEL IN THE EAST-CENTRAL PART OF THE DALLAS-MONMOUTH PROJECT AREA

Fig. 5-1

The following schedule is suggested to optimize development of the Buena Vista well field:

Table 5-2
Buena Vista Well Field Development Schedule

Year	Task or Milestone	Purpose	Total Well Field Capacity
2000-2001	Install pumping and chlorination equipment and iron/ manganese sequestering equipment at Buena Vista #1	Satisfy immediate need for additional source capacity	900 GPM
2001-2003	Perform static and pumping level tests on production and test wells and nearby wells as outlined in monitoring program.	Provide data necessary for optimum selection of new well sites	900 GPM
2001-2003	Perform water quality tests for iron, manganese, and nitrates	Provide data necessary to determine need for water treatment	900 GPM
2002-2003	Select Buena Vista Well Sites #2 and 3 based on data collection and recommendations from hydrogeologist	Secure new well sites	900 GPM
2001-2002	Purchase additional land and/or water rights from nearby landowners or farmers	Secure needed land for additional wells in future years	900 GPM
2004-2005	Install iron/manganese removal equipment, if required	Implement if water quality does not improve with pumping	900-1600 GPM
2004	Drill and develop Buena Vista #2 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	1600 GPM
2005-2013	Continue monitoring program-Modify flows from wells, if necessary, to avoid interference between wells	Optimize available well capacity and Buena Vista #3 site selection	1600 GPM
2012-2013	Drill and develop Buena Vista #3 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	2100 GPM
2015-2020	Continue monitoring water quality and well pumping conditions- Modify frequency as required	Optimize available well capacities	2100 GPM

Table 5-3
Recommended Buena Vista Well Field Monitoring Program

Parameter	Type of Unit	Frequency
1. Well Static Water Level (after full recovery)	Feet from surface	Weekly
2. Pumping Rate	GPM	Monthly
3. Pumping water level (obtained with pumping rate)	Feet from surface	Monthly
4. Iron	mg/L	Monthly
5. Manganese	mg/L	Monthly
6. Nitrate/Nitrite-First Year of Use	mg/L	Monthly
7. Nitrate/Nitrite-After First Year of Use	mg/L	Quarterly
8. Daily Production	Gallons	Daily
9. Static Water levels from Nearby Wells	Feet from surface	Quarterly
10. Pumping water levels from Nearby Wells	Feet from surface	Quarterly
11. Sodium	mg/L	Yearly
12. Chloride	mg/L	Yearly
13. Static Water Level (1) (Observation wells)	Feet from surface	Monthly
14. Inorganics, VOL, SOC, Gross Alpha, etc.	Frequency as Determined by OHD	

(1) These observations should be made during Tests #2 and 3, after the production well has stabilized during normal conditions.

Well Interference Potential

Given the close proximity of the City of Independence's South Well Field and the City of Monmouth's Fourth Street Well Field, the possibility of well interference between these wells certainly exists. Fortunately, the Fourth Street wells are not frequently used, but if an emergency at Monmouth's Marion County well occurred, the potential exists for prolonged pumping from the Fourth Street Wells. If this occurred for an extended period of time, Wells #4 and 5 would most likely incur a drop in production of up to 10% - 50%. The high variable in drop of production would be related to the time of year of use (summer greater than winter), available water stored in the aquifer from recent recharge, and the rate and duration of pumping from both well fields.

The potential for drawing the known pentachlorophenol plume at a faster rate toward both well fields would also present a concern. Both cities would be well advised to discuss these scenarios and prepare an operational plan in the event both well fields would need to be used for an extended period of time. Well interference between Wells #4 and 5 and Monmouth's Marion County Well is not believed to be of concern given the different aquifers and distance between these sites. Even though the potential exists for interference between the Buena Vista Well and nearby agricultural and Luckiamute wells, the possibility of direct interference to nearby irrigation wells is low when considering the actual capacity of the Buena Vista Well versus the available yield and distance to actively used irrigation wells. Since most of the future water sources are projected to originate from the Buena Vista well field, the city must insure that adequate land is available for future well development and spacing. Each well site should be dedicated to 1-2 acres minimum of city owned land for adequate sanitary control as well as necessary well spacing. To prevent interference between existing Luckiamute Water Cooperative wells and the Buena Vista wells, the city should embark on a well level monitoring program (Table 5-3). This program should include both static and pumping water levels obtained throughout the year. A competent hydrogeologist should be consulted before siting and drilling Buena Vista wells #2 and 3 to optimize site selection. The City of Monmouth and Luckiamute Water Cooperative are advised to develop a monitoring and interuse agreement as soon as possible. Excessive aquifer draft or well interference may require purchase of available irrigation water rights or possibly re-consideration of extensive development of Buena Vista well field.

The greatest potential for well interference actually occurs within the Buena Vista Well Field itself. It is believed that with proper balancing of flows from each of the three proposed wells and normal pumping hours of less than 18 - 20 hours per day, the wells can operate together with minimal interference.

Alternate Water Sources

Recent discussions and investigation have been performed regarding the feasibility of securing (purchasing) municipal water rights from existing irrigation water rights. The primary irrigation rights under consideration are located approximately 4-5 miles northeast of the city. This source, although high in capacity, is vulnerable to iron, manganese, corrosion, and nitrate concerns. Use of these wells may also conflict with

other quasi-municipal and irrigation water rights now present in the same general area. In addition, the cost to develop and transmit this source would be prohibitive for one single entity to incur at this time. In the case of Monmouth, the high incremental cost associated with the development and transmission of water from the Buena Vista field necessitates complete utilization of this site. For the purposes of this study, procurement of this alternate water source is not presently recommended, although reconsideration in the future may occur if sufficient cooperative interest is expressed by Dallas or Independence. The city should continue to pursue this potential with Dallas and Independence for water demands beyond 2020.

Recommended Well Construction Standards

In order to optimize future well production, the following recommendations should be considered when constructing new wells:

1. New wells should be a minimum of 12" diameter, with a 12" diameter well recommended at the Buena Vista well sites to allow well screen installation, if feasible.

2. New wells shall be cement grout sealed to a minimum depth of 25', 5' into an impervious layer such as clay, if possible.

3. Formation sampling shall occur at no more than 5' intervals and at every change in formation to facilitate well screen selection.

4. New wells shall be drilled through the water-bearing formation to a minimum of five feet below the bottom of the aquifer. This five foot extension below the aquifer shall remain and be used for accumulation of sand.

5. New wells shall be test pumped for a minimum of twelve hours. During this period, any existing wells within ¼ mile should also be operated and monitored to determine the interference potential.

6. Generally, the well construction shall comply with Water Well Construction standards as issued by the State of Oregon Water Resources Department

7. To optimize the full extent of the aquifer, a stainless steel well screen, properly sized to retain approximately 40% of the formation, should be specified.

Well Pump Selection Criteria

Based on hydraulic modeling results, specific criteria for the selection of well pumps at the Buena Vista and Marion County well fields can be established. Based on projections and data within this report, the following guidelines can be used for selection of well pumps for both well fields.

Buena Vista Well Field

Well #1: Primary Design Condition: 900 GPM @ 323' TDH
Secondary Design Condition: 700 GPM @ 335' TDH
Wells #2 and 3: Design Condition: 700 GPM @ 335' TDH

This application will require 75-100 HP of electrical motor horsepower.

Marion County Well Field

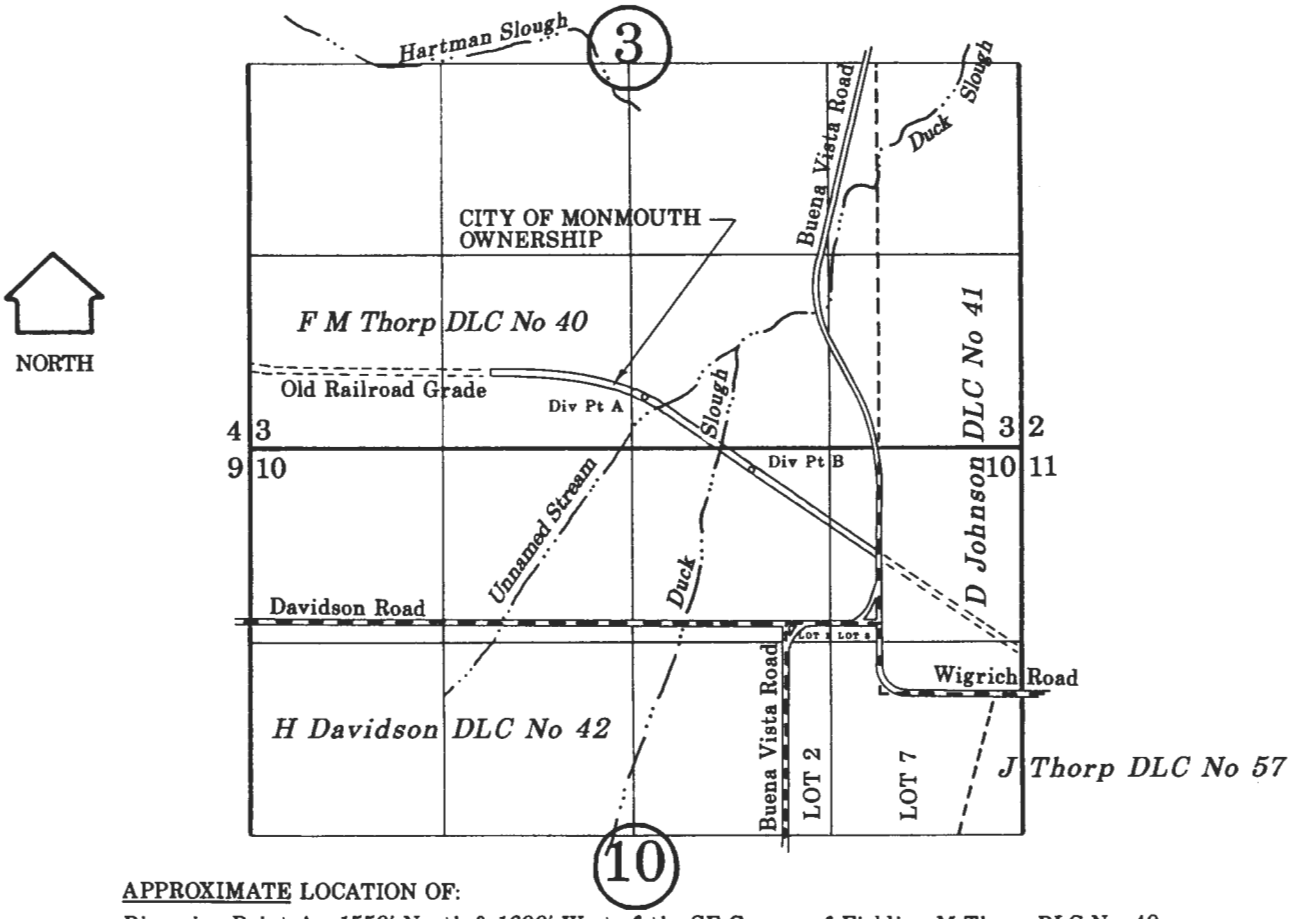
Marion County #2 (Future): 800 GPM @ 345' TDH (1).

This application will require 100 HP electrical motor. The preceding calculations are based on calculated head requirements based on maximum day demand events. Total head includes 30' of well lift plus 20' of piping and valving frictional head.

(1) Contingent upon final determination after completion of well

T 9 S, R 4 W, WM

POLK COUNTY



APPROXIMATE LOCATION OF:

Diversion Point A - 1550' North & 1600' West of the SE Corner of Fielding M Thorp DLC No. 40

Diversion Point B - 1050' North & 850' West of the SE Corner of Fielding M Thorp DLC No. 40

APPLICATION TO APPROPRIATE GROUND WATER

RECEIVED
OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

Application G13521 Permit G12976

City of Monmouth

Scale: 1" = 1320'

October 1, 1993

Certified Water Right Examiner
#208 WRE
Corbey Boatwright
May 30, 1989
STATE OF OREGON

NOTE: This map is for the purpose of identifying the location of water rights and has no intent to dimension or locate property ownership lines.

WELL # 1

TEST PUMPS 950gpm ±
OPERATES 200 gpm ±

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

RECEIVED JUN 19 1969 STATE ENGINEER SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print)
(Do not write above this line)

State Well No. 9/4W-10 Ed

State Permit No. G-4938

(1) OWNER:
Name Luckiamute Domestic Water Cooperative
Address Rt.1 Box 250 Monmouth, Ore.

(2) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

CASING INSTALLED:
Threaded ☐ Welded ☑

10" Diam. from 0 ft. to 59 ft. Gage .250
" Diam. from ft. to ft. Gage

PERFORATIONS:
Perforated? ☒ Yes ☐ No.
Type of perforator used Mills
Size of perforations ½ in. by 2 in.
458 perforations from 22 ft. to 49 ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? ☐ Yes ☒ No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WATER LEVEL: Completed well.
Static level 7 ft. below land surface Date 6/17/69
sian pressure lbs. per square inch Date

(9) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Miller
Yield: 970 gal./min. with 41 ft. drawdown after 8 hrs.
" " "
" " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow / g.p.m. Date
Temperature of water 55 Was a chemical analysis made? ☒ Yes ☐ No

(10) CONSTRUCTION:
Well seal—Material used Cement
Depth of seal 18 ft.
Diameter of well bore to bottom of seal 13 in.
Were any loose strata cemented off? ☐ Yes ☒ No Depth
Was a drive shoe used? ☒ Yes ☐ No
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☒ Yes ☐ No Size of gravel: ½ inch
Gravel placed from 47 ft. to 18 ft.

(11) LOCATION OF WELL:
AUG 19 1994 WATER RESOURCES SALEM, OREGON
County Polk Driller's well number N-14-69
SE ¼ NW ¼ Section 10 T. 9S R. 4W W.M.
Bearing and distance from section or subdivision corner

(12) WELL LOG:
Diameter of well below casing 8"
Depth drilled 75 ft. Depth of completed well 75 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level as drilling proceeds. Note drilling rates.

MATERIAL	From	To	SWL
Top soil	0	2	-
Clay, gray	2	5	-
Clay, brown	5	13	-
Clay, green	13	18	7
Gravel, medium	18	50	7
Clay, blue	50	75	7

Work started 6/6 1969 Completed 6/17 1969
Date well drilling machine moved off of well 6/17 1969

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] C V Todd (Drilling Machine Operator) Date 6/17, 1969
Drilling Machine Operator's License No. 451

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
NAME Todd's Drilling Service (Person, firm or corporation) (Type or print)
Address Rt. 1 Box 144 Monmouth, Ore.
[Signed] C V Todd (Water Well Contractor)
Contractor's License No. 450 Date 6/17 1969

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

RECEIVED
JAN 13 1986
WATER RESOURCES DEPT.
SALEM, OREGON

9s/4W-10bd

PLEASE TYPE or PRINT IN INK

(for official use only)

(1) OWNER:

Name LUCKIAMUTE WATER COOP

Address 8585 SILVER RD.

City MONMOUTH State ORE.

(2) TYPE OF WORK (check):

New Well ☐ Deepening ☐ Reconditioning ☑ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary Air ☐ Driven ☐

Rotary Mud ☐ Dug ☐

Cable ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☑ Municipal ☐

Irrigation ☐ Thermal: ☐ Withdrawal ☐ Reinjection ☐

Other: Piezometric ☐ Grounding ☐ Test ☐

(5) CASING INSTALLED:

Steel ☐ Threaded ☐ Plastic ☐ Welded ☐

..... " Diam. from ..... ft. to ..... ft. Gauge .....

..... " Diam. from ..... ft. to ..... ft. Gauge .....

LINER INSTALLED:

Steel ☐ Threaded ☐ Plastic ☐ Welded ☐

..... " Diam. from ..... ft. to ..... ft. Gauge .....

(6) PERFORATIONS:

Perforated? ☑ Yes ☐ No

Size of perforations 3/8 in. by 2 1/2 in.

312 perforations from 37'9"* ft. to 49'9" ft.

..... perforations from ..... ft. to ..... ft.

..... perforations from ..... ft. to ..... ft.

(7) SCREENS:

Well screen installed? ☐ Yes ☑ No

Manufacturer's Name .....

Type ..... Model No. .....

Diam. ..... Slot Size ..... Set from ..... ft. to ..... ft.

Diam. ..... Slot Size ..... Set from ..... ft. to ..... ft.

(8) WELL TESTS:

Drawdown is amount water level is lowered below static level

Was a pump test made? ☑ Yes ☐ No If yes, by whom? Driller

250 gal./min. with 9.5 ft. drawdown after 1 3/4 hrs.

340 gal./min. with 16 ft. drawdown after 2 1/2 hrs.

Air test ..... gal./min. with drill stem at ..... ft. ..... hrs.

Bailer test ..... gal./min. with ..... ft. drawdown after ..... hrs.

Artesian flow ..... g.p.m.

Temperature of water ..... Depth artesian flow encountered ..... ft.

(9) CONSTRUCTION:

Special standards: Yes ☐ No ☐

Well seal—Material used Seal NOT DISTURBED

Well sealed from land surface to ..... ft.

Diameter of well bore to bottom of seal ..... in.

Diameter of well bore below seal ..... in.

Amount of sealing material ..... sacks ☐ pounds ☐

How was cement grout placed? .....

Was pump installed? ..... Type ..... HP ..... Depth ..... ft.

Was a drive shoe used? ☐ Yes ☐ No Plugs ..... Size: location ..... ft.

Did any strata contain unusable water? ☐ Yes ☐ No

Type of Water? ..... depth of strata .....

Method of sealing strata off .....

Was well gravel packed? ☐ Yes ☐ No Size of gravel: .....

Gravel placed from ..... ft. to ..... ft.

(10) LOCATION OF WELL by legal description:

County POLK SE ¼ NW ¼ of Section 10 of

Township 9S (Township is North or South), Range 4W (Range is East or West) WM.

Tax Lot ..... Lot ..... Block ..... Subdivision .....

MAILING ADDRESS OF WELL (or nearest address) .....

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT.

(11) WATER LEVEL of COMPLETED WELL:

Depth at which water was first found ..... ft.

Static level 24* ft. below land surface. Date 1-7-86

Artesian pressure ..... lbs. per square inch. Date .....

(12) WELL LOG:

Diameter of well below casing .....

Depth drilled ..... ft. Depth of completed well ..... ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
This existing well was treated with acid, reperforated, developed & test pumped. The yield had fallen off drastically due to perforation blockage from iron oxide encrustation building.			
*ALL measurements from top of well casing.			

Date work started DEC 11, 1985 /completed JAN. 9, 1986

Date well drilling machine moved off of well JAN. 10 1986

(unbonded) Water Well Constructor Certification (if applicable):

This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.

[Signed] ..... Date ....., 19.....

(bonded) Water Well Constructor Certification:

Bond 9497-460 (number) Issued by: MARYLAND FIDELITY & DEPOSIT (Surety Company Name)

On behalf of MIKE WALDROOP (type or print name of Water Well Constructor)

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief:

(Signed) Michael Waldroop (Water Well Constructor)

(Dated) 1-10-86

NOTICE TO WATER WELL CONSTRUCTOR

The original and first copy of this report are to be filed with the WATER RESOURCES DEPARTMENT, SALEM, OREGON 97310 within 30 days from the date of well completion.

SP*46866-690

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the
STATE ENGINEER, SALEM, OREGON 97310 within 30 days from the date of well completion.

WATER WELL REPORT

STATE OF OREGON (Please type or print) (Do not write above this line)

RECEIVED OCT 10 1974 STATE ENGINEER SALEM, OREGON

State Well No. 1-1tw1-10 bd

State Permit No. G 3816

WELL # 2
TEST PUMPS 350gpm
OPERATES 150 gpm

(1) OWNER:
Name BOATWRIGHT ENGINEERING Assoc.
Address 2613 17th St SE, SALEM, OREGON

(2) TYPE OF WORK (check):
New Well ☑ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☑ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☑
Irrigation ☐ Test Well ☐ Other ☐

CASING INSTALLED:
Threaded ☐ Welded ☑
12¾" Diam. from +4½ ft. to 46 ft. Gage .250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

PERFORATIONS:
Perforated? ☑ Yes ☐ No
Type of perforator used MILLS
Size of perforations ½ in. by 2 in.
240 perforations from 35 ft. to 45 ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? ☐ Yes ☑ No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "
Bailer test 50 gal./min. with 10 ft. drawdown after 2 hrs.
Artesian flow g.p.m.
Temperature of water 54 Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used Cement & Sand
Well sealed from land surface to 25 ft.
Diameter of well bore to bottom of seal 15 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 13½ sacks
Number of sacks of bentonite used in well seal — sacks
Brand name of bentonite —
Number of pounds of bentonite per 100 gallons of water — lbs./100 gals.
Was a drive shoe used? ☑ Yes ☐ No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes ☑ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☑ No Size of gravel:
Gravel placed from ft. to ft.

(10) LOCATION OF WELL:
County Polk Driller's well number Tuckamuta #2
SE ¼ NW ¼ Section 10 T. 9S R. 4W W.M.
Bearing and distance from section or subdivision corner

RECEIVED AUG 19 1994 WATER RESOURCES DEPT. SALEM, OREGON

(11) WATER LEVEL: Completed well.
Depth at which water was first found 18 ft.
Static level 13 ft. below land surface. Date 10-8-74
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing 6"
Depth drilled 55 ft. Depth of completed well 55 ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. *Report each change in position of Static Water Level and indicate principal water-bearing strata.*

MATERIAL	From	To	SWL
Top Soil	0	2	—
CLAY - GRAY	0	4	—
CLAY - BROWN	4	13	—
CLAY - GREEN	13	18	—
GRAVEL - MED COARSE	18	45	13
CLAY - BLUE	45	55	13

Work started 9-30 19 74 Completed 10-8 19 74
Date well drilling machine moved off of well 10-8 19 74

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] C. V. Todd (Drilling Machine Operator) Date 10-9, 19 74
Drilling Machine Operator's License No. 451

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name TODD'S DRILLING SERVICE (Person, firm or corporation) (Type or print)
Address Rt 1 Box 144 MONMOUTH, ORE.
[Signed] C. V. Todd (Water Well Contractor)
Contractor's License No. 450 Date 10-9 74

WELL # 3

TEST PUMPS 350gpm ±

NOTICE TO WATER WELL CONTRACTOR
The original and first copy of this report are to be filed with the
WATER RESOURCES DEPARTMENT
SALEM, OREGON 97310
within 30 days from the date of well completion.

RECEIVED
DEC 1 1978
WATER RESOURCES DEPT.
SALEM, OREGON

WATER WELL REPORT
STATE OF OREGON
(Please type or print) (Do not write above this line)

NC

State Well No. 9/4W-10

OPERATES 200 gpm ±

State Permit No.

(1) OWNER:
Name Tuckiamuk Domestic Water Assn
Address Boatwright Engineering 3613 - 12th St. S.E. Salem, Ore 97302

(2) TYPE OF WORK (check):
New Well ☑ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☑ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☑
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED:
Threaded ☐ Welded ☑
12" Diam. from +1 ft. to 41 ft. Gage .250
" Diam. from ft. to ft. Gage
" Diam. from ft. to ft. Gage

(6) PERFORATIONS:
Perforated? ☑ Yes ☐ No
Type of perforator used
Size of perforations 3/8 in. by 2½ in.
372 perforations from 25 ft. to 35 ft.
perforations from ft. to ft.
perforations from ft. to ft.

(7) SCREENS:
Well screen installed? ☐ Yes ☑ No
Manufacturer's Name
Type Model No.
Diam. Slot size Set from ft. to ft.
Diam. Slot size Set from ft. to ft.

(8) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☑ Yes ☐ No If yes, by whom?
Yield: 350 gal./min. with 2 ft. drawdown after 24 hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m.
Temperature of water Depth artesian flow encountered ft.

(9) CONSTRUCTION:
Well seal—Material used Cement.
Well sealed from land surface to 20 ft.
Diameter of well bore to bottom of seal 16 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 25 sacks
How was cement grout placed? Pumped.
Was a drive-shoe used? ☑ Yes ☐ No Plugs Size: location ft.
Did any strata contain unusable water? ☐ Yes ☑ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☑ No Size of gravel:

(10) LOCATION OF WELL:
County Polk. Driller's well number
¼ ¼ Section 10 T. 9S R. 4W. W.M.
Bearing and distance from section or subdivision corner

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT.
SALEM, OREGON

(11) WATER LEVEL: Completed well.
Depth at which water was first found ft.
Static level 14 ft. below land surface. Date 10-23-78
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing 12
Depth drilled 41½ ft. Depth of completed well 41½ ft.

Formation: Describe color, texture, grain size and structure of materials; and show thickness and nature of each stratum and aquifer penetrated, with at least one entry for each change of formation. Report each change in position of Static Water Level and indicate principal water-bearing strata.

MATERIAL	From	To	SWL
Brown clay	0	18½	
Clay, Sand, Fine Gravel	18½	21	
Small to Med Gravel + Sand	21	35	
Blue Clay	35	41½	

Work started 10-20 19 78 Completed 10-23 19 78
Date well drilling machine moved off of well 10-23 19 78

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] Norman A Estelle (Drilling Machine Operator) Date 10-31, 1978
Drilling Machine Operator's License No. 455

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name EOLA WELL DRILLING (Person, firm or corporation) (Type or print)
Address 4510 DALLAS RD. N.W. SALEM, OR 97304
[Signed] Hamit H Bimalt (Water Well Contractor)
1-10

Application No. G-13524
Permit No.

RECEIVED
OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

EXISTING CERTIFICATES: 11656
11662
15055
16992
36021
39278
45801
49729
62436

PERMIT G-8579

T 8 S, R 4 W
T 8 S, R 5 W
POLK COUNTY, OREGON

NORTH
Scale: 1" = 1320'
September 30, 1993

Certified Water Right Examiner
#208 WRE
Corbey Boatwright
Corbey Boatwright
May 30, 1989
STATE OF OREGON

APPLICATION TO APPROPRIATE GROUND WATER

CITY OF MONMOUTH

NOTE: This map is for the purpose of identifying the location of water rights and has no intent to dimension or locate property ownership lines.

WATER RESOURCES DEPARTMENT
OF OREGON

3850 PORTLAND RD. N.E.
SALEM, OR 97310

HERE'S THE MATERIAL YOU REQUESTED - - -

In response to your recent request, we are happy to forward the attached material. We hope it will serve your purpose.

If we may be of further service, please let us know.

_____

(Name)

18.59 CFS

1.27

17.32 W/O ABANDON WELLS

~~-5.88 - reduce well~~

~~11.44~~

6.44 SURFACE WATER W/O FILTRATION

Oregon Water Resources Department
Water Rights Division

Water Rights Application
Number G-13521

Proposed Final Order

Summary of Recommendation: The Department recommends that the attached draft permit be issued with conditions.

Application History

On October 1, 1993, CITY OF MONMOUTH submitted an application to the Department for the following water use permit:

- Amount of Water: 6.0 CUBIC FEET PER SECOND
- Use of Water: MUNICIPAL
- Source of Water: TWO WELLS IN THE DUCK SLOUGH BASIN
- Area of Proposed Use: Polk County within, TOWNSHIP 8 SOUTH, RANGE 4 & 5 WEST, W.M.

The Department mailed the applicant notice of its Technical Review June 7, 1994, determining that the use of 6.0 CFS of water for MUNICIPAL USE is allowed September 1 through June 30. The 60-day objection period closed AUGUST 19, 1994.

Within the 60-day period, objections were received from the applicant and Water Watch.

In reviewing applications, the Department may consider any relevant sources of information, including the following:
- comments by or consultation with another state agency
- any applicable basin program
- any applicable comprehensive plan or zoning ordinance
- the amount of water available
- the rate and duty for the proposed use
- pending senior applications and existing water rights of record
- designations of any critical groundwater areas
- the Scenic Waterway requirements of ORS 390.835
- applicable statutes, administrative rules, and case law
- any general basin-wide standard for flow rate and duty of water allowed
- the need for a flow rate and duty higher than the general standard
- any comments received

Findings of Fact

The Willamette Basin Program allows the following uses: MUNICIPAL USE September 1 through June 30 only, for tributaries of the Willamette River, and YEAR ROUND from the Willamette River.

Based on comments, data received, and continued evaluation the Department has determined that Duck Slough is intermittent and does not flow during the period restricted by the Willamette Basin Program; therefore the restriction does not apply to this application and the use of water will be allowed YEAR ROUND.

Senior water rights exist on TWO WELLS IN THE DUCK SLOUGH BASIN or on downstream waters.

TWO WELLS IN THE DUCK SLOUGH BASIN are not within or above a State Scenic Waterway.

Water is available for further appropriation (at an 80 percent exceedance probability) YEAR ROUND.

The Department finds that no more than 6.0 CFS would be necessary for the proposed use. The amount of water requested, 6.0 CUBIC FEET PER SECOND, is allowable.

The Department determined, based upon OAR 690-09, that the proposed groundwater use will have the potential for substantial interference with the nearest surface water source, namely Duck Slough.

The Groundwater Section finds that there **is NOT** a preponderance of evidence that the proposed use of groundwater will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife.

Conclusions of Law

Under the provisions of ORS 537.621, the Department must presume that a proposed use will ensure the preservation of the public welfare, safety and health if the proposed use is allowed in the applicable basin program established pursuant to ORS 536.300 and 536.340 or given a preference under ORS 536.310(12), if water is available, if the proposed use will not injure other water rights and if the proposed use complies with rules of the Water Resources Commission.

The proposed use requested in this application is allowed in the Willamette Basin Plan.

No preference for this use is granted under the provisions of ORS 536.310(12).

Water is available for the proposed use.

The proposed use will not injure other water rights.

The proposed use complies with rules of the Water Resources Commission.

The proposed use complies with the State Agency Agreement for land use.

For these reasons, the required presumption has been established.

Under the provisions of ORS 537.621, once the presumption has been established, it may be overcome by a preponderance of evidence that either:

(a) One or more of the criteria for establishing the presumption are not satisfied; or

(b) The proposed use would not ensure the preservation of the public welfare, safety and health as demonstrated in comments, in a protest . . . or in a finding of the department that shows:

(A) The specific aspect of the public welfare, safety and health under ORS 537.525 that would be impaired or detrimentally affected; and

(B) Specifically how the identified aspect of the public welfare, safety and health under ORS 537.525 would be impaired or be adversely affected.

In this application, all criteria for establishing the presumption have been satisfied, as noted above. The presumption has not been overcome by a preponderance of evidence that the proposed use would impair or be detrimental to the public interest.

The Department therefore concludes that water is available in the amount necessary for the proposed use; the proposed use will not result in injury to existing water rights; and the proposed use would ensure the preservation of the public welfare, safety and health as described in ORS 537.525.

Recommendation

The Department recommends that the attached draft permit be issued with conditions.

DATED September 10, 1996

Steven P. Applegate
Administrator
Water Rights and Adjudications Division

Protest Rights

Under the provisions of ORS 537.621(7), you have the right to submit a protest against this proposed final order. Your protest must be in writing, and must include the following:

- Your name, address, and telephone number;
- A description of your interest in the proposed final order, and, if you claim to represent the public interest, a precise statement of the public interest represented;
- A detailed description of how the action proposed in this proposed final order would impair or be detrimental to your interest;
- A detailed description of how the proposed final order is in error or deficient, and how to correct the alleged error or deficiency;
- Any citation of legal authority to support your protest, if known; and
- If you are not the applicant, the $200 protest fee required by ORS 536.050.
- If you are the applicant, a statement of whether or not you are requesting that a contested case hearing be held. If you do not request a hearing, the Department will presume that you do not wish for a hearing to be held.

Your protest must be received in the Water Resources Department no later than **October 25, 1996.**

After the protest period has ended, the Director will either issue a final order or schedule a contested case hearing. The contested case hearing will be scheduled only if a protest has been submitted and if

- upon review of the issues the director finds that there are significant disputes related to the proposed use of water, or
- the applicant requests a contested case hearing within 30 days after the close of the protest period.

RWK

DRAFT This is not a permit!!! DRAFT

STATE OF OREGON

COUNTY OF POLK

DRAFT PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS DRAFT PERMIT IS HEREBY ISSUED TO

CITY OF MONMOUTH
151 W MAIN ST (503)838-0722
MONMOUTH, OREGON 97361

The specific limits for the use are listed below along with conditions of use.

APPLICATION FILE NUMBER: G-13521

SOURCE OF WATER: TWO WELLS IN THE DUCK SLOUGH BASIN within the Willamette basin

PURPOSE OR USE: MUNICIPAL

MAXIMUM RATE: 6.0 CFS

PERIOD OF USE: YEAR ROUND

DATE OF PRIORITY: October 1, 1993

POINT OF DIVERSION LOCATION: SW 1/4 SE 1/4, SECTION 3, NW 1/4 NE 1/4, SECTION 10, T 9S, R4W, W.M.; WELL A - 1550 FEET NORTH & 1600 FEET WEST; WELL B - 1050 FEET NORTH & 850 FEET WEST FROM SE CORNER DLC 40

THE PLACE OF USE IS LOCATED AS FOLLOWS:

WITHIN THE SERVICE BOUNDARIES OF THE CITY
TOWNSHIP 8 SOUTH, RANGE 4 & 5 WEST, W.M.

Measurement, recording and reporting conditions:

A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.

B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

The water user shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit (or replacement well) displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the water user's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The water user shall in no instance allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The use of water allowed herein may be made during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

STANDARD CONDITIONS

The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.

This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The Director finds that the proposed use(s) of water described by this permit, as conditioned, will not impair or be detrimental to the public interest.

Actual construction of the well shall begin within one year from permit issuance, and shall be completed on or before October 1, 1998. Complete application of the water to the use shall be made on or before October 1, 1999.

Issued _____, 199_

DRAFT - THIS IS NOT A PERMIT

_____
Water Resources Department
Director

Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE ## G 13521

ROUTED TO: WATER RIGHTS

TOWNSHIP/
RANGE-SECTION: 9S/4W-10

CONDITIONS ATTACHED? [ ] yes [X] no

REMARKS OR FURTHER INSTRUCTIONS:

Reviewer: Doug Woodcock

Water Resources Department

MEMO ~~E~~ JAN 17, 1996

TO **Application G-** 13521

FROM **GW:** Doug Woodcock
(Reviewer's Name)

SUBJECT **Scenic Waterway Interference Evaluation**

☐ Yes
☑ No — The source of appropriation is within or above a Scenic Waterway.

☐ Yes
☑ No — Use the Scenic Waterway condition (Condition 7J).

PREPONDERANCE OF EVIDENCE FINDING: (Check box only if statement is true)

☐ At this time the Department is unable to find that there is a preponderance of evidence that the proposed use of ground water will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife.

FLOW REDUCTION: *(To be filled out only if Preponderance of Evidence box is not checked)*

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE ## 13521

ROUTED TO: Colleen

TOWNSHIP/
RANGE-SECTION: 9s/4w - 3, 10

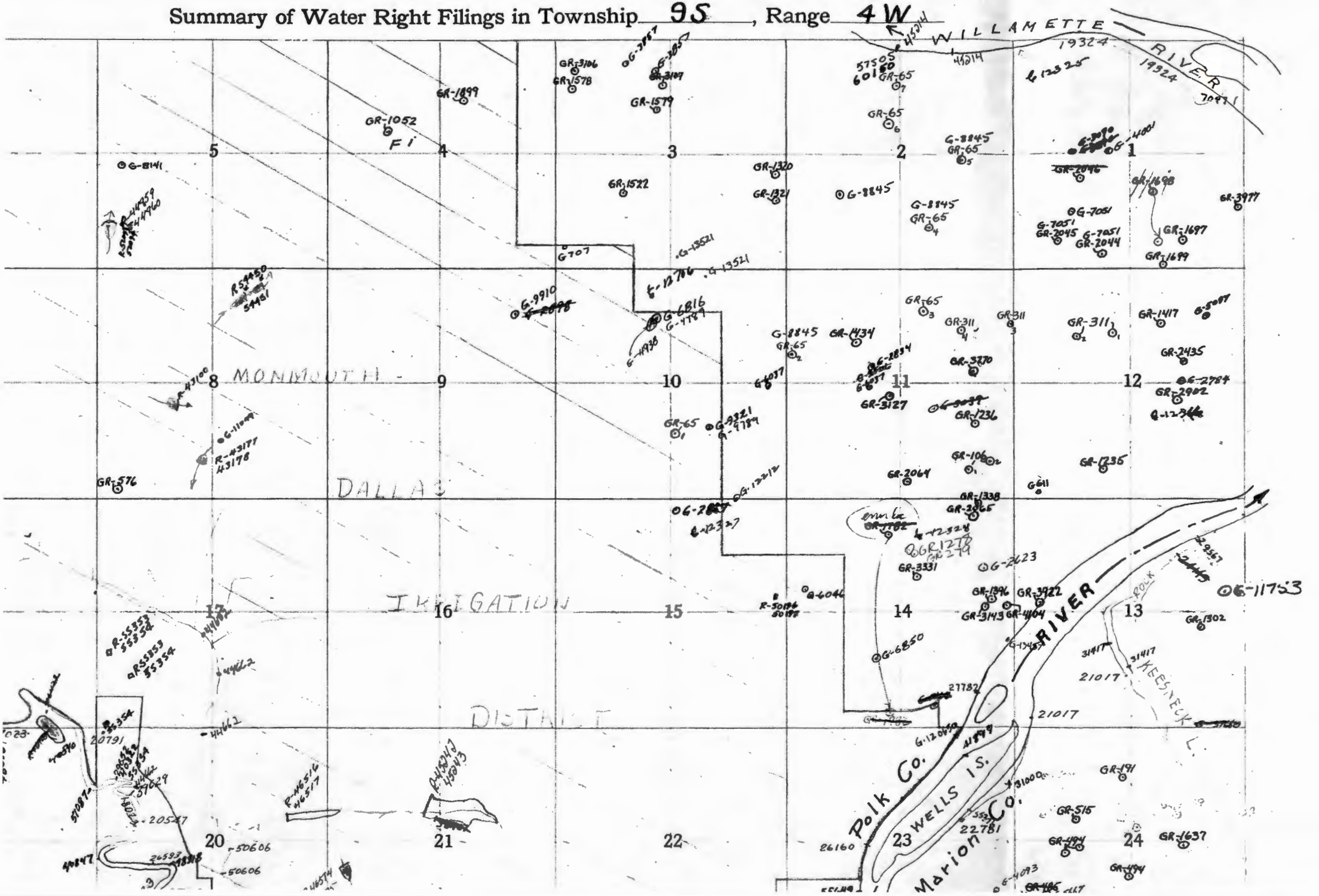
CONDITIONS ATTACHED? [ ] yes [ ] no

REMARKS OR FURTHER INSTRUCTIONS:

Hydraulic Connection

Reviewer: D. Woodcock

Summary of Water Right Filings in Township 9S, Range 4W



TO: Water Rights Section Nov 2, 1993

FROM: Groundwater/Hydrology Section D. Woodcock
Reviewer's Name

SUBJECT: Application G- 13521

1. PER THE Willamette Basin rules, one or more of the proposed POA's is/is not within 1/4 feet/mile of a surface water source (Duck Slough) and taps a groundwater source hydraulically connected to the surface water.

2. BASED UPON OAR 690-09 currently in effect, I have determined that the proposed groundwater use
   a. ✓ will, or } have the potential for substantial interference with the nearest surface water
   b. ____ will not } source, namely Duck Slough Trib. Willamette ; or
   c. ____ will, if properly conditioned, adequately protect the surface water from interference:
      i. ___ The permit should contain condition #(s)_____;
      ii. ___ The permit should contain special condition(s) as indicated in "Remarks" below;
      iii. ___ The permit should be conditioned as indicated in item 4 below; or
   d. ____ will, with well reconstruction, adequately protect the surface water from substantial interference.

3. **BASED UPON** available data, I have determined that groundwater for the proposed use
   a. ____ will, or } **likely be available in the amounts requested without injury to prior rights and/or**
   b. ____ will not } **within the capacity of the resource; or**
   c. ✓ **can, if properly conditioned, avoid injury to existing rights or to the groundwater resource;**
      i. ___ **The permit should contain condition #(s)** 4H ;
      ii. ___ **The permit should contain special condition(s) as indicated in "Remarks" below;**
      iii. ___ **The permit should be conditioned as indicated in item 4 below.**

4. a. ____ **THE PERMIT** should allow groundwater production from no deeper than _____ ft. below land surface;
   b. ____ The permit should allow groundwater production from no shallower than _____ ft. below land surface;
   c. ____ The permit should allow groundwater production only from the _____ groundwater reservoir between approximately _____ ft. and _____ ft. below land surface;
   d. ____ Well reconstruction is necessary to accomplish one or more of the above conditions.
   e. ____ One or more POA's commingle 2 or more sources of water. The applicant must select one source of water per POA and specify the proportion of water to be produced from each source.

REMARKS: _____

WELL CONSTRUCTION (If more than one well doesn't meet standards, attach an additional sheet.)

5. THE WELL which is the point of appropriation for this application does not meet current well construction standards based upon:
   a._____review of the well log;
   b._____field inspection by _____;
   c._____report of CWRE _____;
   d._____other: (specify) _____
   _____.

6. THE WELL construction deficiency:
   a._____constitutes a health threat under Division 200 rules;
   b._____commingles water from more than one groundwater reservoir;
   c._____permits the loss of artesian head;
   d._____permits the de-watering of one or more groundwater reservoirs;
   e._____other: (specify) _____
   _____.

7. THE WELL construction deficiency is described as follows: _____
   _____
   _____.

8. THE WELL
   a._____was, or
   b._____was not
   } constructed according to the standards in effect at the time of original construction or most recent modification.
   c._____I don't know if it met standards at the time of construction.

RECOMMENDATION:

A.____I recommend including the following condition in the permit:
"No water may be appropriated under terms of this permit until the well(s) has been repaired to conform to current well construction standards and proof of such repair is filed with the Enforcement Section of the Water Resources Department."

B.____I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Enforcement Section of the Water Resources Department.

C.____REFER this review to Enforcement Section for concurrence.

THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

I concur in G/H's recommendation A or B above relating to conditioning or withholding the permit.

_____ _____, 1992.
(Signature)

I do not concur in G/H's recommendation A or B above relating to conditioning or withholding the permit for the following reasons: _____
_____
_____.

_____ _____, 1992.
(Signature)

Water Resources Department

MEMO JAN 17, 1996

TO **Application G-** 13521

FROM **GW:** Doug Woodcock
(Reviewer's Name)

SUBJECT **Scenic Waterway Interference Evaluation**

☐ Yes
☑ No — The source of appropriation is within or above a Scenic Waterway.

☐ Yes
☑ No — Use the Scenic Waterway condition (Condition 7J).

PREPONDERANCE OF EVIDENCE FINDING: (Check box only if statement is true)

☐ At this time the Department is unable to find that there is a preponderance of evidence that the proposed use of ground water will measurably reduce the surface water flows necessary to maintain the free-flowing character of a scenic waterway in quantities necessary for recreation, fish and wildlife.

FLOW REDUCTION: *(To be filled out only if Preponderance of Evidence box is not checked)*

Exercise of this permit is calculated to reduce monthly flows in _____ Scenic Waterway by the following amounts expressed as a proportion of the consumptive use by which surface water flow is reduced.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

13521

Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE ## G 13521

ROUTED TO: WATER RIGHTS

TOWNSHIP/
RANGE-SECTION: 9S/4W-10

CONDITIONS ATTACHED? [ ] yes [4no

REMARKS OR FURTHER INSTRUCTIONS:

Reviewer: Doug Woodcock

Water Resources Department
Interoffice Memo

Date: January 17, 1996

To: Water Rights Section

From: Doug Woodcock

Subject: Response to objection, File G-13285

Several objections were received after the preliminary review of the application. The review of these objections address only those portions which pertains to the Ground Water/Hydrology Section's component of the technical review.

Data from the objections do not support any changes to the original finding by the Groundwater/Hydrology Section.

TO: Water Rights Section

FROM: Groundwater/Hydrology Section

SUBJECT: Application G- 13521

1. PER THE Willamette Basin rules, one o: feet/mile of a surface water source (Duck : connected to the surface water.

2. BASED UPON OAR 690-09 currently in effect
   a. ✓ will, or } have the potential for sub:
   b. ___ will not } source, namely Duck
   c. ___ will, if properly conditioned, adequately
      i. ___ The permit should contain conditi
      ii. ___ The permit should contain special
      iii. ___ The permit should be conditioned
   d. ___ will, with well reconstruction, adequately

3. **BASED UPON** available data, I have determine
   a. ___ will, or } likely be available in the ar
   b. ___ will not } within the capacity of the r
   c. ✓ can, if properly conditioned, avoid injury
      i. ___ The permit should contain conditio
      ii. ___ The permit should contain special c
      iii. ___ The permit should be conditioned a: ____ in item 4 below.

Water Right Conditions Tracking Slip

Groundwater/Hydrology Section

FILE ## 13521

ROUTED TO: Colleen

TOWNSHIP/ RANGE-SECTION: 9s/4w - 3, 10

CONDITIONS ATTACHED? [ ] yes [ ] no

REMARKS OR FURTHER INSTRUCTIONS:

Hydraulic Connection

Reviewer: D. Woodcock

4. a. ___ **THE PERMIT** should allow groundwater production from no deeper than _____ ft. below land surface;
   b. ___ The permit should allow groundwater production from no shallower than _____ ft. below land surface;
   c. ___ The permit should allow groundwater production only from the _____ groundwater reservoir between approximately _____ ft. and _____ ft. below land surface;
   d. ___ Well reconstruction is necessary to accomplish one or more of the above conditions.
   e. ___ One or more POA's commingle 2 or more sources of water. The applicant must select one source of water per POA and specify the proportion of water to be produced from each source.

G-13521

REMARKS: _____

WELL CONSTRUCTION (If more than one well doesn't

5. THE WELL which is the point of appropriation for this application does not meet current well construction standards based upon:
   a._____review of the well log;
   b._____field inspection by _____;
   c._____report of CWRE _____;
   d._____other: (specify) _____

6. THE WELL construction deficiency:
   a._____constitutes a health threat under Division 200 rules;
   b._____commingles water from more than one groundwater reservoir;
   c._____permits the loss of artesian head;
   d._____permits the de-watering of one or more groundwater reservoirs;
   e._____other: (specify) _____

7. THE WELL construction deficiency is described as follows: _____

8. **THE WELL** a._____was, or } **constructed according to the standards in effect at the time of**
   b._____was not } **original construction or most recent modification.**
   c._____**I don't know if it met standards at the time of construction.**

RECOMMENDATION:

A.____**I recommend including the following condition in the permit:**
"No water may be appropriated under terms of this permit until the well(s) has been repaired to conform to current well construction standards and proof of such repair is filed with the Enforcement Section of the Water Resources Department."

B.____**I recommend withholding issuance of the permit until evidence of well reconstruction is filed with the Enforcement Section of the Water Resources Department.**

C.____**REFER this review to Enforcement Section for concurrence.**

THIS SECTION TO BE COMPLETED BY ENFORCEMENT PERSONNEL

I concur in G/H's recommendation A or B above relating to conditioning or withholding the permit.

_____ _____, 1992.
(Signature)

I do not concur in G/H's recommendation A or B above relating to conditioning or withholding the permit for the following reasons: _____

_____ _____, 1992.
(Signature)

WATER RESOURCES DEPARTMENT MEMORANDUM

TO: Groundwater/Hydrology Files Date 11-2-93

FROM: Douglas Woodcock

SUBJECT: Groundwater Application G- 13521

Applicant(s) seek _____ gpm (6 cfs) from 2 wells in the WILLAMETTE basin, DUCK SLOUGH sub basin, _____ sub basin.

Pertinent 7 1/2 - minute quads MONMOUTH

WELLS NOT DRILLED

Well 1 WRD# _____ T 9 S R 4 W S 3 QQ SWSE County POLK

Legal Description 1550' N & 1600' W FROM SE COR DLC 40

Well is 100 ft from UNNAMED CR (river/stream)

Well is 600 ft from DUCK SLOUGH TRIB WILLAMETTE (river/stream)

Well elevation 165 ft. River/stream elevation _____ ft.

Well elevation - river/stream elevation 162

Well depth EST 80' SWL _____ on _____

Sealed to _____ Depth first water found _____

Cased to _____ Perforations/screens _____

Lined to _____ Perforations/screens _____

Well tests and types _____

Confined or unconfined? UNCONFINED Direct hydraulic connection? WILLAMETTE & POSSIBLY DUCK SLOUGH

Potential to cause substantial interference? YES

Well 2 WRD# _____ T 9 S R 4 W S 10 QQ NWNE County POLK

Legal Description 1050' N & 850' W OF SE COR DLC 40

Well is 250 ft from DUCK SLOUGH (river/stream)

Well is _____ ft from _____ (river/stream)

Well elevation 165 ft. River/stream elevation 162 ft.

Well elevation - river/stream elevation _____

Well depth _____ SWL _____ on _____

Sealed to _____ Depth first water found _____

Cased to _____ Perforations/screens _____

Lined to _____ Perforations/screens _____

Well tests and types _____

Confined or unconfined? (UNCONFINED) Direct hydraulic connection? YES

Potential to cause substantial interference? YES

Conditioned water rights in area: NONE

Other nearby water rights of record: SEE ATTACHED STREAM INDEX

Density of nearby wells: LOW

Comments: PROPOSED WELLS ARE ESTIMATED TO BE 80' DEEP. THIS IMPLIES THE TARGET AQUIFER IS UNCONSOLIDATED SAND AND GRAVEL BELOW WILLAMETTE SILT. SILT IS ABOUT 20' DEEP HERE. MOST WELLS YIELD 25-50 GPM - THOSE WHICH DO BETTER ARE PERFORATED FROM 20' TO BOTTOM. UNDERLYING SILTSTONE IS AS SHALLOW AS 34' IN SECTION 3. WATER LEVELS ARE SHALLOW, 10-20' FOR LOGS IN SECTION 3 & 10. GRADIENT WOULD BE NORTH TO WILLAMETTE. NOT CLEAR THAT 6.0 CFS IS EVEN AVAILABLE FROM 2 WELLS IN THIS AREA

References used: _____

* REREVIEW 5-3-95 CONVERSATION W/ RALPH CRISTIANSON INDICATES YIELDS COULD BE HIGHER THAN 1 FPM I THOUGHT (SEE UPDATED DOM. WATER COOP. LOG #1). HOWEVER, AQUIFER IS THIN AND SHALLOW AND NO INFO HAS BEEN PROVIDED TO LIMIT HYDRAULIC CONNECTION W/ DUCK SLOUGH

GROUNDWATER APPLICATION

G-13521

Estimated number of wells within one mile radius of POA:

TOTAL:	75	DO:	26
		ID:	
		IR:	44
		MO:	
		MU:	3
		IM:	1
		TE:	13

State observation wells within a five mile radius:

778
779

Groundwater permits issued with conditions within a five mile radius:

NONE

TE=TEST

95 4W3

To: Fred Lissner

From: Bill Fujii

November 14, 1995

Subject: G13221, G12461 and G13521

The following applications have objections to the Technical Review. Please review these applications to see if there is any reason to change the TR's findings.

I've listed the file, objector and the initial reviewer below:

G13221 City of Brownsville (Waterwatch objects) Doug Woodcock

G12461 City of LaFayette (Waterwatch objects) Sara Gates

G13521 City of Monmouth (Applicant objects supplied some data) Doug Woodcock

If there will be a delay of over 2 weeks please let me know.

Thanks.

COMPLETENESS DETERMINATION CHECKLIST

550

Application #	Review Date	Reviewer
G-13521	11/9/95	CORY

A checkmark (✓) indicates that the item is incomplete or defective.

_____ 1. Examination fees (and recording fees, if for PFO/FO).
_____ 2. Name and address of the applicant, and title if applicable.
_____ 3. Source of water.
_____ 4. Use of water.
_____ 5. Amount of water.
_____ 6. Description of delivery system.
_____ 7. A statement of **whether** the applicant has written authorization or easements permitting access to lands owned by others.
_____ 8. Name(s) and address(es) of the owners of any lands involved, but not owned by the applicant.
_____ 9. Proposed dates of beginning and completion of construction, and complete application of water.
_____ 10. If for **municipal use,** the present population to be served and expected future water requirements.
_____ 11. If for **mining use,** the type of mines and methods of supplying & utilizing the water.
_____ 12. If for a **reservoir:**
- _____ a. The height of the dam.
- _____ b. The storage capacity.
- _____ c. The area submerged.
- _____ d. The maximum depth.
- _____ e. The construction method (earthfill, concrete, flashboard, etc.).
- _____ f. A description of the outlet conduit.
- _____ g. A description of the spillway.

COMPLETED

_____ 13. If for **groundwater,** the horizontal distance from the well to the nearest surface water source (if within one mile), and the difference in land surface elevation between them.
_____ 14. If the application was made under **HB 2107:**
- _____ a. Name and address of each adjacent property owner and verification that each owner has been mailed a copy of the completed notice.
- _____ b. A description of the proposed water used and related project, the condition it will address, and the benefits that are expected to result from the project.
- _____ c. The number of reservoirs per application is appropriate as per OAR 690-11-049 (3)(b)

_____ 15. An oath that the application information is true and correct.
_____ 16. The signature of the applicant(s).
_____ 17. A satisfactory map of the proposed POD & POU.
_____ 18. A Land Use Information Form or receipt.
_____ 19. A legal description of the property where water will be used.

To: Water Resources Department
From: Steve Mamoyac (District Fish Biologist - ODFW)
Subj: Water right application reviews
Date: 8-17-94

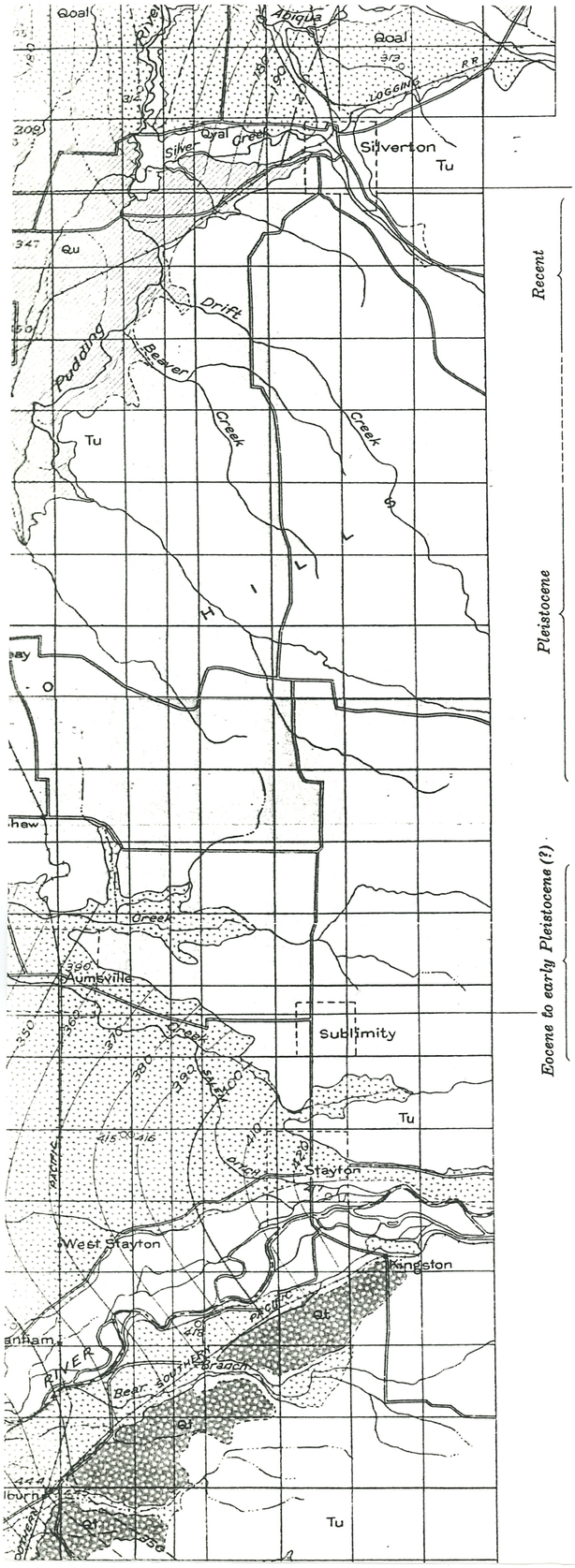
I have reviewed the following applications and offer these comments:

- Permit # R 73850: No fish present. No screening or passage required.
- Permit # G 13521: Availability analysis must provide for unconverted Willamette River MPS at Salem. Permit should be held in abeyance if this is not the case. No screening or fish passage requirements.
- Permit # S 73279: Screening required as per ODFW standards. Site inspection by ODFW personnel (to inspect screens) mandatory. Availability analysis must provide for unconverted Willamette MPS'. Otherwise, hold in abeyance.
- Permit # R 72926: Presence of fish at site of proposed reservoir uncertain. If pond in-channel and fish are present we must object due to fish passage concerns. If pond off-channel and fish present screening must be provided. At minimum (cont)

release of 50 percent live flow should be required during Storage season to insure sufficient flows occur below dam site to support fish and the migration thereof.

Applicant is advised to contact Steve Mamoyac (757-4186) so arrangements can be made to fully assess specific needs relative to the project.

Thanks for the opportunity to comment.



EXPLANATION

UNCONSOLIDATED DEPOSITS

Qyal

Younger alluvium

(Along the Willamette River and its principal tributaries from the east: rudely assorted coarse gravel and sand with some silt; clean and pervious at most places. Along smaller tributaries from the east and tributaries from the west: poorly sorted sand and gravel with much silt; perviousness highly variable)

Recent

Qoal

Older alluvium and related deposits

(In the region south of Salem: tongues and lentils of pervious gravel and sand in sandy silt; finer toward the north. In the region north of Salem: rudely stratified fine sand and silt enclosing pervious coarse sand and gravel at two known horizons; several interfingering bodies of gravel and sand along edge of valley plain)

Pleistocene

Qt

Terrace deposit and related alluvial material

(Terrace deposit: poorly sorted coarse gravel and sand, thoroughly decomposed for several tens of feet below the land surface. Alluvial material: gravel, sand, and silt, in part rudely stratified and slightly cemented. In large part of low perviousness)

Qu

Older alluvium and terrace deposits undivided

QUATERNARY

CONSOLIDATED ROCKS

Tu
QTu

Sedimentary and volcanic rocks, undifferentiated

(Shale and earthy sandstone of marine and nonmarine origin, tuff and tuffaceous sandstone, and nonfragmental volcanic rocks, of Tertiary age (Tu). In northeastern part of area, uppermost rocks are nonfragmental and fragmental volcanics, and slightly consolidated sandstone and conglomerate, in part probably of Pleistocene age (QTu). Stratigraphy and water-bearing properties are described in text)

Eocene to early Pleistocene (?)

TERTIARY AND QUATERNARY (?)

• MONMOUTH WELLS
• LUCKIAMUTE WELLS

°642

Well, nonflowing

•597

Well, flowing

Φ725

Well, unsuccessful or abandoned

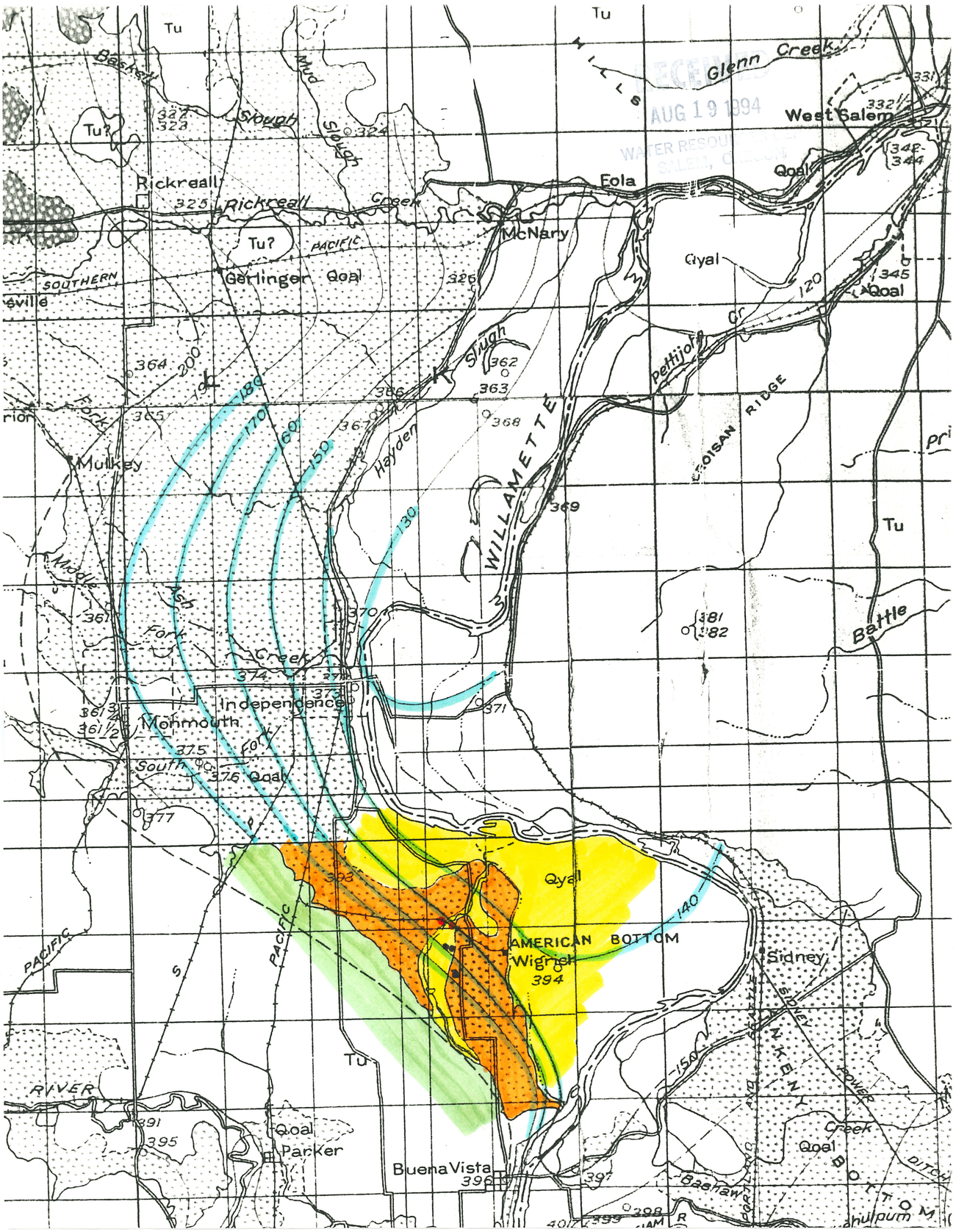
(Numbers refer to description in text)

260
250

Contour lines showing approximately the height of the water table on November 1, 1935, in feet

(Datum is mean sea level; contour interval 10 feet; dashed contours are hypothetical. Water table is semiperched or perched locally in northern part of the valley)

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT
SALEM, OREGON



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AUG 19 1994
WATER RESOURCES
SALEM, OREGON

UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary

GEOLOGICAL SURVEY
W. C. Mendenhall, Director

AUG 19 1994

Water-Supply Paper 890

GROUND-WATER RESOURCES OF THE WILLAMETTE VALLEY, OREGON

BY

ARTHUR M. PIPER

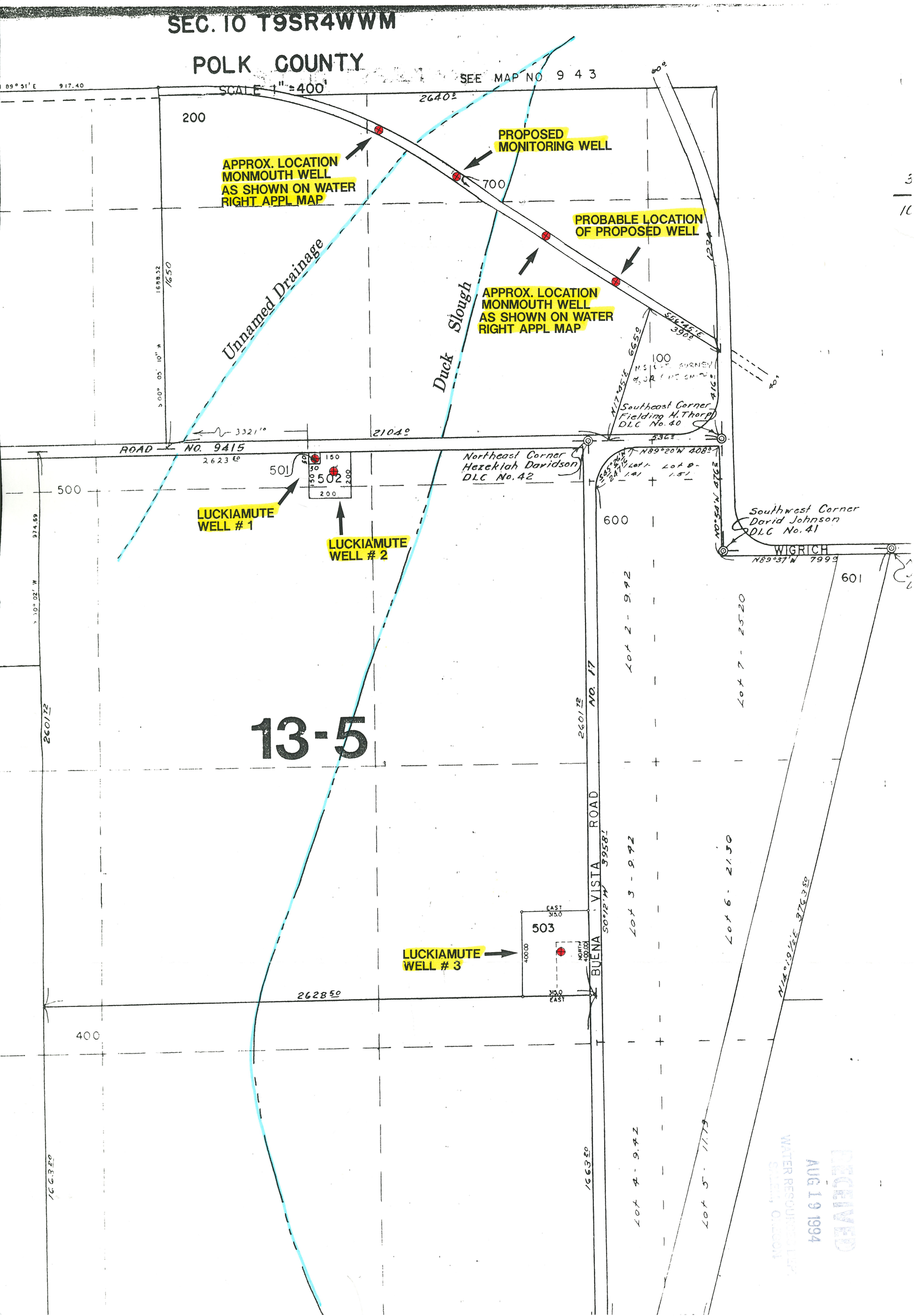
Prepared in cooperation with the

OREGON AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF SOILS

RECEIVED
DEC 11 1942
State Engineer's
Office

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON : 1942

For sale by the Superintendent of Documents, Washington, D. C. - - - - - - - - Price 45 cents



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AUG 19 1994
WATER RESOURCES DEPT.
SALEM, OREGON

August 18, 1994

Boatwright Engineering Inc.
2613 12th ST SE, SALEM, OREGON 97302
civil engineers • land surveyors
(503) 363-9225 (FAX) 363-1051

Thomas E. Shook
Oregon Dept. of Water Resources
158 12th Street NE
Salem, Oregon 97310

Re: City of Monmouth
G-13521

AUG 19 19 94
WATER R
SALE

Dear Tom,

We are assisting the City of Monmouth with their water rights applications and submit this objection to your Technical Review for the above referenced application on their behalf.

The technical review states that the two proposed wells are tributary to Duck Slough. We have submitted the well logs for the production wells of the Luckiamute Domestic Water Cooperative which are located just south of Monmouth's proposed well field. These well logs show a clay cap of 16 to 19 feet deep sealing the surface water runoff from the underlayment of alluvial gravels. The water bearing level is at about 150 USGS which corresponds with the elevation at and near the confluence of the slough with the Willamette River. This 150 USGS water elevation is further confirmed by the water level contour map shown on the enclosed excerpt of Plate 1 of the Geologic Map of the Northern Part of the Willamette Valley, Oregon from the United States Department of the Interior publication *Ground Water Resources of the Willamette Valley, Geological Survey Water Supply Paper 890.* The ground elevation of Duck Slough at the location of the proposed wells is approximately 165 USGS. Therefore, it is our contention that the wells will not be connected to the surface water in Duck Slough.

The technical review sites OAR 690-09-040 as the controlling section on the Determination of Hydraulic Connection and Potential for Substantial Interference for ground water interfering with surface water. However, we feel that if any surface water body is being considered, it should be the Main Stem of the Willamette River, not a tributary. We believe the information cited above satisfies 690-09-040(2) and demonstrates that the wells are not connected to Duck Slough.

690-09-040 (4)(a-d) outlines situations in which hydraulic connections are assumed to have the potential to cause substantial interference. These sections are not applicable because the wells are located farther from the river than the listed distances.

We feel that Section 690-09-040 (5) is the applicable review criteria for these wells as they relate to the Willamette River.

The Willamette Basin Program, specifically 690-502-050 (1)(b), classifies this section of the main stem of the river as open for municipal appropriation year round. Because we do not believe that we are connected to Duck Slough, 690-502-050 (1)(e) does not apply.

In conclusion, we believe that the technical review for application G-13521 by the City of Monmouth for the use of 6 cfs from 2 wells located in Sections 3 and 10 of T 9 S, R 4 W is in error because the wells are not tributary to Duck Slough as cited, but rather they may be tributary to the main stem of the Willamette River and should be re-evaluated as such. To support our position we have submitted the following documents:

1) Three well logs for Luckiamute Domestic Water Cooperative, numbered in the upper right hand corner and labeled with pump test gpm and production gpm.

2) Photocopy of a portion of the Polk County Assessor's Map with identified locations of Monmouth and Luckiamute production wells, proposed monitoring well and surface water locations.

3) Photocopies of portions of Plate 1, Geologic Map of the Northern Part of the Willamette Valley, Oregon showing ground water contours and geologic features.

4) Photocopy of a portion of the USGS Monmouth 7.5' Quad map showing surface water features and contours.

5) Interoffice Memo from Martin G. Boatwright, P.E. outlining his professional experience dealing with ground water in the Polk County area over the past 30 to 35 years and how that pertains to the particulars of this situation.

If you have any questions or would like further information, please do not hesitate to call.

Sincerely,

Jeanne Plasker Boatwright

Jeanne Plasker Boatwright.

CC: City of Monmouth

monprtst.wtr

G-13521

WATER AVAILABILITY TABLE

Basin: Willamette
Water Availability Subbasin: 0105300000000000 (and Nested Subbasins)
Exceedance Level: 80
Time: 14:02 Date: 06/06/1994

Item #	W.A. Subbasin	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Sto
1	0100000000000000	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
2	0105000000000000	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
3	0105300000000000	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

THOL—NO
W.A. YR ROUND

BASIN PROG:
9/1 → 6/30

LIMITING WATER AVAILABILITY SUBBASINS

Water Availability Subbasin: 0105300000000000
Basin: Willamette
Exceedance Level: 80
Time: 14:02 Date: 06/06/1994

Month	Limiting Subbasin	Stream Name	Water Available?	Net Water Available
1	0105300000000000	WILLAMETTE R	YES	15800.0
2	0105300000000000	WILLAMETTE R	YES	11100.0
3	0105300000000000	WILLAMETTE R	YES	11800.0
4	0105300000000000	WILLAMETTE R	YES	10200.0
5	0105300000000000	WILLAMETTE R	YES	10800.0
6	0105300000000000	WILLAMETTE R	YES	5900.0
7	0105000000000000	WILLAMETTE R	YES	2290.0
8	0105000000000000	WILLAMETTE R	YES	1270.0
9	0105300000000000	WILLAMETTE R	YES	1540.0
10	0105300000000000	WILLAMETTE R	YES	2940.0
11	0105300000000000	WILLAMETTE R	YES	7660.0
12	0105300000000000	WILLAMETTE R	YES	15000.0
Stor	0105300000000000	WILLAMETTE R	YES	*********

DETAILED REPORT ON WATER AVAILABILITY

Basin: Willamette
Stream: WILLAMETTE R > COLUMBIA R
Water Availability Subbasin: 0105300000000000
Exceedance Level: 80
Time: 14:03 Date: 06/06/1994

Month	Natural Stream Flow	CU + Stor Prior to 1/1/93	Water Available 1/1/93	CU + Stor After 1/1/93	Net Minimum Flow	Instream Water Rights	Net Water Available
1	18400.00	1300.00	17100.00	4.62	17100.00	1300.00	15800.00
2	20100.00	7700.00	12400.00	4.71	12400.00	1300.00	11100.00
3	19600.00	6500.00	13100.00	4.22	13100.00	1300.00	11800.00
4	18000.00	6500.00	11500.00	4.19	11500.00	1300.00	10200.00
5	15500.00	3400.00	12100.00	5.14	12100.00	1300.00	10800.00
6	8310.00	1100.00	7210.00	12.90	7200.00	1300.00	5900.00
7	4710.00	1100.00	3610.00	11.80	3600.00	1300.00	2300.00
8	3620.00	1010.00	2610.00	11.40	2600.00	1300.00	1300.00
9	3680.00	830.00	2850.00	11.10	2840.00	1300.00	1540.00
10	4650.00	410.00	4240.00	3.51	4240.00	1300.00	2940.00
11	9400.00	440.00	8960.00	3.76	8960.00	1300.00	7660.00
12	16700.00	400.00	16300.00	4.54	16300.00	1300.00	15000.00
Stor	13400000	1840000	11600000	4900	11500000	934000	10600000

DETAILED REPORT OF CONSUMPTIVE AND STORAGE AFTER 01/01/1993

Basin: Willamette
Stream: WILLAMETTE R > COLUMBIA R
Water Availability Subbasin: 01053000000000000
Time: 14:03 Date: 06/06/1994

Month	Consumptive Use			Storage		
	Apps.	Permits	Certs.	Apps.	Permits	Certs.
1	3.42	.00	.00	1.20	.00	.00
2	3.42	.00	.00	1.29	.00	.00
3	3.45	.00	.00	.77	.00	.00
4	3.67	.00	.00	.51	.00	.00
5	4.98	.00	.00	.16	.00	.00
6	12.83	.00	.00	.07	.00	.00
7	11.75	.00	.00	.00	.00	.00
8	11.38	.00	.00	.00	.00	.00
9	11.10	.00	.00	.00	.00	.00
10	3.50	.00	.00	.01	.00	.00
11	3.42	.00	.00	.34	.00	.00
12	3.42	.00	.00	1.13	.00	.00

DETAILED REPORT OF ISWRs

Basin: Willamette
Stream: WILLAMETTE R > COLUMBIA R
Water Availability Subbasin: 0105300000000000
Time: 14:03 Date: 06/06/1994

	ISWRs				
APP # :	183A	0	0	0	RESULTANT
STATUS:	Certificate				
1	1300.0	.0	.0	.0	1300.0 C
2	1300.0	.0	.0	.0	1300.0 C
3	1300.0	.0	.0	.0	1300.0 C
4	1300.0	.0	.0	.0	1300.0 C
5	1300.0	.0	.0	.0	1300.0 C
6	1300.0	.0	.0	.0	1300.0 C
7	1300.0	.0	.0	.0	1300.0 C
8	1300.0	.0	.0	.0	1300.0 C
9	1300.0	.0	.0	.0	1300.0 C
10	1300.0	.0	.0	.0	1300.0 C
11	1300.0	.0	.0	.0	1300.0 C
12	1300.0	.0	.0	.0	1300.0 C

DETAILED REPORT ON WATER AVAILABILITY

Basin: Willamette
Stream: WILLAMETTE R > COLUMBIA R
Water Availability Subbasin: 0105000000000000
Exceedance Level: 80
Time: 14:03 Date: 06/06/1994

Month	Natural Stream Flow	CU + Stor Prior to 1/1/93	Water Available 1/1/93	CU + Stor After 1/1/93	Net Minimum Flow	Instream Water Rights	Net Water Available
1	21400.00	300.00	21100.00	81.50	21000.00	1500.00	19500.00
2	23200.00	3300.00	19900.00	82.10	19800.00	1500.00	18300.00
3	22400.00	4500.00	17900.00	80.10	17800.00	1500.00	16300.00
4	19900.00	4300.00	15600.00	79.30	15500.00	1500.00	14000.00
5	16600.00	2000.00	14600.00	79.00	14500.00	1500.00	13000.00
6	8740.00	850.00	7890.00	87.40	7800.00	1500.00	6300.00
7	4980.00	1100.00	3880.00	87.60	3790.00	1500.00	2290.00
8	3830.00	980.00	2850.00	83.90	2770.00	1500.00	1270.00
9	3890.00	730.00	3160.00	83.60	3080.00	1500.00	1580.00
10	4850.00	250.00	4600.00	75.10	4520.00	1500.00	3020.00
11	10200.00	260.00	9940.00	77.10	9860.00	1500.00	8360.00
12	19300.00	300.00	19000.00	81.20	18900.00	1500.00	17400.00
Stor	15100000	1130000	13400000	58600	13400000	1080000	12300000

DETAILED REPORT ON WATER AVAILABILITY

Basin: Willamette
Stream: WILLAMETTE R > COLUMBIA R
Water Availability Subbasin: 0100000000000000
Exceedance Level: 80
Time: 14:03 Date: 06/06/1994

Month	Natural Stream Flow	CU + Stor Prior to 1/1/93	Water Available 1/1/93	CU + Stor After 1/1/93	Net Minimum Flow	Instream Water Rights	Net Water Available
1	28800.00	500.00	28300.00	86.90	28200.00	1500.00	26700.00
2	31100.00	3500.00	27600.00	87.50	27500.00	1500.00	26000.00
3	29300.00	4600.00	24700.00	85.20	24600.00	1500.00	23100.00
4	26100.00	4400.00	21700.00	84.40	21600.00	1500.00	20100.00
5	21200.00	2200.00	19000.00	83.60	18900.00	1500.00	17400.00
6	10900.00	1260.00	9640.00	98.80	9540.00	1500.00	8040.00
7	6300.00	1640.00	4660.00	99.30	4560.00	1500.00	3060.00
8	4940.00	1460.00	3480.00	95.20	3380.00	1500.00	1880.00
9	5030.00	1090.00	3940.00	94.50	3850.00	1500.00	2350.00
10	6030.00	360.00	5670.00	79.00	5590.00	1500.00	4090.00
11	12800.00	400.00	12400.00	81.30	12300.00	1500.00	10800.00
12	25800.00	400.00	25400.00	86.60	25300.00	1500.00	23800.00
Stor	19900000	1310000	18000000	63600	17900000	1080000	16800000

COPY CHECK-OFF SHEET FOR TECHNICAL REVIEWS

CC: FILE # G-13521

WATERWATCH

ODF&W

WATERMASTER # 16

REGIONAL MANAGER - NW

CWRE - C. BOATWRIGHT #208

DEQ

OREGON ASSOCIATION OF NURSERYMEN INC.

KEN STAHR

OTHER ADDRESSES: STEVE SCHNEIDER
21881 RIVER RD NE
ST PAUL, OR 97137

CASEWORKER SHOOK

ORIGINAL TO APPLICANT 2/03/94

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT
SALEM, OREGON

To: Jeanne Boatwright
From: Martin Boatwright
Re: WATER RIGHTS PROPOSED CITY OF MONMOUTH WELL FIELD AMERICAN BOTTOM AREA SOUTH OF INDEPENDENCE, OREGON
Date: August 18, 1994

After you, the City Manager of Monmouth, Monmouth's Public Works Director, myself met with Jake Szeramek and Doug Woodcock of Water Resources on July 22, 1994 regarding the Technical Comments of OWRD for the ground water filing for Monmouth that recommended a curtailment of ground water use for 2 months of each year as the ground water was related to a tributary of the Willamette River and not the Willamette River itself. I offer the following comments:

1) The significant geological formation of Polk County (Marine Sedementary Rock) limits significant ground water volumes and water quality for most of the county except for sand and gravel deposits along the Willamette River and ground water in the Columbia River basalt.

2) History has shown little or no water in the marine deposits and where encountered the qualities are not desirable in most cases because of salt and other chemicals.

3) The marine deposits when they weather and decompose break down into silts and clays and are not associated with the sands and gravels producing significant quantities of ground water in the American bottom area.

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SALEM, OREGON

4) I have reviewed the well logs for the three wells owned by the Luckiamute Domestic Water Cooperative to the south of the proposed well field of Monmouth, and other irrigations wells in the area and conclude that the significant water bearing strata are sand and gravel deposits deposited by the Willamette River in earlier times and are of a similar nature in gradation and depth clear to the waters edge of the Willamette River. There is no evidence to suggest this aquifer is associated with the Duck Slough drainage basin except for minor surface features.

I recommend we strongly pursue on behalf of the City of Monmouth the position that this aquifer is directly related in a predominate manner to the Willamette River and is only impacted in a minor way by Duck Slough Drainage.

The wells in the area suggest a ground water surface profile 15 to 25 feet below the ground surface, below a layer 15 to 25 feet in depth of silts, clays and sands.

Our request for water rights should be under the Main Stem of the Willamette River between Albany and the Falls at Oregon City where municipal water rights are allowable.

monmemo1.mgb

4/27/94

TECHNICAL REVIEW CHECKLIST

1. Application: G-13521

2. Review Date: 6/6/94

S indicates information was completed or adequately addressed.
U indicates information is needed, or incomplete, or inadequately addressed
N/A indicates Not Applicable

SUMMARY

S — Land Use

NA/~~yes~~/no — Substantial SW interference w/GW (if yes, see results of surface water availability analysis)

S — Conflicts EXISTING RIGHTS BUT HCR

S — Water Availability (01053)
(Water Availability Sub-basin)

S — The application, map and supporting data are complete and free of defects.

yes/NA — A TMDL letter has been received for this source or tributary. If yes, the period of use has been adjusted.

3. S — The applicant has certified that the information provided in the application is an accurate representation of the proposed use and is true and correct to the best of their knowledge.

4. N/A — No oath is required because application was filed before June 5, 1992.

5. QS — Application fees:

1CFS 100
5 " 250

Examination fee:	$ 200
Recording fee:	$ 350
TOTAL REQUIRED	$ 550
TOTAL SUBMITTED	$ ~~300~~ 550
AMOUNT DUE prior to issuance of permit	$ ~~350~~
AMOUNT OVERPAID refund due applicant	$

6. S — Proposed dates of beginning and completion of construction, and complete application of water.

7. S — A satisfactory map of the proposed place of water use prepared by a certified water right examiner, unless exempt under OAR 690-14-150(3). (A CWRE map is not required for applications filed before November 9, 1987.)

8. N/A* — A written copy of the legal description of the property on which the water is to be used.

9. N/A — A copy of written authorization, contract or easement permitting access to the land or reservoir not owned by the applicant.

10. N/A — No statement of ownership was required for applications filed before August, 1990.

11. S — The proposed use is not restricted or prohibited by statute.

12. S — The source of water is not withdrawn from appropriation by order of the State Engineer or Water Resources Commission, or legislatively withdrawn under ORS Chapter 538.

13. S — MUNICIPAL use(s) is/are classified uses(s) under the WILLAMETTE Basin Program, OAR 690 - 502-050. 1(e)

Land Use Compatibility:

14. As expressed by the Planning Department of CITY OF MONMOUTH * POLK COUNTY

15. S — The land uses to be served by proposed water uses (including proposed construction) are allowed or are not regulated by the local comprehensive plan (ordinance section C. 136).

16. N/A — The land uses to be served by proposed water uses (including proposed construction) involve discretionary land use approvals which have been obtained.

17. N/A * — The local government was notified, and sent no comment pursuant to the rules at the time; land use was presumed in compliance per such statement printed on the application.

For reservoir applications:

18. N/A — Plans, specifications and supporting information for the dam and impoundment area.

KD

TECHNICAL REVIEW CHECKLIST

FORM-71393

(1) Application: G-13521

(2) Review Date: _____

S Indicates information was completed or adequately addressed.
U Indicates information is needed, or incomplete, or inadequately addressed
N/A Indicates Not Applicable

SUMMARY

S	Completeness
S	Land Use
U (COND. 4H)	GW Interference (if ~~potential~~ interference with surface water, see results of water availability analysis) w/in ¼ mi. of DUCK SLOUGH
S	Conflicts
____	Water Availability

(3) S The applicant has certified that the information provided in the application is an accurate representation of the proposed use and is true and correct to the best of their knowledge.

(4) N/A No oath is required because application was filed before June 5, 1992.

(5) S Application fees:

Examination fee:	$ 200.00
Recording fee:	$ 350.00
TOTAL REQUIRED	$ 550.00
TOTAL SUBMITTED	$ 550.00
AMOUNT DUE prior to issuance of permit	$ 0.00
AMOUNT OVERPAID refund due applicant	$ 0.00

(6) S Proposed dates of beginning and completion of construction, and complete application of water.

(7) S MAP:
- ✓ Prepared by a CWRE
- ___ Exempt under OAR 690-14-150(3)
- ___ A map or drawing included (non-CWRE)
- ___ No map or drawing in file

(8) N/A A CWRE map is not required for applications filed before November 9, 1987.

(9) S A written copy of the legal description of the property on which the water is to be used.

(10) MUNICIPALITY A copy of written authorization, contract or easement permitting access to the land or reservoir not owned by the applicant.

(11) ____ The proposed use is not restricted or prohibited by statute.

(12) ____ The source of water is not withdrawn from appropriation by order of the State Engineer or Water Resources Commission, or legislatively withdrawn under ORS Chapter 538.

(13) S MUNICIPAL use(s) is/are classified uses(s) under the WILLAMETTE Basin Program, OAR 690 - 502.

(14) S The application, map and supporting data are complete and free of defects.

Land Use Compatibility:

(15) As expressed by the Planning Department of CITY of MONMOUTH & POLK CO.

(16) S The land uses to be served by proposed water uses (including proposed construction) are allowed or are not regulated by the local comprehensive plan (ordinance section 859 + ACC AMENDS.). CHAP. 136 (CITY)

(17) N/A The land uses to be served by proposed water uses (including proposed construction) involve discretionary land use approvals which have been obtained.

(18) N/A The local government was notified, and sent no comment pursuant to the rules at the time; land use was presumed in compliance per such statement printed on the application.

For ground water applications:

(20) S A copy of the constructor's log, if available, for any well already constructed, or required information regarding actual or anticipated construction.

(21) S The report from groundwater section has been received.

For reservoir applications:

(22) N/A Plans, specifications and supporting information for the dam and impoundment area.

TOWNSHIP 8 S , RANGE 5W , W. M. SECTION 24

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT																		
														Mun	Mun	22133	18321	16992
												Mun	Mun	Mun	Mun	23911	22964	CANCELED
										Mun				Mun.		41310	30886	36021
												Mun		Mun	Mun	G-4332	G-4087	39278
												Mun		Mun		G-5106	G-4818	G-2436
														Mun		G-5992		CANCELED
10			13									3				54419	40807	
																G-8926	G857	4
			MUN					MUNICIPAL								G-13521		

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8S , RANGE 5W , W. M. Card #1 SECTION 25

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
	DLC 41 DLC 60 DLC 70				DLC 60				DLC 60 DLC 58				DLC 70					
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT																		
Municipal																6716	4305	49729 9761
				Municipal												16134	11941	11656
				Municipal												16135	11942	CANCELLED
				Municipal												16248	12058	11662
				Municipal												16832	12602	15055
Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	22132	18320	CANCELLED
Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	22133	18321	16992
								Res								R-24911	R-1047	CANCELLED
												1	18	1		24916	18557	CANCELLED
Mun	Mun	Mun	Mun									Mun	Mun	Mun	Mun	23911	22964	CANCELED
								SEE TBS R6W WM 16								GR-72	GR-76	
								Res								R-36589	R-2702	31516

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8S RANGE 5W W. M. Card #

NE				NW				SW				SE				App N
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT, IF OTHER THAN 40 ACRES																
	0 2	0 5					7 2	0 2								3
		Mun						Mun		Mun			Mun			41
	Mun					Mun						Mun	Mun		Mun	G-4
	Mun														Mun	G-5
	Mun												Mun		Mun	G-
															2 0	56
	Mun															9
	Mun												Mun			G-4
					Domestic											G-5
					MUNICIPAL						MUNICIPAL					G-1

TOWNSHIP 8S RANGE 5W W. M.

NE				NW				SW				SE				App N
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT, IF OTHER THAN 40 ACRES																
					Quasi		Municipal									G-4
1 2																56
									Domestic							G-
MUN				MUN												G-

TOWNSHIP 8 S, RANGE 4 W, W. M. Card #1 SECTION 19

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
DLC 48		DLC 66			DLC 48			DLC 47						DLC 66				
DLC 47						DLC 47								DLC 47				
Lot 1		Lot 3	Lot 2															
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT																		
					40.69	40.87			41.05	41.23								
														15		14015	10106	9877
		6	3										0.2	10 ~~12~~	~~13~~	15757	11615	12347
		~~6~~			21.4 ~~25~~		~~5~~									20315	15848	50345 ~~14444~~
															5.4	22820	17861	19467
										Mun	Mun					22133	18321	16992
								~~Mun~~	~~Mun~~	~~Mun~~	~~Mun~~					~~23911~~	~~22964~~	CANCELED
															5.0	GR-2868	GR-2702	Q
										- Mun -				- Mun. -		41310	30886	36021
										Mun				Mun		G-4332	G-4087	39278
										Mun				Mun		G-5106	G-4818	62436
														— Mun —		G-5992		CANCELE
										— Mun —				— Mun —		G-8926	G8579	4

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8 S RANGE 4W W. M. CARD 2 SECTION 19

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT. IF OTHER THAN 40 ACRES																		
	MUN							— MUNICIPAL —								G-13521		

TOWNSHIP 8 S, RANGE 4 W, W. M. SECTION 20

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
DLC 43						DLC 66			DLC 66					DLC 66				
DLC 66	DLC 63																	
Lot 1				Lot 4		Lot 6	Lot 5					Lot 2		Lot 3				
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT																		
									2							16680	12447	
																62071	~~48~~	CANCELED
Qu.	Quit								Quit							G11243	G10375	4
Mun	Mun																	
																G-12734		
15.0	11.0			6.0		1.0										G-12836		
				MUN					MUN							G-13521		

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8 S, RANGE 4 W, W. M. Card No 1 SECTION 29

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
DLC 44 DLC 66 DLC 45				DLC 44 DLC 66 Lot 1				DLC 44 DLC 61 Lot 2				DLC 44						
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT																		
												x						
													10			15738	11602	CANCELLED
	2	15								8	11		6			16064	11874	CANCELLED
													3 8/9	x		16767	12540	CANCELLED
			Pond ✓													18304	14237 ✓	14494 ✓
												20 5				22716	17851	19464
Mun			Mun													G656	G569	CANCELLED
Mun			Mun													G885	G980	CANCELLED
			Mun													G1804	G-971	3
														12 5	10 2	GR-1266	GR-1222	
												6 2	2 4	9 2	12 2	GR-1267	GR-1223	
																G-1478	G1355	

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8 S, RANGE 4 W, W. M. Card No. 2 SECTION 29

N E				N W				S W				S E				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT, IF OTHER THAN 40 ACRES																		
													17 2			3[illegible]	[illegible]	
Mun			Mun													GR-3143	GR-3141	
Mun			Mun													[illegible]	[illegible]	
Mun			Mun													[illegible]	[illegible]	
																41310	9C886	6
										3.7						53405	39617	
				2.4	1.75											62897	46603	CANCELLED
							4 0	12 2								GR-293	GR-294	
								19 2								G-10984	G10155	CANCELLED
																G-11243	G 10375	
																G-12756		
												V			1	72417		
						MUN				MUN						G-13521		

TOWNSHIP 8S, RANGE 4W, W. M. Card #1 SECTION 30

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
DLC 66	DLC 47	DLC 62	Lot 2	DLC 47		DLC 62	Lot 1	DLC 62		DLC 61	Lot 2	Lot 3	DLC 62	DLC 61	Lot 3			
TOTAL ACREAGE IN SUBDIVISION AS SHOWN ON GOVERNMENT PLAT				41.34	41.37			41.40	41.43									
				Municipal												16134	11941	11656
				Municipal												16135	11942	CANCELLED
				Municipal												16248	12058	11662
				Municipal												16832	12602	15055
26																22820	17961	19467
Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	22132	18320	CANCELLED
Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	Mun	22133	18321	16992
																23911	22964	CANCELED
5																GR-2868	GR-2702	2
				Mun.								Mun.				41310	30886	36021
				Municipal								Mun				G-4332	G-4087	39278
				Municipal								Mun				G-5106	G-4818	62436

(SEE BACK OF CARD FOR PLAT OF SECTION)

TOWNSHIP 8S RANGE 4W W. M. Card #2 SECTION 30

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT, IF OTHER THAN 40 ACRES																		
				Municipal												G-5992	G-5041	CANCELED
																G-7115		
																G-7145	G-6077	
																G-8926	G8579	
				MUNICIPAL												G-13521		

TOWNSHIP 8S RANGE 4W W. M. SECTION 31

NE				NW				SW				SE				Application Number	Permit Number	Certificate Number
NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE			
ACREAGE IN LOT OR LEGAL SUBDIVISION AS SHOWN ON GOVERNMENT PLAT, IF OTHER THAN 40 ACRES																		
																G-6816	G-6093	
																G-9321	G-8747	
	MUN			MUN												G-13521		

RECORDING REQUESTED BY

G13521 G-13521

BOR 270 PAGE 1413

AND WHEN RECORDED MAIL TO

Name
Street Address
City State Zip

City of Monmouth
151 West Main Street
Monmouth, OR 97361
ATTN: Stanley J. Kenyon

RECEIVED
OCT 19 1993
WAT... ES DE ...EGON

SPACE ABOVE THIS LINE FOR RECORDER'S USE

Approved As To Form
By General Counsel
March 8, 1993

BARGAIN AND SALE DEED

KNOW ALL MEN BY THESE PRESENTS, That **SOUTHERN PACIFIC TRANSPORTATION COMPANY**, a Delaware corporation, hereinafter called "Grantor," for the consideration hereinafter stated, does hereby convey unto **CITY OF MONMOUTH**, a municipal corporation of the State of Oregon, hereinafter called "Grantee," all of that certain real property situated in the County of Polk, State of Oregon, as more particularly described in the Exhibit "A" attached and hereby made a part hereof, (the "Property"), subject to all covenants, conditions, restrictions, exceptions, easements, rights-of-way, rights-of-access, agreements, reservations, encumbrances, liens and other matters as the same may be of record; any matters which would be disclosed by survey, investigation or inquiry; and any tax, assessment or other governmental lien against the Property.

THIS INSTRUMENT WILL NOT ALLOW USE OF THE PROPERTY DESCRIBED IN THIS INSTRUMENT IN VIOLATION OF APPLICABLE LAND USE LAWS AND REGULATIONS. BEFORE SIGNING OR ACCEPTING THIS INSTRUMENT, THE PERSON ACQUIRING FEE TITLE TO THE PROPERTY SHOULD CHECK WITH THE APPROPRIATE CITY OR COUNTY PLANNING DEPARTMENT TO VERIFY APPROVED USES. [ORS 93.040(1)]

Grantee, by signing below, expressly acknowledges that Grantee is buying the Property in an "**AS IS**" condition and that Grantee has relied upon its own independent investigation of the physical condition of the Property. Grantee hereby releases and indemnifies Grantor and Grantor's shareholders, officers, directors, agents and employees from all responsibility and liability regarding the condition (including, but not limited to, the physical condition or presence of hazardous materials), valuation or utility of the Property.

TO HAVE AND TO HOLD the same unto Grantee and Grantee's heirs, successors and assigns forever.

WILLAMETTE ... TITLE CO. 166120-P

RECEIVED
OCT 19 1993
EGON

The true and actual consideration paid for the transfer, stated in terms of dollars, is **TWO THOUSAND FIVE HUNDRED DOLLARS DOLLARS ($2,500.00).** (ORS 93.030)

In construing this Deed and where the context so requires, the singular includes the plural, and all grammatical changes shall be implied to make the provisions hereof apply equally to corporations and individuals.

IN WITNESS WHEREOF, the Grantor has executed this instrument this 24th day of June, 1993; if a corporate Grantor, it has caused its name to be signed and its seal affixed by its officers duly authorized thereto by order of its Board of Directors.

GRANTOR:

SOUTHERN PACIFIC TRANSPORTATION COMPANY

By: _____

Title: Its Vice President

Attest: _____

By: SECRETARY

[Note: Attach Grantor's notarial certificate here.]

CERTIFICATE OF ACKNOWLEDGEMENT

STATE OF CALIFORNIA
COUNTY OF San Francisco } S.S.

On June 30, 1993 before me,

NANCY L. GLOTFELTY

a Notary Public in and for said County and State, personally appeared J. A. Holm and T. F. O'Donnell

personally known to me (or proved to me on the basis of satisfactory evidence) to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal

Signature Nancy L. Glotfelty
F 2492 (5-91)

FOR NOTARY SEAL OR STAMP

NANCY L. GLOTFELTY
COMM. # 928942
Notary Public — California
SAN FRANCISCO COUNTY
My Comm. Expires JUL 4, 1995

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OCT 19 1993
WATER RES
SALEM, GON

BOOK 270 PAGE 1415

GRANTOR'S NAME AND ADDRESS:

SOUTHERN PACIFIC TRANSPORTATION COMPANY
San Francisco Regional Office - Real Estate
One Market Plaza, Suite 912
San Francisco, CA 94105

GRANTEE'S NAME AND ADDRESS:

CITY OF MONMOUTH
151 West Main Street
Monmouth, OR 97361

Until a change is requested, all tax statements shall be sent to the following address:

151 West Main Street
Monmouth, OR 97361

Original of recorded deed shall be sent to:

San Francisco Regional Office - Real Estate
One Market Plaza, Suite 912
San Francisco, CA 94105

Grantee hereby accepts this deed and agrees for itself, its successors and assigns, to be bound by the conditions and covenants set forth herein and to perform all obligations of Grantee set forth herein.

Dated this 7 day of July, 1993

GRANTEE:

CITY OF MONMOUTH

By: Stanley J. Kenyon

Title: City Manager

[Note: Attach Grantee's notarial certificate here.]

STATE OF OREGON
COUNTY OF MARION

On this 7th day of July, 1993, personally appeared Stanley J. Kenyon, City Manager of the City of Monmouth and acknowledged ~~the foregoing instrument to~~ be his voluntary act and ~~deed~~.

Before me: Alyce Peters
Notary Public for Oregon
My commission expires: 8-9-94

OFFICIAL SEAL
ALYCE PETERS
NOTARY PUBLIC - OREGON
COMMISSION NO. 000977
MY COMMISSION EXPIRES AUG 9, 1994

BOR 270 PAGE 1416

6-21-93

RECEIVED
OCT 19 1993
WA
SALEM, OREGON

EXHIBIT "A"

DESCRIPTION SHEET

All that land situate in Sections 3 and 10, Township 9 South, Range 4 West, Willamette Meridian, Polk County, Oregon, described as follows:

PARCEL I:

That parcel of land conveyed by deed from H. Hirschberg, grantor, to the Oregon and California Railroad Company, grantee, recorded April 2, 1913, in Deed Book 57, at Page 305, records of said county, and described fifthly therein as follows: "A part of the F. M. Thorp Donation Land Claim, located in Sections 3 and 10, Township and Range aforesaid, and particularly described as follows: Beginning at a point on the East line of said Donation Land Claim, 455.3 feet North of the Southeast corner thereof, which point is 20 feet Northerly from, measured at right angles to the center of the railroad of grantee, above referred to; thence North 55°10' West, on a line parallel with and 20 feet distant from said center line, 1547 feet; thence on a curve concave to the left, having a radius of 1931 feet, a distance of 778.1 feet to the line between the properties of S. H. McElmurry, et al, and Mrs. P. E. Compton, et al; thence West on said property line 390.9 feet; thence Southeasterly on a curve to the right, having a radius of 1891 feet, the tangent to the curve at the point of beginning bearing South 89°56' East, a distance of 1146.1 feet; thence South 55°10' West, 1574.4 feet to the East line of said F. M. Thorp Donation Land Claim; thence North 48.6 feet to the place of beginning."

PARCEL II:

That portion of the land described fourthly in said deed from H. Hirschberg to the Oregon and California Railroad Company, lying Easterly of that portion thereof described as "Parcel No. 3" in deed from Southern Pacific Company to Charles S. Bowman, et ux, dated February 14, 1951, recorded May 17, 1951, in Volume 144, Page 650, Deed Records for Polk County, Oregon.

STATE OF OREGON)
) ss.
County of Polk)

I hereby certify that the within was received and duly recorded by me in Polk County records:

B.O.R. 270 Page 1413

374280

FILED
POLK COUNTY OREGON

'93 JUL -8 A10:43

LINDA DAWSON
COUNTY CLERK

BY LB DEPUTY

WaterWatch
OF OREGON

RECEIVED
OCT 29 1993
WATER RESOURCES DEPT.
SALEM, OREGON

October 28, 1993

Water Resources Department
3850 Portland Rd. N. E.
Salem, OR 97310

RE: Application for Permit #G13521, City of Monmouth
Duck Slough Basin, Polk Co., Municipal Use

WaterWatch has reviewed the limited amount of information contained in the public notice of this water right application. Based upon that information, WaterWatch raises the following issues, questions and concerns:

Is there unappropriated water available for this proposed use? How will the Department determine water availability for this proposed use? What will be the cumulative effect of this proposed use, in combination with other, already existing uses of the aquifer?

Is the groundwater source in question in hydraulic connection with surrounding surface waters? If so, what is the amount of surface water depletion and what effect will this proposed use have on instream flows necessary to protect the public's interest in fish, wildlife, recreation and a health aquatic system? We oppose any application which in any way reduces surface water flows needed for the public uses that are served by any instream water right.

What has the City of Monmouth done to promore water conservation within the community? Has the City considered implementing a conservation based rate structure in order to encourage wise water use within the City? If this permit is issued, what conditions will it include relative to water conservation?

Will this proposed use be compatible with Goal 5 elements in the local comprehensive plan?

It is a high priority of the state to eliminate waste and improve the efficiency of water use. OAR 690-410-060(1) Statewide policy also calls upon water users to use and maintain their water systems in a manner consistent with the state's priority. What conditions are proposed for this permit that will carry out and encourage compliance with state policy?

Is this an existing illegal use of water? If so, will the continued use without a permit cause harm to existing water rights and the public interest?

We request copies of the draft permit and the Department's technical review of this application.

Sincerely,

Jim Myron

bc:

Application No. G13521

Permit No. G12976

Name CITY OF MONMOUTH

Address 151 W MAIN ST
MONMOUTH, OR 97361

Assigned

Address

Beginning construction 10-31-97

Completion of construction 10-1-98

Extended to

Complete application of water 10-1-99

Extended to

Form 111

RECEIVED
OCT 19 1993
WATER RESOURCES DEPT.
SALEM, OREGON

COMMENT FORM

Please list below the Application Number of the water use application(s) that are of interest to you. When the technical evaluation is completed a report of the technical review of these applications will be delivered to you.

Application #s G13522, G13521, T7044, T7045, _____, _____

Send to: Steve Schneider
2881 River Rd NE
St. Paul, OR 97137

Please include specific comments or concerns. Use additional sheets if necessary.

Return to:
Oregon Water Resources Department
3850 Portland Road N.E.
Salem, Oregon 97310

This Comment corresponds to the OCT/13/1993 Public Notice.

Oregon

WATER
RESOURCES
DEPARTMENT

October 13, 1993

CITY OF MONMOUTH
151 W MAIN ST
MONMOUTH, OR 97361

REFERENCE: File(s) G-13521

We have received your application(s) for a water use permit along with your supporting data, documentation, and fees. A receipt is enclosed here unless you were previously issued one. Your application has been assigned the above referenced file number. Please refer to this number whenever you contact us about your application.

Even though your application has been received, filed and assigned an application reference number, no authorization has been granted to develop your water use. The filing of an application does not create a water right. Water may not be used without a water right permit.

After an application has been accepted for filing, public notification of the application is made, followed by the mandatory 30-day comment period. Thereafter, applications can be considered for processing as time allows.

At present the Water Resources Department has a backlog of several thousand applications for water use permits which has delayed our application processing time. Applications are processed in the order in which they are received.

The processing of an application does not guarantee that a water right permit will be issued. Each application must undergo a specialized analysis called a technical review and a public interest review. There is no way to determine at this time whether your particular proposed water use will be recommended for a permit.

3850 Portland Rd NE
Salem, OR 97310
(503) 378-3739
FAX (503) 378-8130

REFERENCE: File(s) - G-13521

When the report on the technical review is completed and sent to you, a 60-day objection period begins during which you, the applicant, or anyone who has expressed an interest in your proposed water use may communicate to us their disagreement with what we have said in our report on your application. After the 60-day objection period, the Department conducts the public interest review and considers any objections which have been made.

After any objections have been considered, there may follow time to allow parties to resolve conflicts over the proposed water use. In addition, a 30-day protest period may be required. Lastly, it may be necessary to schedule a hearing or send the application to the Water Resources Commission for their review. In most cases no objections are received and the application processing can proceed without further conflict resolution, protest, or hearing.

If your application is recommended for approval and a permit is issued, the use allowed by the permit will be subject to the Basin Program Rules of the Water Resources Commission, instream flow requirements, and the demands of prior right holders, and other conditions to conform the water use to particular standards.

Please contact the Water Rights Section of the Water Resources Department if you have any questions. You may write to us at 3850 Portland Road, Northeast, Salem, Oregon 97310 or you may call 378-3739 in Salem or toll free from within the state 1-800-624-3199.

Sincerely,

Steve Brown
Steve Brown
Manager
Water Rights Division

cc:CWRE

APPLICATION PROCESS OUTLINE

APPLICATION FILE # G13521
PRIORITY DATE

DATE	INITIALS	
10-1-93	KC	**MINIMUM REQUIREMENTS TO FILE**
		Name and mailing address
		Source of water
		Quantity of water
		Location of project
		Use of water
		Signature of applicant
		Allowable use by policy
		State Engineer withdrawal
		Legislative withdrawal
		Land use approved _____ pending Y
		FIELD OPERATIONS
10-12-93	CB	Application date stamped per money receipt date
		Stream Indexed Basin 2
		Stream Code _____
		Scenic Waterway _____
		Findings:
		1) Concluded - Scenic-Reg Ack letter
		2) Under Study - Scenic-Ack letter
		3) Basin 2 - Willamette-Ack letter
10-20-93	DCB	Plat Carded and copy made (YES) NO
		Conflicts (well _____surface_____) ___ ___
		Prior ISWR # _____ ___ ___
		Within Irrigation District _____ (name)
		Notified ___ ___
		District excerpt received ___ ___
		Entered in Paradox
		Prepare six copies of Draft Permit
		Send one copy to Data Center
		SUPPORT SERVICES
10/13/93	CAC	Stamp contents with application number
		Mail/Provide copies of draft permits to DEQ, ODFW, PARKS, AND WATERMASTER
10/14/93	h	Mail ack letter (provided by Data Center) with receipt to applicant, cc to CWRE and file
h	h	Place label on file and card
		If dam is over 10 feet or storage exceeds 9.2 AC-FT, route file to Dam Safety Section
		Notify Irrigation District
		FIELD OPERATIONS
		YES NO
		Ownership Statement ___ ___
		Name and address of all owners ___ ___
		Other landowners notified ___ ___
		Legal Description ___ ___
		Need Commission review ___ ___
		____ Requests greater than 5.0 cfs
		____ Dam height greater than 20 feet
		____ Storage greater than 100 acre-feet
		____ Out of Basin diversion
		____ Groundwater recharge project
		____ Other substantial public interest
		GW comments received _____ resolved _____
		ODFW comments received _____ resolved _____
		DEQ comments received _____ resolved _____
		Interest Groups _____
		Water availability received
		Objections received _____ resolved _____
		Protest received _____ resolved _____
		Management Codes

EXAMINATION FEE: _____
RECORDING FEE: _____

TOTAL: _____
REFUND: _____
DEFICIENT: _____

REMARKS: _____

G13521 G-13521

Land Use Information Form: Permits, Hydroelectric Licenses, Water Uses in Addition to Classified Uses

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OCT 19 1993
WATER RESOURCES DEPT
SALEM, OREGON

This information is needed to determine compatibility with local comprehensive plans as required by ORS 197.180. The Water Resources Department will use this and other information to evaluate the water use application. DO NOT FILL OUT THIS FORM IF water is to be diverted, conveyed, and/or used only on federal lands.

Applicant's Name: City of Monmouth
Address: 151 W Main St
City: Monmouth *State:* OR *Zip:* 97361 *Day Phone:* 838-0722

Please provide information as requested below for all tax lots on or through which water will be diverted or used. (Attach extra sheets as necessary.) Applicants for municipal use, or irrigation uses within irrigation districts, may substitute existing and proposed service area boundaries for the tax lot information requested below.

Tax Lot or Local I.D.#	Plan Designation/Zoning (e.g. Rural Residential/RR-5)	Check All That Apply		
		Water Diverted	Water Conveyed	Water Use
9410 700	Agriculture / EFU	X	X	
See Attached			X	X
See Boundary	Map			

Please list all counties and cities within which water is proposed to be diverted, conveyed, and/or used. City of Monmouth Polk Co.

The following section must be completed by a planning official from each county and city listed unless your project will be located entirely within city limits. In this case, only the city planning agency must complete this form. Please request extra forms as needed.

For Local Government Use Only

Local planning officials are to complete the remainder of this form. If it cannot be completed while the applicant waits, sign and detach the receipt as instructed below. You will receive notice when the applicant's water right request is filed with the Water Resources Department (WRD). You will have 30 days from the notice date to return this completed this land use form to WRD. If no land use information is received from you within that period, WRD may presume the land use associated with the proposed water right is compatible with your comprehensive plan.

a) Check the appropriate box below and provide requested information.

☑ *Land uses to be served by proposed water uses (including proposed construction) are allowed outright or are not regulated by your comprehensive plan. Cite applicable ordinance section(s):* Chapter 136. *Go to section b) on reverse side.*

☐ *Land uses to be served by proposed water uses (including proposed construction) involve discretionary land use approvals as listed in the table below. Note: Please attach documentation of applicable local land use approvals which have already been obtained. (Record of Action plus any accompanying findings is sufficient.)*

Type of Land Use Approvals Needed (e.g.: plan amendments, rezones, conditional use permits, etc.)	Cite Most Significant, Applicable Plan Policies & Ordinance Section References	Please check the box that applies:		
		Already Obtained	Already Denied	Being Pursued Satisfactorily
n/a				

(over)

(For Local Use Continued)

b) Please provide printed name and written signature.

Name: David Perry *Date:* 10/5/93

Title: Assoc. Planner *Phone:* 627-9237

Signature: D B Perry

Local governments are invited to express special land use concerns or make recommendations to the Department regarding this proposed use of water below, or on a separate sheet.

Additional Comments:

Planning Official Initials: DBL

Description of Water Use

Note to Applicant: This sheet will provide local planning staff with a basic description of your proposed water use. Please fill out this sheet before bringing the attached land use form to your local planning office. It will help local planning offices complete your land use information form quickly.

Note to Local Planning Officials: Please initial this sheet. Do not separate it from the land use information form. If needed, please make a separate copy for your records.

RECEIVED
OCT 19 1993
WATER RESOURCES DEPT
SALEM, OREGON

Applicant Name: City of Monmouth
Address: 151 W. Main St.
Monmouth, Oregon 97361
Phone: 838-0722

Please indicate what you will use the water for. Check all boxes that apply and fill in the blanks with key characteristics of the project

- ☐ Irrigation (crop type, golf course, nursery or greenhouse): _____
- ☐ Livestock (type of livestock, feedlot, slaughterhouse): _____
- ☐ Residential (# units, single or multi-family, # lots if partition or subdivision): _____
- ☐ Commercial (i.e., retail, office, restaurant, gas station, hotel, service, etc.): _____
- ☐ Industrial (i.e., factory, pulp mill, research and development, processing, etc.): _____
- ☐ Institutional (i.e., school, library, etc.): _____
- ☐ Mining (aggregate, metal, open pit, placer, etc.): _____
- ☐ Recreation (park, campsite, pond, etc.) _____
- ☐ Fish and Wildlife (pond, hatchery, etc.) _____
- ☐ Hydropower (dam, reservoir, power generating or transmitting facilities): _____
- ☒ Other (Name and list key characteristics): municipal

Indicate sources for the proposed water use below:	Indicate the estimated quantity of water the use will require.
☐ Surface Water Name sources: _____ _____ _____	6 Cubic feet per second. _____ Gallons per minute. _____ Acre-Feet
☐ Reservoir or pond	
☒ Ground Water	

Water Resources Department, 3850 Portland Rd. NE, Salem, OR 97310
Phone: 378-3671

Version: 10/8/91

Receipt for Request for Land Use Information

WRD Applicant Name: CITY OF MONMOUTH

This receipt must be signed by a local government representative and returned to the applicant for inclusion in the WRD application IF the local government cannot provide the above requested land use information while the applicant waits.

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OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

City or County: Polk County

Staff Contact: CHRIS SCHMOYER Phone: 623-9237

Signature: Chris Schmoyer Date of Information Request: 9/30/93

Application No. G13521

Permit No.

Version: 6/15/92

Oregon Water Resources Department
3850 Portland Rd. NE
Salem, OR 97310
378 - 3671

Version: 6/92

Application No. G-13521
Permit No.

Land Use Information Form: Permits, Hydroelectric Licenses, Water Uses in Addition to Classified Uses

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OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

This information is needed to determine compatibility with local comprehensive plans as required by ORS 197.180. The Water Resources Department will use this and other information to evaluate the water use application. DO NOT FILL OUT THIS FORM IF water is to be diverted, conveyed, and/or used only on federal lands.

Applicant's Name: City of Monmouth
Address: 151 W. Main St.
City: Monmouth *State:* OR *Zip:* 97361 *Day Phone:* 838-0722

Please provide information as requested below for all tax lots on or through which water will be diverted or used. (Attach extra sheets as necessary.) Applicants for municipal use, or irrigation uses within irrigation districts, may substitute existing and proposed service area boundaries for the tax lot information requested below.

Tax Lot or Local I.D.#	Plan Designation/Zoning (e.g. Rural Residential/RR-5)	Check All That Apply		
		Water Diverted	Water Conveyed	Water Use
See Attached Service Boundary Map	All uses allowed as per City Zoning		X	X

Please list all counties and cities within which water is proposed to be diverted, conveyed, and/or used. City of Monmouth, Polk Co.

The following section must be completed by a planning official from each county and city listed unless your project will be located entirely within city limits. In this case, only the city planning agency must complete this form. Please request extra forms as needed.

For Local Government Use Only

Local planning officials are to complete the remainder of this form. If it cannot be completed while the applicant waits, sign and detach the receipt as instructed below. You will receive notice when the applicant's water right request is filed with the Water Resources Department (WRD). You will have 30 days from the notice date to return this completed this land use form to WRD. If no land use information is received from you within that period, WRD may presume the land use associated with the proposed water right is compatible with your comprehensive plan.

a) Check the appropriate box below and provide requested information.

☒ *Land uses to be served by proposed water uses (including proposed construction) are allowed outright or are not regulated by your comprehensive plan. Cite applicable ordinance section(s):* Ord. 859 + all amendments. *Go to section b) on reverse side.*

☐ *Land uses to be served by proposed water uses (including proposed construction) ... discretionary land use approvals as listed in the table below. Note: Please ... land use approvals which have already*

Version: 6/92

Oregon Water Resources Department
3850 Portland Rd. NE
Salem, OR 97310
378 - 3671

(For Local Use Continued)

b) *Please provide printed name and written signature.*

Name: JOAN E HOWARD Date: 9/30/93

Title: FINANCE DIRECTOR/RECORDER Phone: 838-0722

Signature: Joan E Howard

Local governments are invited to express special land use concerns or make recommendations to the Department regarding this proposed use of water below, or on a separate sheet.

Additional Comments:

Planning Official Initials: _____

Description of Water Use

Note to Applicant: This sheet will provide local planning staff with a basic description of your proposed water use. Please fill out this sheet before bringing the attached land use form to your local planning office. It will help local planning offices complete your land use information form quickly.

Note to Local Planning Officials: Please initial this sheet. Do not separate it from the land use information form. If needed, please make a separate copy for your records.

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WATER RESOURCES DEPT
SALEM, OREGON

Applicant Name: City of Monmouth
Address: 151 W. Main St
Monmouth, Oregon 97361
Phone: 838-0722

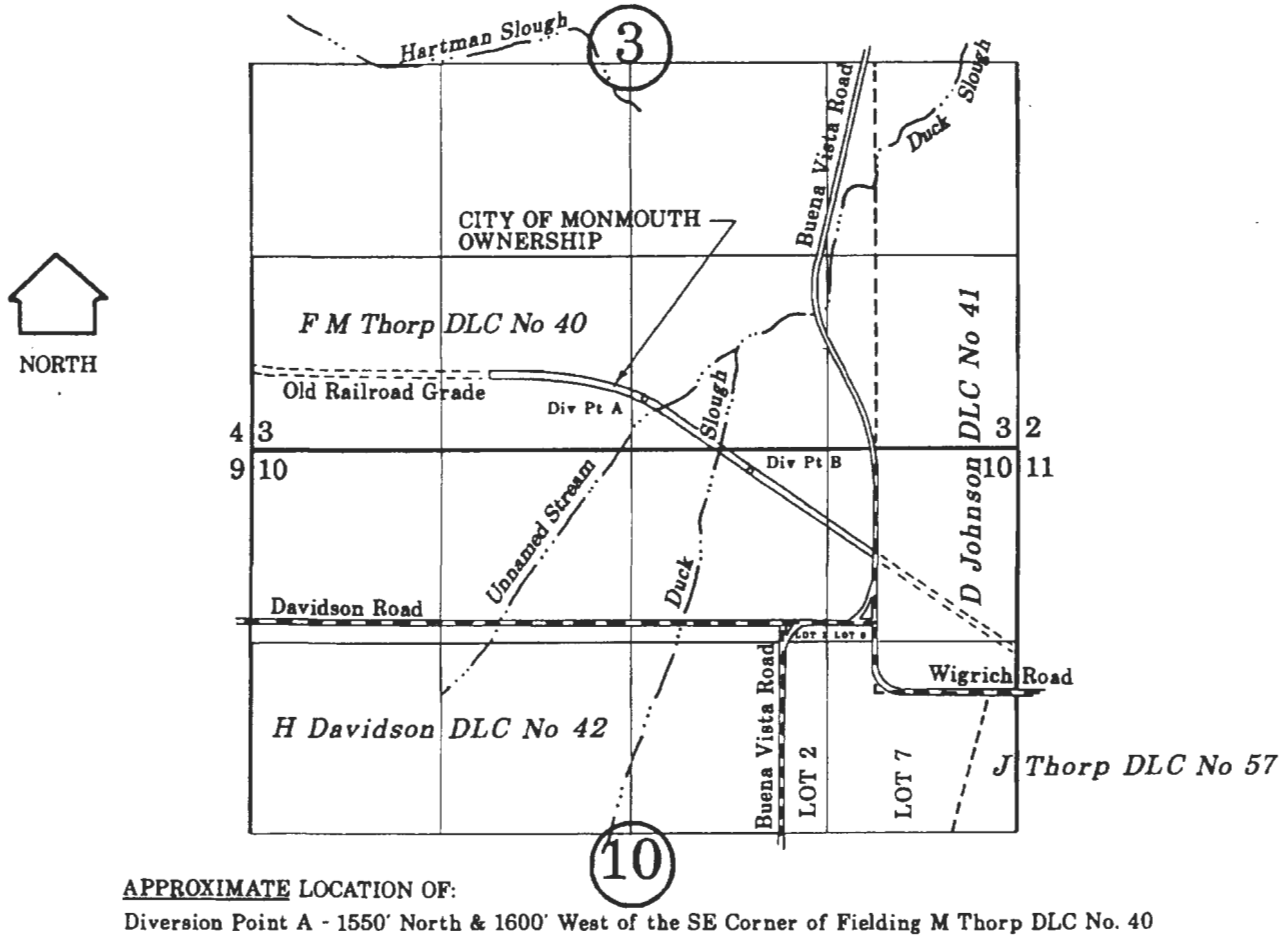
Please indicate what you will use the water for. Check all boxes that apply and fill in the blanks with key characteristics of the project

- ☐ Irrigation (crop type, golf course, nursery or greenhouse): _____
- ☐ Livestock (type of livestock, feedlot, slaughterhouse): _____
- ☐ Residential (# units, single or multi-family, # lots if partition or subdivision): _____
- ☐ Commercial (i.e., retail, office, restaurant, gas station, hotel, service, etc.): _____
- ☐ Industrial (i.e., factory, pulp mill, research and development, processing, etc.): _____
- ☐ Institutional (i.e., school, library, etc.): _____
- ☐ Mining (aggregate, metal, open pit, placer, etc.): _____
- ☐ Recreation (park, campsite, pond, etc.) _____
- ☐ Fish and Wildlife (pond, hatchery, etc.) _____
- ☐ Hydropower (dam, reservoir, power generating or transmitting facilities): _____
- ☒ Other (Name and list key characteristics): Municipal

Indicate sources for the proposed water use below:	Indicate the estimated quantity of water the use will require.
☐ Surface Water Name sources: _____ _____ _____	6 Cubic feet per second. _____ Gallons per minute. _____ Acre-Feet
☐ Reservoir or pond	
☒ Ground Water	

T 9 S, R 4 W, WM

POLK COUNTY



APPROXIMATE LOCATION OF:

Diversion Point A - 1550' North & 1600' West of the SE Corner of Fielding M Thorp DLC No. 40

Diversion Point B - 1050' North & 850' West of the SE Corner of Fielding M Thorp DLC No. 40

APPLICATION TO APPROPRIATE GROUND WATER

RECEIVED
OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

Application G13521 Permit G12976

City of Monmouth

Scale: 1" = 1320'

October 1, 1993

Certified Water Right Examiner
#208 WRE
Corbey Boatwright
May 30, 1989
STATE OF OREGON

NOTE: This map is for the purpose of identifying the location of water rights and has no intent to dimension or locate property ownership lines.

Polk
50392

RECEIVED
JUN 19 1997
WATER RESOURCES DEPT.
SALEM, OREGON

WELL I.D.# 34

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

(START CARD) # 095448

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number P-1
Name City of Monmouth
Address 151 W Main St.
City Monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 57 ft.
Explosives used ☐ Yes ☒ No Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
16	0	57	Cement	0	25	39+ bent

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from 25 ft. to 27 ft. Material 3/8 Crushed
Gravel placed from 57 ft. to 27 ft. Size of gravel P-gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	12in	+3	34	.250	☒	☐	☒	☐
	12in	44	57	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☒ Screens Type V-Slot Material Stainless Steel

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
34	44	250		12in		☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.
1000	22 ft		5 1/2
950	22 ft.		18 1/2 hr

Temperature of water 54 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Polk Latitude ____ Longitude ____
Township 9-S N or S Range 4-W E or W. WM.
Section 3 SW 1/4 SE 1/4
Tax Lot 700 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) North of Intersection of Buena Vista Rd + Davidson Rd on W-Side

(10) STATIC WATER LEVEL:
10 ft ft. below land surface. Date 6-2-97
Artesian pressure ____ lb. per square inch. Date ____

(11) WATER BEARING ZONES:
Depth at which water was first found 19

From	To	Estimated Flow Rate	SWL
19	25	Cased off	
25	45.5	950	10

(12) WELL LOG:
Ground Elevation ____

Material	From	To	SWL
Fill	0	4	
Sticky brown clay	4	19	
Fine Sand + Gray Clay	19	25	
Fine to Med Grey Sand	25	30	
Coarse water Sand	30	32	
Coarse Sand + Gravel mostly gravel	32	34	
Coarse Gravel + small amount of sand	34	45.5	
Brown Clay	45.5	48	
Red Sticky Clay	48	57	

Date started 5-13-97 Completed 6-4-97

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number 1629
Signed ____ Date 6-10-97

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 1213
Signed Floyd A Sipp Date 6-10-97

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

WaterWatch

RECEIVED
AUG 2 3 1994
WATER
SALEM, OREGON

By FAX 378-8130 and Regular Mail

August 18, 1994

Oregon Water Resources Department
Water Rights Section
158 12th Street NE
Salem, Oregon 97310

Re: Objection to Technical Report for:
G 13521, City of Monmouth, Municipal, Duck Slough, Willamette

WaterWatch submits the following objections pursuant to OAR 690-11-170:

- **The Technical Report is Defective.**

The technical report fails to contain many of the elements and evaluations required in OAR 690-11-160(1).

- **The Water Availability Analysis in the Technical Report is Defective**

The analysis is defective for the following reasons:

- There was no water availability analysis in the technical report as required under OAR 690-11.

- The water availability analysis failed to take into account existing water rights of record. Merely assuming the streamflow data reflects the amount of use or by using estimates of consumptive use fails to give adequate consideration to rights-of-record. At any given moment there may be valid, but unexercised water rights in a basin. Water users may at any time use the water which there are legally entitled to up to the limit of their rights-of-record. Failure to account for future increases in water use pursuant to rights of record results in an over-estimation of water availability and over-allocation of the resource. This is contrary to the statewide Water Allocation Policy. OAR 690-400-010.

- The water availability analysis failed to differentiate between natural flows and regulated flows (water released from upstream storage) in the Willamette River system. There are several storage facilities in the system. These facilities release stored water into the Willamette mainstem. Failure to differentiate between natural flows and regulated flows in the analyses overestimates the amount of natural flow available for use downstream and may result in the over-allocation of the resource. This is contrary to the statewide Water Allocation Policy. OAR 690-400-010. As a policy matter the Department should be differentiating between stored water and natural flow in

it's water availability analysis for new permits and in it's regulation activities on existing permits.

- The technical report acknowledged that the withdrawal will cause significant interference with the surface waters of the Duck Slough. The Department's water availability analysis for is not adequate because it fails to predict water availability for the Slough.

◆ **The Use As Proposed is Not in the Public Interest.**

The proposed use fails to pass the public interest considerations in ORS 537.525 and 537.620 and the policies of Oregon's laws calling for the protection of native and anadromous fish (ORS 496.430 et sec.) and management of storage projects for multiple purposes. ***See also***, OAR 690-11-195(3)(b), (d), (4)(a), (4)(b), (4)(c)(A), (4)(d), (4)(e), (4)(f).

1. The proposed use will deplete flows and adversely affect the streamflows and water quality needed to support numerous public instream uses of the Willamette River.

In 1964 the State Water Resources Board acknowledged the importance of using stored water to protect and enhance public uses of instream flows when it adopted several minimum perirenal streamflows which called upon stored water for flow releases. For the past 29 years the Water Resources Commission and Department have done nothing to honor the commitment it made in 1964 to the public uses of water in the Willamette.

Despite the Department's historic failure to enforce the minimum perennial streamflow rules, there has been a reaffirmation in the recent Willamette Basin Plan amendments of the following streamflow protection policies:

OAR 690-502-020(1):

(a) Protect undeveloped streams with instream values for public instream uses.

(b) Seek a balance in the future appropriation of water between instream and total out-of-stream uses on those streams already significantly developed for out-of-stream purposes.

(e) Manage stored waters which have been released for instream purposes to meet flow needs reflected in established instream water rights.

OAR 690-502-030 sets forth the following objectives:

(3) Meet public instream needs for fish life, wildlife, recreation and pollution abatement.

(4) Protect instream values in state scenic waterways . . .

The basin plan acknowledges that the operations of the federal storage projects in the Willamette Basin should be revisited in order to ensure that the reservoirs are managed for a variety of purposes including instream flows needed for public uses of water. The plan sets forth numerous goals and objectives toward this goal.

In the past six years the Commission has revisited its commitment to protect these streamflows in a variety of forums. The catalyst for many of these discussions was the directive under the 1987 Instream Water Rights Act to convert these and other minimum perennial streamflows into instream water rights. Today, six years later, no movement has been made to convert these flows. Rather it's been business as usual - the Department has continued to process applications for private out-of-stream uses natural flow and stored water.

ORS 537.170(5)(a) and (c) require the Department to ensure that waters in the basin will be used and controlled for all purposes, not just consumptive purposes. The Statewide Instream Flow Protection Policy states that "(w)here streamflows have been depleted to the point that public uses have been impaired, methods to restore the flows are to be developed and implemented." OAR 690-410-030(1). When considering applications for new water rights the agency is required to consider the needs of instream and out-of-stream uses and the need to develop streamflow restoration programs. OAR 690-410-030(2)(a). No such consideration has been done.

Establishment of these instream water rights also furthers statewide policies, priorities and goals for streamflow restoration including those in OAR 690-11-030(1), 690-410-070, and 690-77-015. Protection streamflows is also necessary in order to carry out the state policy of restoring native fish stocks. Oregon law states that "it is declared to be a goal of the people of the State of Oregon to restore native stocks of salmon and trout to their historic levels of abundance." ORS 496.435. Thus, protection of the public interest requires denial of these applications.

This is just one of the many applications coming forward for new uses in the Willamette Basin. **Every one** of these applications have priority dates **junior** to the minimum perennial stream flows that are awaiting conversions. It is bad public policy to continue to issue water rights for water in the Willamette Basin until the legal and policy issues surrounding the conversions are addressed and the minimum perennial stream flows are converted to instream water rights.

2. A public interest determination on the groundwater application is impossible because essential information appears to be missing.

The technical report contains a condition which requires a pump test prior to receiving a certificate. A pump test provides information relating to the extent the ground water use will interfere with surface waters and aquifer properties. This information is critical for the public interest determination and should be obtained prior to a final public interest determination. If, after this information is obtained, and the use is found to be in the public interest, then this proposed condition should be amended to require periodic pump tests during the life of these permits and certificate. The condition should not, however limit the Director's ability to require pump tests. We suggest language that would require pump tests "annually or as deemed needed by the Director."

3. Measurement and Reporting

In general, we support the proposed measurement and reporting conditions. However, these proposed conditions should allow the Director to require measurement and reporting of both **rate and duty** of water use. The proposed permit conditions restrict use based upon a specific rate. Measurement and reporting of water use is to be a useful informational and regulatory tool for the Department, it should provide the information needed to ensure that water use is within the terms of the permit.

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4. The proposed use is contrary to Oregon's statewide policies.

Oregon statutes and rules call for the state to "aggressively promote" water conservation and places a high priority on eliminating waste and improving the efficiency of water use. ORS 537.460(2)(a) and OAR 690-410-060(1). The proposed conditions in the technical report do little to further these policies. The Water Resources Commission has been trying to adopt conservation management plan rules for the past four years. It is unclear when or even if these rules will ever be put in place. Given the critical status of fish

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5. Long Term Water Supply Planning

Condition # 12 requires the City to, within a year of permit issuance, prepare a "plan/timetable" which will "indicate the steps which the City (sic) intends to pursue to obtain a long-term water supply." While WaterWatch supports the concept of long term water supply planning, this condition does little to further **meaningful** long term water supply planning because it is standardless. It only requires a "plan" for the "steps" that the City "intends" to pursue. This condition should require, among other things, that the City develop and implement a plan within a specified time. The condition should also include a requirement that the City consider a "no growth" alternative. Merely issuing another unlimited permit for additional use of water does nothing to protect the resource or to achieve responsible long term water supply planning.

The actions of the City are similar to actions being taken by municipal water suppliers throughout the Willamette Basin in response to increasing concerns over the ability of the water resources in the Willamette and Columbia basin to sustain existing and future economic development. The League of Oregon Cities is pursuing a request for a reservation of water for municipal uses for future economic development in the basin. In addition a coalition of water suppliers in the region have begun a regional water supply study. It is not good public policy to continue to issue new water use permits, from an already stressed resource, without an analysis of how this new use fits into the regional water supply problems. There are many water suppliers, including the Cities of Canby and Salem, that are looking to the Willamette for water. It also makes no sense to issue permits for a questionable source of water, when the City currently has an existing water supply and numerous policy issues have yet to be resolved in the basin. This application should either be denied, or a decision on the permit should be delayed until the regional supply study is completed and there is resolution of the policy issues in the basin.

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Several segments of the Willamette River are identified by the Oregon Department of Environmental Quality (DEQ) as "Water Quality Limited" year round and cannot support the listed beneficial uses of aquatic life and water contact. Several other segments can only partially support beneficial uses of aesthetics, aquatic life, and water contact.

Further depletion of surface water flow will only exacerbate these existing water quality problems in the river system. In addition, the proposed use itself, municipal use, may add yet another source of pollution to the Willamette system, creating the possibility of even further degradation of water quality.

DEQ has requested that the Department not issue any new water rights on this and other water quality limited receiving streams. See Letter to WRD Director Bill Young, from DEQ Director Fred Hansen, 6/21/91. The Department has a duty to subject this application to review to ensure that public values are protected. OAR 690-410-070(2). See also Instream Flow Protection Policy OAR 690-410-030.

When evaluating applications for new uses, the Department has a duty to ensure that the use will not harm either the quantity or the quality of surface waters. The governing statutory and regulatory schemes make this self evident. See e.g. ORS 537.170(5)(a)&(c). Other statutory mandates amplify this requirement. ORS 468B.015 specifies that pollution of the water of the state of Oregon:

> constitutes a menace to public health and welfare, creates public nuisances, is harmful to wildlife, fish and aquatic life and impairs domestic, agriculture, industrial, recreational, and other legitimate beneficial uses of water, ***.

It is the public policy of the state:

> To protect, maintain, and improve the quality of the waters of the state *** (and) [t]o provide for the prevention, abatement and control of new or existing water pollution. ORS 468B.015(2), (4).

ORS 468B.020 declares that:

> Pollution of any of the waters of the state is declared to be not a reasonable or natural use of such waters and to be contrary of the public policy in the state of Oregon.

The statutes and rules under which the Water Resources Commission and Department operate mandate that the agency act in a fashion consistent with ORS 468B.015 et seq. See e.g. ORS 536.220(1)(b) (requiring coordinated integrated state water resources policy). See also ORS 536.220(2)(a) (requiring "proper and adequate consideration of the multiple aspects of the beneficial use and control" of Oregon's waters); ORS 537.332(4)(c) (pollution abatement is a beneficial use of water); OAR 690-11-010(3) (defining beneficial use as use that is "consistent with" the laws, rules, and the best interests of the people of the state);

OAR 537.170(4)(a) & (c). In addition, the groundwater act calls for prevention of the impairment of ground water by pollution. ORS 537.525(8). Thus, the public interest determination made by the Commission and Department must include an evaluation of the effects of these proposed uses on the water quality of the rivers and ground water. See also OAR 690-11-195(4)(c).

This proposed use will interfere with surface water flows, impairing the public's interest in maintaining sufficient streamflows to abate pollution in the Willamette River. See ORS 537.170(5)(a), (b), (c) and (g) and OAR 690-11-195(3), (4)(a)(D), (c)(A) (d), & (f). These streamflows are needed to protect water quality for fish and wildlife, human use such as fishing and swimming, and for existing and future economic development in the Willamette River basin. In addition, the because the proposed use is municipal use, wastes will be generated which will likely result in a discharge of pollutants through municipal effluent treatment plant. The technical report does not reveal where in the Willamette the City's effluent is (or will be) discharged, whether the City has a permit to discharge or whether the City's proposed use will comply with state water quality standards. Until DEQ has made a determination regarding the effect this proposed use on the water quality of the Willamette River, the Department has insufficient information upon which to make a public interest determination. If the applicant has or obtains a NPDES and if a water use permit it subsequently issued, the permit should be conditioned to require that water use under the permit is only allowed if the applicant continues to maintain a valid NPDES permit and is in compliance with the terms of the NPDES permit.

7. Protection of Groundwater

The use is likely to impair the public interest because the proposed condition #13 appears to be a standard condition and is not specifically geared to protect this resource. The condition requires the permit holder to stop use if the well "displays a total static water-level decline of 25 or more feet." What is the aquifer depth in this situation? As we understand it, this is a standard condition. This condition will not protect the resource if the aquifer depth is, for example, 20 feet. If this is the case, this condition would allow the permittee to pump the aquifer dry before they would be required to stop. The aquifer depth must be determined in order to determine the level of "tolerable" static water level decline. If the aquifer depth is unknown at this time - then there should be a permit condition requiring the permittee to conduct tests to determine the aquifer depth - **prior** to beginning use.

Sincerely,

Karen Russell

Karen A. Russell
Assistant Director

DESCRIPTION	VENDOR'S NUMBER	PURCHASE ORDER NO.	INVOICE NUMBER	AMOUNT
Goundwater permit application				$550.00****

STATE OF OREGON
WATER RESOURCES DEPARTMENT
3850 PORTLAND ROAD NE
SALEM, OR 97310
378-8455/378-8130 (FAX)

RECEIPT # **105331**

G

RECEIVED FROM: City of Monmouth
BY:

APPLICATION	13521
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☒ 24-22 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $ 550.00

01-00-0 WRD MISC CASH ACCT

842.010	ADJUDICATIONS		$
831.087	PUBLICATIONS/MAPS		$
830.650	PARKING FEES Name/month		$
_____	OTHER: (IDENTIFY)		$

RECEIVED OVER THE COUNTER

REDUCTION OF EXPENSE

CASH ACCT. $

COST CENTER AND OBJECT CLASS VOUCHER #

03-00-0 WRD OPERATING ACCT

MISCELLANEOUS:

840.001	COPY FEES		$
850.200	RESEARCH FEES		$
880.109	MISC REVENUE: (IDENTIFY)		$
520.000	OTHER (P-6) (IDENTIFY)		$

WATER RIGHTS:

		EXAM FEE		RECORD FEE
842.001	SURFACE WATER	$	842.002	$
842.003	GROUND WATER	$ 300.00	842.004	$ 350.00
842.005	TRANSFER	$	842.006	$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**
842.022	WELL DRILL CONSTRUCTOR	$	842.023	$
	LANDOWNER'S PERMIT		842.024	$
_____	OTHER (IDENTIFY)			

06-00-0 WELL CONST START FEE

842.013	WELL CONST START FEE	$	CARD #	
	MONITORING WELLS	$	CARD #	

45-00-0 LOTTERY PROCEEDS

864.000	LOTTERY PROCEEDS	$

07-00-0 HYDRO ACTIVITY

		LIC NUMBER	
842.011	POWER LICENSE FEE(FW/WRD)		$
842.115	HYDRO LICENSE FEE(FW/WRD)		$
_____	HYDRO APPLICATION		$

RECEIPT # **105331** DATED: 10-1-93 BY: DRiesbeck

Distribution—White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

WaterWatch

By FAX 378-8130 and Regular Mail

August 18, 1994

Oregon Water Resources Department
Water Rights Section
158 12th Street NE
Salem, Oregon 97310

Re: Objection to Technical Report for:
G 13521, City of Monmouth, Municipal, Duck Slough, Willamette

WaterWatch submits the following objections pursuant to OAR 690-11-170:

- **The Technical Report is Defective.**

The technical report fails to contain many of the elements and evaluations required in OAR 690-11-160(1).

- **The Water Availability Analysis in the Technical Report is Defective**

The analysis is defective for the following reasons:

- There was no water availability analysis in the technical report as required under OAR 690-11.

- The water availability analysis failed to take into account existing water rights of record. Merely assuming the streamflow data reflects the amount of use or by using estimates of consumptive use fails to give adequate consideration to rights-of-record. At any given moment there may be valid, but unexercised water rights in a basin. Water users may at any time use the water which there are legally entitled to up to the limit of their rights-of-record. Failure to account for future increases in water use pursuant to rights of record results in an over-estimation of water availability and over-allocation of the resource. This is contrary to the statewide Water Allocation Policy. OAR 690-400-010.

- The water availability analysis failed to differentiate between natural flows and regulated flows (water released from upstream storage) in the Willamette River system. There are several storage facilities in the system. These facilities release stored water into the Willamette mainstem. Failure to differentiate between natural flows and regulated flows in the analyses overestimates the amount of natural flow available for use downstream and may result in the over-allocation of the resource. This is contrary to the statewide Water Allocation Policy. OAR 690-400-010. As a policy matter the Department should be differentiating between stored water and natural flow in

it's water availability analysis for new permits and in it's regulation activities on existing permits.

- The technical report acknowledged that the withdrawal will cause significant interference with the surface waters of the Duck Slough. The Department's water availability analysis for is not adequate because it fails to predict water availability for the Slough.

- **The Use As Proposed is Not in the Public Interest.**

The proposed use fails to pass the public interest considerations in ORS 537.525 and 537.620 and the policies of Oregon's laws calling for the protection of native and anadromous fish (ORS 496.430 et sec.) and management of storage projects for multiple purposes. ***See also***, OAR 690-11-195(3)(b), (d), (4)(a), (4)(b), (4)(c)(A), (4)(d), (4)(e), (4)(f).

1. **The proposed use will deplete flows and adversely affect the streamflows and water quality needed to support numerous public instream uses of the Willamette River.**

In 1964 the State Water Resources Board acknowledged the importance of using stored water to protect and enhance public uses of instream flows when it adopted several minimum perirenal streamflows which called upon stored water for flow releases. For the past 29 years the Water Resources Commission and Department have done nothing to honor the commitment it made in 1964 to the public uses of water in the Willamette.

Despite the Department's historic failure to enforce the minimum perennial streamflow rules, there has been a reaffirmation in the recent Willamette Basin Plan amendments of the following streamflow protection policies:

OAR 690-502-020(1):

(a) Protect undeveloped streams with instream values for public instream uses.

(b) Seek a balance in the future appropriation of water between instream and total out-of-stream uses on those streams already significantly developed for out-of-stream purposes.

(e) Manage stored waters which have been released for instream purposes to meet flow needs reflected in established instream water rights.

OAR 690-502-030 sets forth the following objectives:

(3) Meet public instream needs for fish life, wildlife, recreation and pollution abatement.

(4) Protect instream values in state scenic waterways . . .

The basin plan acknowledges that the operations of the federal storage projects in the Willamette Basin should be revisited in order to ensure that the reservoirs are managed for a variety of purposes including instream flows needed for public uses of water. The plan sets forth numerous goals and objectives toward this goal.

In the past six years the Commission has revisited its commitment to protect these streamflows in a variety of forums. The catalyst for many of these discussions was the directive under the 1987 Instream Water Rights Act to convert these and other minimum perennial streamflows into instream water rights. Today, six years later, no movement has been made to convert these flows. Rather it's been business as usual - the Department has continued to process applications for private out-of-stream uses natural flow and stored water.

ORS 537.170(5)(a) and (c) require the Department to ensure that waters in the basin will be used and controlled for all purposes, not just consumptive purposes. The Statewide Instream Flow Protection Policy states that "(w)here streamflows have been depleted to the point that public uses have been impaired, methods to restore the flows are to be developed and implemented." OAR 690-410-030(1). When considering applications for new water rights the agency is required to consider the needs of instream and out-of-stream uses and the need to develop streamflow restoration programs. OAR 690-410-030(2)(a). No such consideration has been done.

Establishment of these instream water rights also furthers statewide policies, priorities and goals for streamflow restoration including those in OAR 690-11-030(1), 690-410-070, and 690-77-015. Protection streamflows is also necessary in order to carry out the state policy of restoring native fish stocks. Oregon law states that "it is declared to be a goal of the people of the State of Oregon to restore native stocks of salmon and trout to their historic levels of abundance." ORS 496.435. Thus, protection of the public interest requires denial of these applications.

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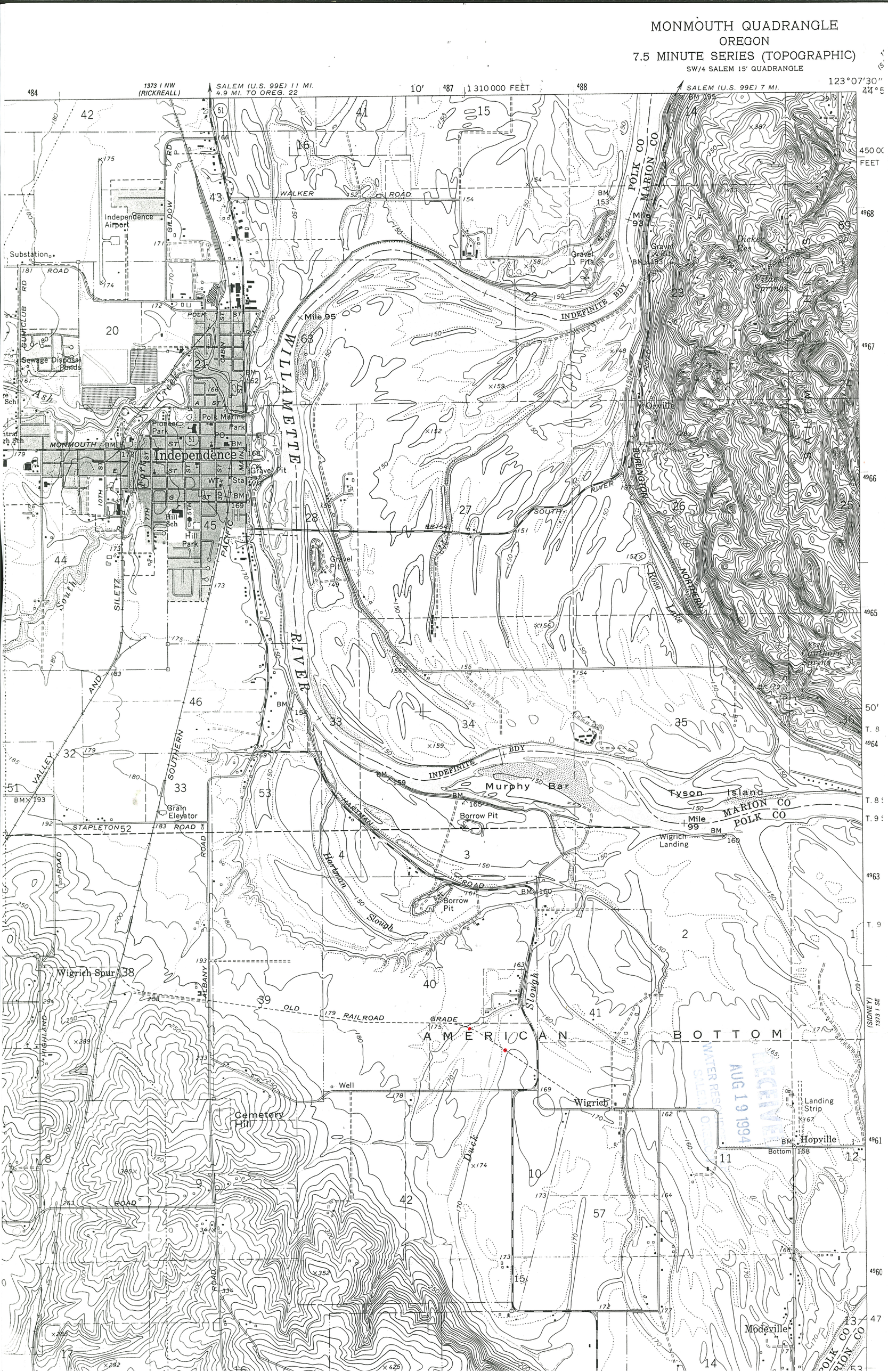
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Sincerely,

Karen Russell

Karen A. Russell
Assistant Director


MONMOUTH QUADRANGLE
OREGON
7.5 MINUTE SERIES (TOPOGRAPHIC)
SW/4 SALEM 15' QUADRANGLE
123°07'30"
44°5
1373 I NW (RICKREALL)
SALEM (U.S. 99E) 11 MI. 4.9 MI. TO OREG. 22
10'
1 310 000 FEET
SALEM (U.S. 99E) 7 MI.
Independence Airport
Substation
Sewage Disposal Ponds
Pioneer Park
Polk Marine Park
MONMOUTH
Independence
Hill Sch
Hill Park
Gravel Pit
WILLAMETTE RIVER
SOUTH YAMHILL RIVER
INDEFINITE BDY
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Mile 93
Mile 99
POLK CO
MARION CO
Orville
Bridgeton
Dicken Res
Fitts Springs
Rose Lake
Northern
Murphy Bar
Tyson Island
Wigrich Landing
Borrow Pit
Grain Elevator
Wigrich Spur
Cemetery Hill
Well
Wigrich
Landing Strip
Hopville
Bottom 158
Modeville
AMERICAN BOTTOM
OLD RAILROAD GRADE
Harriman Slough
Duck Slough
SOUTHERN PACIFIC
ALBANY AND VALLEY
SILETZ
WALKER ROAD
STAPLETON ROAD
GUN CLUB RD
HIGHLAND ROAD
ALBANY ROAD
BM 153
BM 193
BM 159
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BM 152
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Borrow Pit
Well
Landing Strip
Hopville
Bottom 158
Modeville
Cemetery Hill
Wigrich Spur
Wigrich
Wigrich Landing
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Tyson Island
Rose Lake
Fitts Springs
Dicken Res
Orville
Bridgeton
Independence
MONMOUTH
Ash Creek
Duck Slough
Harriman Slough
SOUTH YAMHILL RIVER
WILLAMETTE RIVER
INDEFINITE BDY
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RECEIVED
AUG 19 1994
WATER RESOURCES DEPARTMENT
SALEM, OREGON

151 West Main Street
Monmouth, Oregon 97361-2199
(503) 838-0722

CITY OF MONMOUTH

Promoting pride, progress, and friendly hometown values.

August 19, 1994

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT
SALEM, OREGON

Oregon Water Resources Department
158 12th St N.E.
Salem, Oregon 97310

SUBJECT: WATER USE PERMIT APPLICATION OBJECTIONS
Reference G-13521

The City of Monmouth has made an application for a water use permit to develop municipal wells on property located south of Independence. The purpose of this letter is to comment on the Water Resource Department's technical review of our application.

Also commenting on the City of Monmouth's behalf will be project consultant, Martin Boatwright. Our consultants letter will provide the technical details further supporting the comments contained herein.

The WRD Technical Review findings indicate that the proposed wells are located in Duck Slough, a tributary to the Willamette River. We feel that this judgement is incorrect. The proposed wells are located along the old Willamette River channel. The choice of locations was to develop a well in the gravel deposited by the Willamette River. The well property is located just outside the Willamette River Floodway in an area which is expected to be inundated during a major flood event. Care will be necessary to see that the well is constructed above the expected flood water elevation.

For some purposes, a tributary could be defined as beginning at the point of confluence with the major water body. But in this case where we are dealing with the hydraulics rather than topography, the point of beginning is better defined as the point where the hydraulic effects begin to separate and the Tributary's influence becomes predominant. This would certainly be further from the Willamette River than along the Floodway. Geologic evidence indicates that our proposed site was once in the river channel.

We also disagree with the WRD Technical Review findings that the proposed wells will have a discernable influence on surface water in the area. The gravels we are proposing to construct our wells in are separated from the surface waters by a layer of impervious material.

Please review the supporting technical information we are providing and adjust the report findings accordingly.

Should you need more information or wish to discuss these issues further please don't hesitate to give me a call at 838-2173.

SINCERELY,

Gary A. Wilson

Gary A. Wilson, P.E.
Public Works Director/Engineer

cc: Stan Kenyon, City Manager

RECEIVED
AUG 19 1994
WATER RESOURCES DEPT
SALEM, OREGON

Doug
Look this over for your comments, and give me a call.

PHONE CON. W/ RALPH CHRISTENSEN
- NO INFO PROVIDED TO REBUT HYDRAULIC CONNECTION (W.L. ~ 10 ft BLS BUT SEASONAL FLUCTUATION IS 10 ft OR MORE. HE AGREES ON HYD. CONNECTION BUT SAYS THE SLOUGH IS DRY IN AUGUST (WHEN THEY WANT TO USE THE WATER). I SUGGESTED HE GATHER SOME EVIDENCE AND TALK TO THE WATER RIGHTS FOLKS.
Dave Woodcock
5-5-95

April 15, 1995

Mr. Steve Brown
Manager Water Rights Section
Water Resources Department
Commerce Building
158 12th Street NE
Salem, Oregon 97310-0210

RE: G-13521, Substantial interference with Duck Slough

Dear Mr. Brown:

I have been retained by the City of Monmouth to review their water right application G-13521. This application was given a satisfactory technical review for 6.0 cfs for municipal use, but as part of the conditions to the permit, water withdrawal could only occur from September 1 through June 30. This condition was based upon OAR 690-09-040 which defines substantial interference, and the Willamette Basin Program OAR 690-502-050 (1) which defines which waters of the Willamette Basin are open for appropriation. The main stem of the Willamette River is open for municipal uses, while tributary streams are closed for municipal uses from June 30 to September 1. Thus for a well that "substantially interferes" with a tributary during this period it is precluded from using water during that period, while wells that "substantially interfere" with the main stem of the Willamette are not.

This proposed well field location has Duck Slough crossing it. However, Duck Slough is shown on the USGS Monmouth Quad sheet as being an intermittent stream. Visual evidence of the stream also indicates that this stream does not flow year round. Anecdotal evidence from people familiar with the area indicate that the stream does not flow during the summer months. A review of the water rights for the area shows that no surface water rights holders use Duck Slough as their source.

A review of the well logs for the area show that the water table is averages about 14 feet below ground surface with the high water level 6 feet below ground surface. This strongly implies that when Duck Slough is flowing the water is surface water flowing across a poorly permeable surface. A further

examination of the well logs indicates that the first 14 to 30 feet is clay/silts. That these clay/silts are sufficiently poorly permeable to preclude easy transmission of water from the surface down to the sand and gravel aquifers below can be seen from the head difference between the surface elevation of the stream bed and the static water levels in the aquifer below. The low topography of the area makes this comparison easy, and clearly shows that the water table head is several feet to nearly 10 feet blow the level of the corresponding stream bed above it. Thus the aquifer cannot be intimately connected to the stream and therefore cannot cause substantial interference with Duck Slough.

The fact that Duck Slough does not regularly flow water during the critical months in question only adds weight to the argument. Given the distance from the Willamette River, and the fact that the elevation of the aquifer at this point is approximately 10 feet above the Willamette River, we would argue that this well field will not substantially interfere with the Willamette River main stem as that is currently defined and administered under OAR 690-09-040.

Sincerely,

Ralph Christensen RG
Principal Geologist

Oregon

WATER
RESOURCES
DEPARTMENT

June 7, 1994

CITY OF MONMOUTH
151 W MAIN ST
MONMOUTH, OR 97361

Reference: File G-13521

This letter informs you of the current status of your application for a water use permit and accompanies the Satisfactory Report of Technical Review For Water Use Permit(s). We apologize for the delay in transmitting this information and Report to you and for any inconvenience the wait may have caused you.

The enclosed Report of Technical Review is the Department's summary of a specialized analysis of various legal and scientific aspects of your application and proposed water use. We are required by the state of Oregon's administrative rules (in OAR 690-11-160) to conduct this official technical review of each application submitted to the Oregon Water Resources Department for a water use permit. This process was designed to insure that your application receives a fair evaluation and to secure protection of existing water rights and of the public at large.

AS THE RESULT OF OUR TECHNICAL EVALUATION, WE HAVE DETERMINED THAT YOUR APPLICATION SATISFIES THE REQUIREMENTS OF THE TECHNICAL REVIEW.

The Department will now move your application to the next phase of processing. This phase includes a public interest review of your proposed water use. No final action may be taken on your application until the public interest review is completed.

You should also note that the Report of Technical Review describes conditions currently anticipated which may limit the water use proposed in your application.

If you wish to object to any of the analyses contained in the Report, you must submit your objection to the Department in writing within 60 days of the date of mailing of this Report or by the date specified below. Your objection must allege that the technical review is defective and you may also submit evidence which demonstrates that your proposed water use will not impair or be detrimental to the public interest.

Copies of the Report of Technical Review will be distributed to all persons who have filed comments or otherwise expressed an interest in the water use proposed in your application. Interested parties must also submit their objections within the prescribed objection period. Those objections must allege that the technical review is defective and/or that the proposed water use may impair or be detrimental to the public interest.

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

If an objection contains allegations that the technical review is defective, it must be accompanied by facts which support such allegations. If an objection contains allegations that the proposed water use may impair or be detrimental to the public interest, the objection must specify the particular public interest standards which apply as set out in Oregon Revised Statutes (ORS 537.170(5)) and Oregon Administrative Rules (OAR 690-11-195) and state facts showing how such standards would be violated.

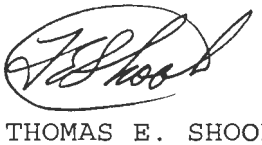
All evidence and objections must be received by our Salem office **no later than 5:00 p.m. on or before AUGUST 19, 1994** or the Department may presume there is no opposition to any of the analyses set out in the technical review report. Evidence and objections must be addressed and delivered to: Oregon Water Resources Department, Water Rights Section, 158 12th Street Northeast, Salem, Oregon 97310.

If objections and evidence are submitted on or before the above time and date, the Director of the Water Resources Department will evaluate each issue raised in the objections and either accept or deny them. Objectors are encouraged to indicate whether they would be interested in resolving their concerns through alternative dispute resolution.

If any of the objections are denied, the objector will be allowed thirty days to submit a protest to the denial. The protest must meet the standards set forth in OAR 690-02-030 through 080.

If you have any questions, please feel free to telephone me or any of the Department's Water Rights Section staff. My telephone number is 378-3739, in Salem, or you may call toll free from within the state to 1-800-624-3199.

Sincerely,



THOMAS E. SHOOK
WATER RIGHT SPECIALIST

Enclosures

Report Date: June 7, 1994

OREGON WATER RESOURCES DEPARTMENT

SATISFACTORY REPORT OF TECHNICAL REVIEW

FOR WATER USE PERMIT(S)

OBJECTIONS TO THE PROPOSED WATER USE AS DESCRIBED BELOW MUST BE RECEIVED IN WRITING BY THE OREGON WATER RESOURCES DEPARTMENT, 158 12th ST N.E., SALEM, OREGON 97310, BY 5 P.M. ON OR BEFORE: AUGUST 19, 1994.

1. APPLICATION FILE NUMBER - G-13521

2. MINIMUM APPLICATION INFORMATION

Applicant name/address/county/phone:

CITY OF MONMOUTH
151 W MAIN ST
MONMOUTH, OR 97361
POLK COUNTY 503-838-0722

Date application received for filing and/or tentative date of priority: 10/1/93

SOURCE: TWO WELLS TRIBUTARY TO: DUCK SLOUGH

Purpose and/or use: MUNICIPAL

Flow: 6 CUBIC FEET PER SECOND (CFS)

Point of Diversion Location:
T 9 S, R 4 W, W.M.; SECTION 3, SWSE; SECTION 10, NWNE

Place of use:
CITY OF MONMOUTH SERVICE AREA

GROUNDWATER AVAILABILITY

This is an application for use of groundwater. The Groundwater/Hydrology Section report indicates that:

Pursuant to OAR 690-09-040, the proposed groundwater withdrawal will have the potential to cause substantial interference with surface water.

In addition, the Groundwater/Hydrology Section has reported that the groundwater for the proposed use can, if properly conditioned. avoid injury to existing rights or to the groundwater resource.

SURFACE WATER AVAILABILITY

Water is likely available in excess of needs for all existing rights 80% of the time during each monthly period proposed by the technical review.

Water availability tables are available in the application file and may be reviewed in the office of the Water Resources Department in Salem.

CONFLICTS WITH OTHER WATER RIGHTS:

There are no existing rights from this point of diversion.

There are existing water rights appurtenant to the lands described in the application. See proposed permit conditions.

REPORT CONCLUSIONS:

Based on the Department's review of water availability and Oregon Administrative Rules, water in the amount of 6 CFS is likely available for 10 months.

The evaluation of your application takes into consideration water quality concerns that have been identified by the Oregon Department of Environmental Quality (DEQ).

Tributaries of the Main Stem Willamette River Subbasin of The Willamette Basin Program are classified for, among other uses, municipal purposes between September 1 and June 30.

Therefore, the Director finds that water is available in sufficient amount and during periods which will reasonably support the proposed use.

THE PROPOSED WATER USE, AS CONDITIONED, SATISFIES THE REQUIREMENTS OF THIS TECHNICAL REVIEW.

This Report of Technical Review sets out the Director's technical analysis of the application. In addition to this technical analysis, the Director will evaluate this application to determine whether the proposed water use might impair or be detrimental to the public interest under the standards set out in ORS 537.170(5) and OAR 690-11-195. Matters relating to public interest in the proposed water use which are raised in objections will be evaluated following the 60-day objection period.

PROPOSED PERMIT CONDITIONS

Application: G-13521

The following conditions will apply to water use under the permit, and will appear in the permit, if issued.

1. Use of water under this permit is subject to all prior rights.

2. Period of allowed use: SEPTEMBER 1 THROUGH JUNE 30

3. Rate of use: 6 CFS

4. Water use development requirements:

   A. Begin construction by (one year from issuance of permit).

   B. Complete construction by October 1, 1996.

   C. Completely apply the water to beneficial use by October 1, 1997.

5. Measurement, recording and reporting conditions:

   A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.

   B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

6. Failure to comply with any of the provisions of the permit may result in action including, but not limited to, restrictions on the use, penalties, or cancellation of the permit.

7. The permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

8. The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

9. The well shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times. The use of water shall be limited when it interferes with any prior surface or ground water rights.

10. Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

11. This right is limited to any deficiency in the available supply of any prior right existing for the same land.

12. Within one year from the date the Water Resources Commission adopts rules describing the schedules, standards and procedures for water conservation management plans by water suppliers, the city shall submit a plan which is consistent with said rules.

    Within one year of permit issuance, the city shall prepare a plan/timetable for the Water Resources Commission which shall indicate the steps which the City intends to pursue to obtain a long-term water supply.

13. The CITY shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the CITY shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the CITY'S or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The CITY shall in no instance allow excessive decline to occur within the aquifer as a result of use under this permit.

The "satisfactory" TR for the city of Monmouth application G-13521 allowed the use of 6 CFS of water from two wells September 1 through June 30. It was hydraulically connected to Duck Slough, a tributary of Willamette river, and therefore the basin plan did not allow municipal use July and August.

Ralph Christensen prepared a letter for the city claiming that the well was actually not connected to Duck Slough but directly to the Willamette and therefore should be allowed year round according to the basin plan. He also said even if it was connected to Duck Slough it should be allowed year round anyhow because the locals say Duck Slough is dry in July and August. Doug Woodcock read the letter from Ralph and maintained his initial determination of connection to Duck Slough; And it seemed ridiculous to me to allow the use of water except when Duck Slough was flowing in July and August.

I talked to Corbey Boatwright by phone approximately Friday, May 17, and Jeanne Boatwright in person on May 21, 1996. I suggested to each of them that transferring some of the City's existing surface water rights (which at this time are not being used because of the expense associated with testing and filtering requirements) to hydraulically connected wells might be a more viable option.

To: tmppdx@europa.com
From: Russell W Klassen <Russell.W.KLASSEN@wrd.state.or.us>
Subject: city of Monmouth publication
Cc: Russ Klassen
Bcc:
X-Attachments:

TMP Worldwide Public Notice Advertising Request

tmppdx@europa.com

Requestor: Russ Klassen
Fiscal Contact: Marie Licari
Telephone Number: (503) 378-8455 ext. 266 Fax: 378-6203
Department: Water Resources
Division: Water Rights

Billing Information File# G-13521 WRD receipt# 000360

Special Instructions: Run ad once per week for three consecutive weeks

Publication Information:

Publication: Itemizer-Observer Run date: Next Available

Keyword:

Type of Ad: Individual Ad

Copy:
STATE OF OREGON
WATER RESOURCES DEPARTMENT
PUBLIC NOTICE OF WATER USE REQUESTS
Regarding Application: G-13521

The Oregon Water Resources Department is evaluating the request by City of Monmouth to use 2690 gallons per minute of the waters of 2 Wells for municipal purposes. The proposed place of use is located within Polk County, Township 8 South, Range 4 & 5 West, W.M. This process is to determine if the request is in compliance with state water laws and regulations. Public participation and comment is encouraged.

ORS 537.130 (3) requires notice to all affected landowners and ORS 537.130 (4) allows the Department to make this notice through publication in a local newspaper if there are more than 25 landowners involved.

For further information contact the Water Resources Department Water Rights Information Group at 1 (800) 624_3199 ext. 499. Written requests may be addressed to the Oregon Water Resources Department at 158 12th St NE Salem, Oregon 97310-0210

PFO MUNI & Q-MUNI CHECKLIST

Application #: G 13521 Vol 24 Subbasin Willamette Riv S/2 & Misc

Basin: 2 WAB: 01053

Township 9S Range 4W Section 3,10 1/4 1/4 SW SE, NW NE

1. Completeness checklist verified? (Y) / N
   a. Form M Y / N Proj population 14,700 Proj peak flow 4.1 MGD (12.7 CFS) EXISTING 18.59 CFS
   b. $ for public notice (Y) / N
2. Indicators that the process should not continue (ie - protest, items missing, letter to file indicating hold, other) Y / (N)
3. Groundwater review (A) B C D
   a. Is second groundwater review necessary? (Y) / N reason OBJECTIONS TO CONNECTION
   b. Is the well located in a groundwater limited area? Y / (N)
4. SWW Y / (N) Triage Y / (N) conditions/restrictions Y / N
5. Basin Program limitations? (Y) / N * 690 502 050 (1)(e) ALLOW 9/1 - 6/30 ONLY
6. Withdrawn? Y / (N) season allowed
7. Basin Maps have been checked. (Y) / N The River Mile is TRIB NF Rm 98
8. Water Availability (50% < July 17, 1992 OR 80% [50% storage] > July 17, 1992) NA Yr Rnd
   a. Notify Ken Stahr Y / N (Q, Duty, or Season)
9. Rate/Duty/Season 6 CFS
10. Use MUNI Period of Allowed Use ~~9/1 - 6/30~~ * Yr Rnd
11. Priority Date(s) 10/1/93 TR / IR mail date
12. B.O.R. project Y / (N) contract #
13. TMDL Basin? Y / (N) (Tualatin, Yamhill, Pudding) DIVISION 33 Y / (N) (Abv Bonn >July 17,92 //// Blw Bonn >April 18,94 or June 3,94)
14. Objections? Y / N CITY WW PFO different from IR/TR Y / N
15. Conditions (from IR/TR/ or Additional) (Y) / N (macro series 4 - 7) ** 7A NO FLOW 7B
    a. Conplan Y / N
16. Land use approval (OK'd) needs approval county notified NA
17. SIZE Small (≤0.1cfs, ≤9.2AF), Medium (>0.1 or <1.5cfs, >9.2 or <100AF) (Large (≥1.5 cfs, ≥100 AF)?
18. Watermaster Dist: (1 2 (16) 18 - (NWR)) (3 4 5 - NCR) (6 8 9 10 - ER) (11 12 17 - SCR) (14 15 19 - SWR)

#'s of deficiencies above 3 9

** CONDITION W/ 9 IF DUCK SLOUGH IS DRY JULY - AUGUST 31

* DAVE J MEMO SAY CRK IS INTERMITTANT

C BOATWRIGHT # 208

WELL A - 1550 FT N & 1600 FT W } OF SE CORNER SW SE 3

WELL B - 1050 FT N & 850 FT W } DLC 40 NW NE 10

Name: RWK Date: 5/16/96 save to m:\t\pfo\done\week#\app#.w51

Application No. G13521

RECEIVED
OCT 01 1993
WATER RESOURCES DEPT
SALEM, OREGON

State of Oregon
WATER RESOURCES DEPARTMENT

Application for a Permit to Appropriate Ground Water

Applicant(s) City of Monmouth
(Please print or type - use dark ink)

Mailing Address: 151 W Main Street

Monmouth (City) Oregon (State) 97361 (Zip) 838-0722 (Daytime Phone No.)

I (We) make application for a permit to appropriate the following described ground waters of the State of Oregon:

1. ***THE DEVELOPMENT*** *(number of wells, tile lines, infiltration galleries, etc.):* two wells

If development is less than one mile from a natural stream, give the following:

Distance from development to stream: 100' and 300' from Duck Slough trib. to Willamette R.

Elevation difference between streambed and development: 5'

NOTE: Wells must be constructed according to standards set by the department for the construction and maintenance of water wells. If the well is already constructed, please enclose a copy of the well driller's log with this application, and skip to Section 2 below.

Diameter of well: 12" *Depth in feet:* 80' +/-

Type and size of well casing: 12" dia steet 1/4" thick *No. of feet:*

Estimated depth to water:

Type of access port or measuring device:

Wells to be drilled by: All to be determined at time of construction.

Address:

If the water well is flowing artesian, describe your water control and conservation works:

2. ***TOTAL AMOUNT OF WATER*** *to be applied to beneficial use:* 6 *cubic feet per second,* ***OR*** *gallons per minute. If water is to be used from more than one ground water source, give the quantity of water from each:*

3. ***INTENDED USE(s) OF WATER:*** municipal

If for more than one use, give the quantity of water from each source for each use; _____

*If for **DOMESTIC** use, state the number of households to be supplied;* _____

*If for **MUNICIPAL OR QUASI-MUNICIPAL** use, state the present population to be served, and an estimate of the future requirements; (List population projections, water needs, anticipated areas to be provided water.)*

present population = 6635

2025 projected population = 13,000 +/-

*If for **MINING** use, state the nature (gold, silver, etc.) of the mines to be served;* _____

*If for **IRRIGATION,** or other land area use, state the TOTAL number of acres to be developed under each use;*

Irrigation _____

Other (describe) _____

4. ***DESCRIPTION OF WATER DELIVERY SYSTEM:*** *Include dimensions and type of construction of diversion works, length and dimensions of supply ditches or pipelines, size and type of pump and motor. If for irrigation, describe the type of system (i.e., flood, wheel line, hand line, drip, other).*

10" - 12" transmission line, cross country to intertie to existing municipal system

5. ***PROJECT SCHEDULE:*** *(List month and year)*

Proposed date construction work will begin permit date + 1 year

Proposed date construction work will be completed permit date + 10 years

Proposed date water use will be completed permit date + 10 years

NOTE: A map prepared by a Certified Water Right Examiner (CWRE) and a complete legal description of the subject property are required under ORS 537.140 and OAR 690 as a part of your application. The legal description may be copied from your deed, title insurance policy, or land sales contract.

6. a) *In the event any deficiencies are noted involving the application map enclosed herein, please return the map with instructions for correction to (check one):*

_____ *Applicant* __x__ *CWRE* _____ *Other (Identify in REMARKS section)*

b) *In the event any deficiencies are noted involving the application, please return the application with instructions for correction to (check one):*

_____ *Applicant* __x__ *CWRE* _____ *Other (Identify in REMARKS section)*

7. *Are all lands involved (including the proposed diversion site, place of use, and access for conveying the water) under your ownership?* yes *. If not, list in the REMARKS section below, or on an attached sheet, the names and mailing addresses of the legal owners of all property involved in the proposed development.*

NOTE: Prior to receiving a certificate of water right, the permit holder must submit to the Water Resources Department the results of a pump test meeting the department's standards. The Director will require water level or pump test results every ten years thereafter.

REMARKS: _____

I/We certify that the information I have provided in this application is an accurate representation of the proposed water use and is true and correct to the best of my knowledge.

NOTE: The permit, when issued, is for the beneficial use of water without waste. By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan. It is possible the land use you propose may not be allowed if it is not in keeping with the goals and acknowledged plan. Your city or county planning agency can advise you about the land-use plan in your area.

Stanley Kemper
Signature of Applicant

9-30-93
Date

Signature of Co-Applicant, if any

Date

FOR WATER RESOURCES DEPARTMENT USE ONLY

Dear Applicant:

I certify that I have examined the foregoing application, together with the accompanying information, and am returning it to you for:

_____

_____

In order to retain its tentative priority, this application must be returned with the requested corrections or additions on or before:

_____, 19____.

WITNESS my hand this _____ day of _____, 19____.

_____

Water Resources Director

*By:*_____

This instrument was first received in the office of the Water Resources Director at Salem, Oregon, on the 1 day of October, 1993, at 3:05 o'clock, P. M.

APPLICATION NO: G13521

A:APPFORM 9/89

Oregon

WATER
RESOURCES
DEPARTMENT

June 21, 1996

MEMO TO FILE G-13521

FROM DAVE JARRETT, WATERMASTER, DIST. 16

RE: CITY OF MONMOUTH APPLICATION FOR WATER FROM TWO WELLS IN DUCK SLOUGH BASIN

I visited the area on 6/19/96 to determine if there was flow in Duck Slough. I was not able to access the waterways at the points closest to the proposed well sites, however, I checked the road crossings upstream and downstream from the points. I found that Duck Slough was dry at Buena Vista Rd, about 1/4 mile downstream from the proposed well sites. There was some standing water in the channel upstream from the road, but no flow. Upstream from the well sites, where Davidson Rd crosses the streams, the unnamed stream, tributary to Duck Slough had a small amount of flow that entered a marshy area north of Davidson Road. Duck Slough was dry just north of Davidson Rd and had some standing water further north(downstream), closer to the well sites.

Commerce Building
158 12th Street NE
Salem, OR 97310-0210
(503) 378-3739
FAX (503) 378-8130

Wells listed on Groundwater Rights in OWRD WRIS pt.of.div database

Current as of 10/07/1998.

TRSQQ	County	Log #	Total Depth		application		permit	cert_num	pod_ num	status	city
8.00S 4.00W28SESW	POLK	2978	72	G	4332	G	4087	39278	1	V	CITY OF MONMOUTH
8.00S 4.00W28SESW	POLK	2979	72	G	4332	G	4087	39278	2	V	CITY OF MONMOUTH
8.00S 4.00W28SESW	POLK	2968	62	G	4332	G	4087	39278	3	V	CITY OF MONMOUTH
8.00S 4.00W28SESW	POLK	2969	62	G	5106	G	4818	62436	1	V	CITY OF MONMOUTH
8.00S 4.00W33NWNW	POLK	2967	60	G	5106	G	4818	62436	2	V	CITY OF MONMOUTH
8.00S 4.00W28NESE	MARI	13286	46	G	8926	G	8579	0	1	V	CITY OF MONMOUTH
8.00S 4.00W28NESE			0	G	8926	G	8579	0	2	V	CITY OF MONMOUTH
9.00S 4.00W 3SWSE	POLK	50392	57	G	13521	G	12976	0	1	V	CITY OF MONMOUTH
9.00S 4.00W10NWNE		*	0	G	13521	G	12976	0	2	V	CITY OF MONMOUTH

Not yet drilled (11-98). KCW

Application G-13521

COPY CHECK-OFF SHEET FOR PROPOSED FINAL ORDERS

CC: FILE # G-13521

WATERMASTER # 16

REGIONAL MANAGER: NWR

ODF&W - Polk County:

CWRE (if agent): CORBEY BOATWRIGHT (#208)

DEQ

OTHER STATE AGENCY IF NECESSARY:

DIVISION 33 LIST: COLUMBIA RIVER INTERTRIBAL FISH COMMISSION; U.S. FISH & WILDLIFE;
(CHECK ONLY IF APPLICABLE) NORTHWEST POWER PLANNING COUNCIL & NATIONAL MARINE FISHERIES

POWER BUILDER UPDATER; FRONT COUNTER

OTHER ADDRESSES OF PEOPLE WHO PAID THE $10 FEE:

PEOPLE WITH OBJECTIONS, COMMENTS OR REQUESTED COPY W/O $10 (SEND THE $10 LETTER):

CASEWORKER : RWK

FILE # G13521

FO CHECKLIST

REVIEW DATE: 10/30/96

WEEK # 59

PFO TO FO CONVERSION

INITIALS: JJ

n preparing the FO, you should check the following:

1. Y / (N) Were comments or protests received in response to the PFO?
2. ___/ If #1 = "Y", from whom were the comments received and when?
3. ___/ Verify names and addresses on the PFO CC list. **ALL** commentors (regardless of comment date), **affected landowners (were they notified?), and those who paid the $10 fee** should be listed.
4. ___/ Verify payment of recording fees (circle the appropriate option)
   (1) Issue FO w/permit if fees are paid -- Prepare refund request for excess fees, **including standing fees if no protest is filed and no modifications are being made to the PFO**
   (2) Issue FO w/o permit if fees are lacking

200
100 1CFS
250 5CFS
550.00

5. Y / (N) Is the file lacking a signed oath of accuracy for the application?
6. Y / (N) Has ODFW asked for self certification on screening condition?
7. Y / (N) Is water use prohibited for one or more months of the normal use period?
8. Y / (N) If #6 = "Y", is short season letter on file? Note: If short season letter is lacking prepare FO with Draft permit giving applicant 60 days to submit letter.
9. (Y) / N Is further processing possible? If not state reason: _____
10. ____ Notify applicant of additional information or fees required prior to permit issuance (**SEND CERTIFIED LETTER** & use standard wording from M:\T\FO\TOOLS if possible)
11. ____ Assign permit numbers to files with oath, fees, and no protests or other issues

Route to: (circle one)

DENIAL	FO w/o PERMIT	FO & PERMIT	COMMENTS
LARRY	JERRY	JEREMY	DOUG

LARRY

Initials _____

Modify FO as needed to:

12. ____ Respond to significant comments, issues, or disputes related to the proposed use of water (see notes, if any, listed above)
13. ____ Include or exclude permit conditions and management codes
14. ____ Correct PFO errors (such as POD or POU location (verify from map), Permit format)

Once FO document is completed:

15. ____ Save WordPerfect document in M:\T\FO\WEEK & delete duplicates
16. ____ Print final draft of document and submit to team leader for review
17. Y / N Team leader review completed

Appl # G-13521 / Permit # G-12976

Municipal/Quasi-Municipal Permit Extension Application

❖ **Published on the Department's Public Notice, dated:** 4/1/03

After published on the Public Notice, please.....

❒ Enter/Update the date published on the public notice in the **"PNotice Date"** field in the **"cdatewext.DB"** database

❒ Verify the **"Ext Filed"** field in the **"cdatewext.DB"** database is accurate.

The "filed" date for this extension should be: 10-7-99

❒ Return File to Lisa

STATE OF OREGON
WATER RESOURCES DEPARTMENT

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

RECEIPT #

INVOICE # 000360

RECEIVED FROM: City of Prineville G13521

BY:

APPLICATION	
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # 1224 ☐ OTHER: (IDENTIFY)

TOTAL REC'D $ 250.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
____	OTHER: (IDENTIFY) ____	$
____	OTHER: (IDENTIFY) ____	$

REDUCTION OF EXPENSE

CASH ACCT. ____ $

PCA AND OBJECT CLASS ____ VOUCHER # ____

0427 WRD OPERATING ACCT

	MISCELLANEOUS				
0407	COPY FEES				$
0410	RESEARCH FEES				$
0408	MISC REVENUE: (IDENTIFY) ____				$
TC165	DEPOSIT LIAB. (IDENTIFY) ____				$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**	
0201	SURFACE WATER	$	0202		$
0203	GROUND WATER	$	0204		$
0205	TRANSFER	$	0206		$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**	
0218	WELL DRILL CONSTRUCTOR	$	0219		$
	LANDOWNER'S PERMIT		0220		$
0207	OTHER (IDENTIFY) PCA66111 publication deposit 250				

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
____	OTHER (IDENTIFY) ____			

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
____	HRDRO APPLICATION ____		$

RECEIPT # 000360 DATED: 3-8-96 BY: Flo L

Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

DESCRIPTION	VENDOR'S NUMBER	PURCHASE ORDER NO.	INVOICE NUMBER	AMOUNT
WATER RIGHT APPLICATION FEE		12-10-2-0765-00		$250.00**

RECEIVED

MAR - 8 1996

WATER RESOURCES DEPT.
SALEM, OREGON

CITY OF MONMOUTH — MONMOUTH, OREGON 97361

151 West Main Street
Monmouth, Oregon 97361-2199
(503) 838-0722
FAX (503) 838-0725

CITY OF MONMOUTH

Promoting pride, progress, and friendly hometown values.

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MAR - 8 1996
WATER RESOURCES DEPT.
SALEM, OREGON

February 29, 1996

Bill Fujii, Planner 2 Water Rights Section
Water Resources Department
Commerce Building
158 12th Street NE
Salem, Oregon 97310-0210

SUBJECT: WATER RIGHT APPLICATION G-13521

Enclosed is a completed Form M and $250 check to accompany the City of Monmouth's water right application G-13521.

If you have any questions or comments, please don't hesitate to give me a call at (503) 838-2173.

Sincerely,

Gary A. Wilson

Gary A. Wilson, P.E.
Public Works Director/Engineer

Oregon Water Resources Department

Form M

RECEIVED
MAR - 8 1996
WATER RESOURCES DEPT.
SALEM, OREGON

This form is to be used in conjunction with applications for permits to use water for municipal purposes.

Read instructions carefully. Answer all questions.
Type or print clearly in dark ink.

1. **POPULATION:**

   a. What is the present population to be served? 7225

   b. Do you serve population beyond your city limits? Yes (UGB in non-contigous areas)

   c. According to your estimates, what will the population be 25 years from now? (Please citesource) 14,700 (3% growth rate)

2. **WATER NEEDS:**

   a. What are your current water needs? .8 MGD - 2 MGD

   b. What will your water needs be 25 years from now? 1.6 MGD - 4.1 MGD

   c. List your current source(s) of water by water body, amount of use and water right permit (e.g., Crystal Creek, .01 cfs, Permit S-12345).
   See attached

   d. Explain how your existing water use permits and water rights will assist in meeting your water use needs (i.e., Have you identified any of your water use permits or water rights that cannot or will not be used to meet future needs?). Please explain.
   Due to surface water treatment requirements it is unlikely that the Teal Creek & Teal Creek Springs rights will provide a viable economic source for water without major improvement i.e. treatment plant and storage reservoir.

3. **CONSERVATION MEASURES:** Please describe what you propose to do to prevent waste of water (e.g., metering, weekly measurements, etc.).
   Publish conservation ideas with utility bills
   Meter all customer connections
   Rate system which does not encourage summer consumption

Please include a copy of your water facilities plan with your application.

2/26/96

POD-ID	SOURCE	TRIBUTARY	CERTIFICATE	PERMIT	PRIORITY	PERMITTED RATE	MAXIMUM RATE OF USE DURING 1995	TOTAL USE 10/94-9/95	STATUS
11794	WELL 4	WILLAMETTE R	62436	G 4818	2/17/70	0.550 CFS	0.479 CFS	827,200 CU.FT.	ALTERNATE PRODUCTION WELL
11795	WELL 5	WILLAMETTE R	62436	G 4818	2/17/70	0.330 CFS	0.320 CFS	1,851,097 CU.FT.	ALTERNATE PRODUCTION WELL
11797	WELL 1	WILLAMETTE R	39278	G 4087	4/17/68	0.560 CFS		0 CU.FT.	ABANDONED
11801	TEAL CR	TEAL CR	16992	S 18321	12/11/46	1.000 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
11801	TEAL CR	TEAL CR	11662	S 12058	2/16/36	1.000 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
11801	A SPR	TEAL CR	15055	S 12602	4/2/37	0.250 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
11804	FALL CITY RES	TEAL CR	11656	S 12602	4/2/37	3.000 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
20963	WELL 3	WILLAMETTE R	39278	G 4087	4/17/68	0.380 CFS		0 CU.FT.	ABANDONED
20964	WELL 2	WILLAMETTE R	39278	G 4087	4/17/68	0.330 CFS		0 CU.FT.	ABANDONED
30217	WELL 1	WILLAMETTE R	0	G 8579	8/14/78	5.000 CFS	2.674 CFS	35,834,692 CU.FT.	PRIMARY PRODUCTION WELL
30218	WELL 2	WILLAMETTE R	0	G 8579	8/14/78	5.000 CFS		0 CU.FT.	SAME AS POD-ID 30217
30219	TEAL CR	LITTLE LUCKIAMUTE R	36021	S 30886	8/31/65	0.610 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
30220	TEAL SPR	TEAL CR	45801	S 6521	10/13/24	0.130 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION
30221	TEAL CR	LITTLE LUCKIAMUTE R	49729	S 4305	8/19/19	0.450 CFS		0 CU.FT.	BACKUP - SURFACE WATER - NO FILTRATION

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SALEM, OREGON

WATER SYSTEM PLAN

for the
City of Monmouth
Oregon

CH2M HILL
February 1983

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GLOSSARY

Demand Measurements

Average Day Demand (ADD)	The total water volume for the year divided by the number of days in the year.
Maximum Month Demand (MMD)	The total water volume for the highest use month of the year, expressed in million gallons per day (mgd).
Maximum Day Demand (MDD)	The total water volume for the highest use day of the year, expressed in million gallons per day (mgd).
Maximum Hour Demand (MHD)	The highest hourly water use rate of the maximum day demand (MDD), expressed in million gallons per day (mgd).
Gallons Per Capita Per Day (gpcd)	A measure of water consumption expressed in gallons of water per capita per day.
Gallons Per Acre Per Day (gpad)	A measure of water consumption expressed in gallons of water per acre per day.
Peaking Factor	The ratio of one flow condition to another, used in the planning and sizing of facilities. The peaking factors used most frequently are calculated to show the relationship of maximum month, day, and hour demands such as MMD/ADD; MDD/ADD; and MHD/MDD.
Hydraulic Grade Level (HGL)	In a closed pipeline, a theoretical line joining the elevations that water would reach under atmospheric pressure.

Mathematical System Model or Computer Model	A mathematical description of a water system's physical facilities and characteristics in terms of the fluid flow properties, including pipeline lengths, diameters, internal roughness, pressures, and elevations. The model mathematically describes the system so it can be used to analyze varying existing and future hydraulic conditions.
Total Dynamic Head (TDH)	The sum of the static head and velocity head at a given point in a pipe.

Chapter 1
INTRODUCTION

BACKGROUND

This report describes the findings and recommendations of a detailed study of the Monmouth, Oregon, water system. The study, conducted by CH2M HILL and authorized by the Monmouth City Council on October 6, 1981, assesses the system's capability to provide an adequate and reliable water supply to the area within the Monmouth urban growth boundary throughout a 22-year planning period (1983-2005).

Specifically, this report discusses the following major elements:

- Present water demand and future water requirements
- Water supply
- Computer modeling of the distribution system
- Distribution and storage requirements
- Cost estimates of recommended improvements
- Recommendations

An important product of this engineering study is a mathematical model of the Monmouth water distribution system. Mathematical modeling and computer analysis are valuable methods of evaluating a water system. These analytical tools are used to study the effects of proposed system improvements, new land uses, population projections, and other factors affecting a water system. To prepare the model, an inventory of the distribution system was conducted. This inventory included mapping pipe locations and noting their size, length, type, age, and present condition. In addition, present and proposed land uses and water uses were reviewed to determine water demands and fire protection requirements throughout the service area.

The water system model tested various flow conditions, such as maximum hour demand, reservoir refill, and fire flows during maximum day demand (MDD) periods. The pipeline flows and pressures resulting from simulations of various operating conditions were used to evaluate the existing water transmission and distribution system. Additional computer runs determined the future parameters for the design of pipelines for the projected growth conditions, and to evaluate system improvements.

ACKNOWLEDGEMENT

We appreciate the assistance furnished by many individuals of the City of Monmouth staff in the preparation of this report. Their suggestions and contributions were essential, and their help is gratefully acknowledged.

/CVR4/053

Chapter 2
WATER REQUIREMENTS

INTRODUCTION

An adequate and reliable water system is one that satisfies all of its users' water demands under normal and predictable daily and seasonal use. At the same time, it should have sufficient capability for firefighting and other emergencies throughout the service area. User demands, water for firefighting, and water needed during emergencies are unique to each community. The water use habits of customers and the standards adopted for firefighting and emergencies are the prime factors in determining the water requirements for the City.

The determination of these water requirements is essential for the efficient management and planning for present and future needs of the water system. For the City of Monmouth, present water needs are shown by existing records. Future needs can be estimated by studying social and economic factors affecting water usage, including population growth, land use, housing densities and occupancies, commercial and industrial property uses, changes in the community and family character, conservation of resources, local economic conditions, and the water use habits of the community's inhabitants.

In this study, the records and supporting data available from the City's files have provided much of the information for identifying present water demands; however, some important data was lacking and pertinent water use data from nearby communities was used after interpretation for the conditions that exist for Monmouth. The Comprehensive Plan was used together with the water use data to predict future water requirements.

STUDY AREA

The City of Monmouth contains approximately 1023 acres within its corporate limits. The total area contained within the urban growth boundary shown on Figure 2-1 is approximately 1,934 acres. The Monmouth Comprehensive Plan shows various land uses within the urban growth boundary; these land uses were used in this study. In addition, an industrial area containing 204 acres located in the northern section of the city was included in the study. This industrial area has been designated for inclusion in the Comprehensive Plan.

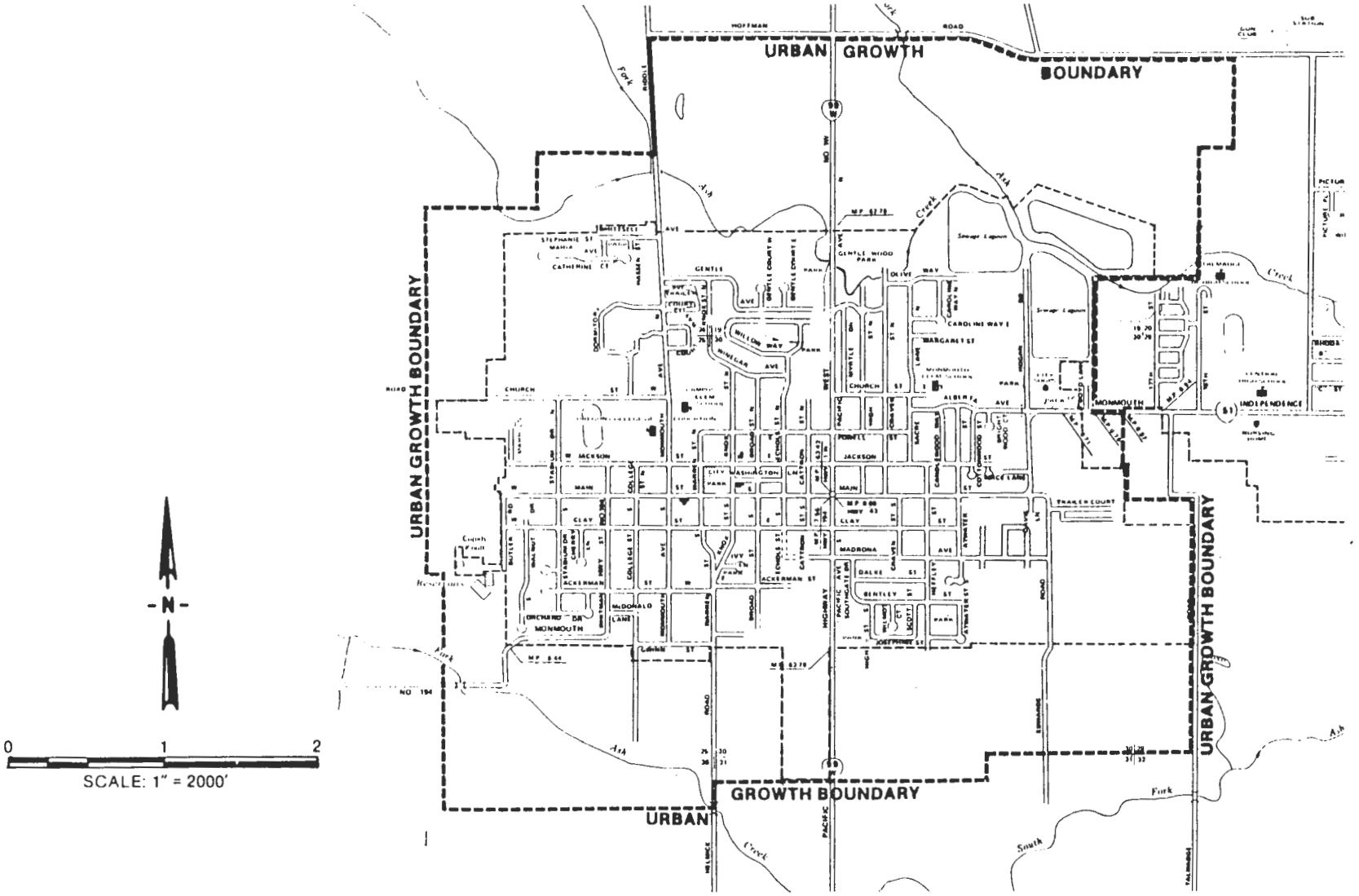


FIGURE 2-1

URBAN GROWTH BOUNDARY
CITY OF MONMOUTH OREGON

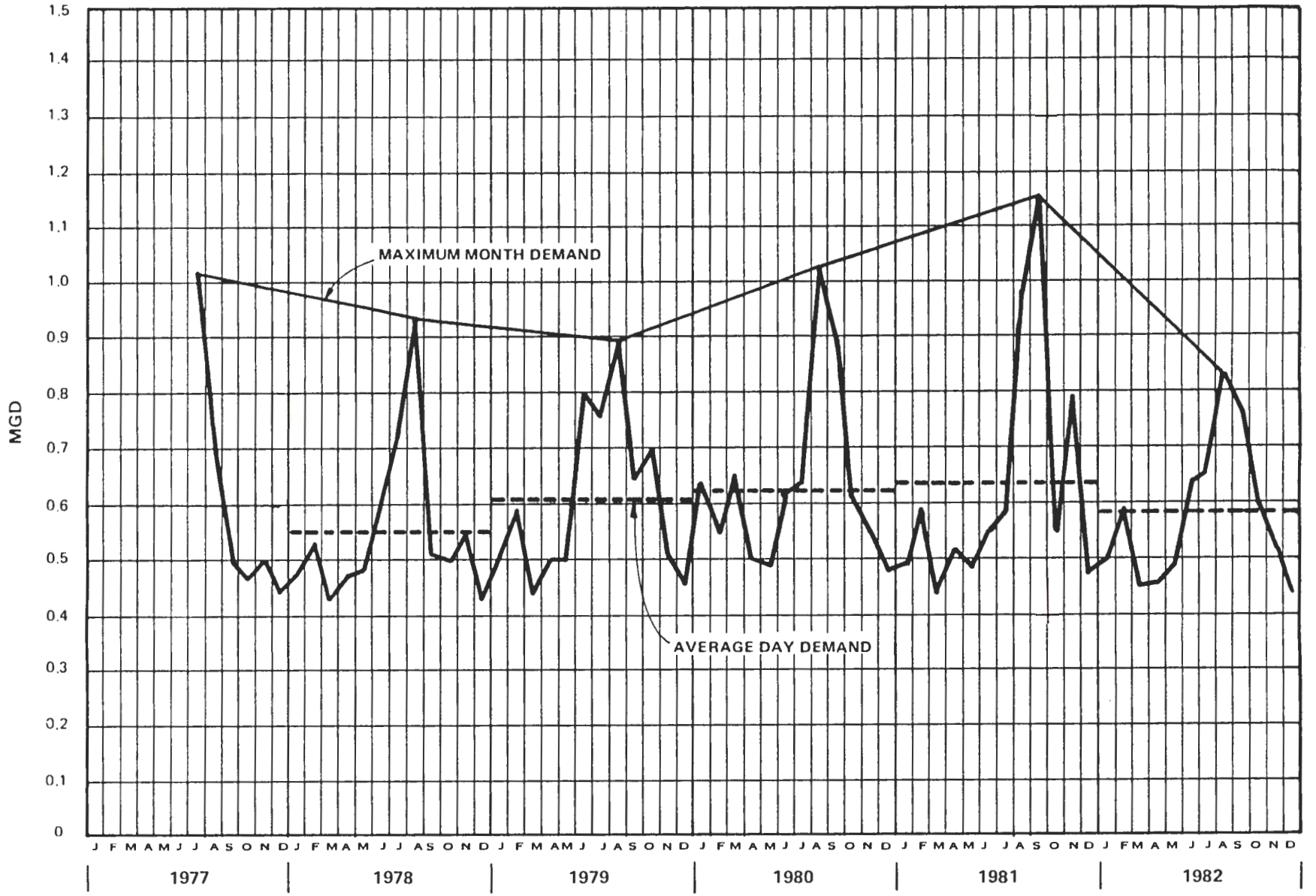


FIGURE 2-2
HISTORICAL WATER USE

C15738 A0

A typical total system diurnal curve usually shows the lowest usage after midnight and the highest usage in the early evening hours (see Figure 2-3).

The water use peaking characteristics for each service class during the total system's peak demand period were determined by reading several water meters within each service class. The water meters were read at 2-hour intervals during daylight hours for a 3-day period (August 6-8, 1981). From this information, the peaking factors for MDD and MHD were interpolated. The peaking factors for MDD/ADD were developed from 1 year's meter readings (May 1980-April 1981). Water use by service class is shown in Table 2-2 for the system's demands.

The total system's multifamily residential peaking factors for MDD/ADD are low due to the low apartment occupancy during the summer when WOSC has a reduced enrollment. Similarly, the public school was also assumed to be closed during this period. Irrigation demands are flexible and no major irrigation at WOSC or city parks was assumed during the maximum day's demand.

Table 2-2
AVERAGE DAY DEMAND AND PEAKING FACTORS
FOR USER CLASSES

		Peaking Factors	
	ADD	MDD/ADD	MHD/MDD
Residential			
Single Family	105 gpcd	3.9	3.8
Multifamily	105 gpcd	0.8	2.0
Commercial			
Office	805 gpad	1.1	0.5
Retail	410 gpad	1.1	1.6
Highway	1720 gpad	1.1	1.6
Industrial	2600 gpad	1.6	0.5
Public Schools	110 gpad		
WOSC	12,100 gpd	1.1	0.5
SYSTEM TOTAL	430 gpm	3.7	3.2

ADD = average day demand
MDD = maximum day demand
MHD = maximum hour demand

gpcd = gal/capita/day
gpad = gal/acre/day
gpd = gal/day
gpm = gal/minute

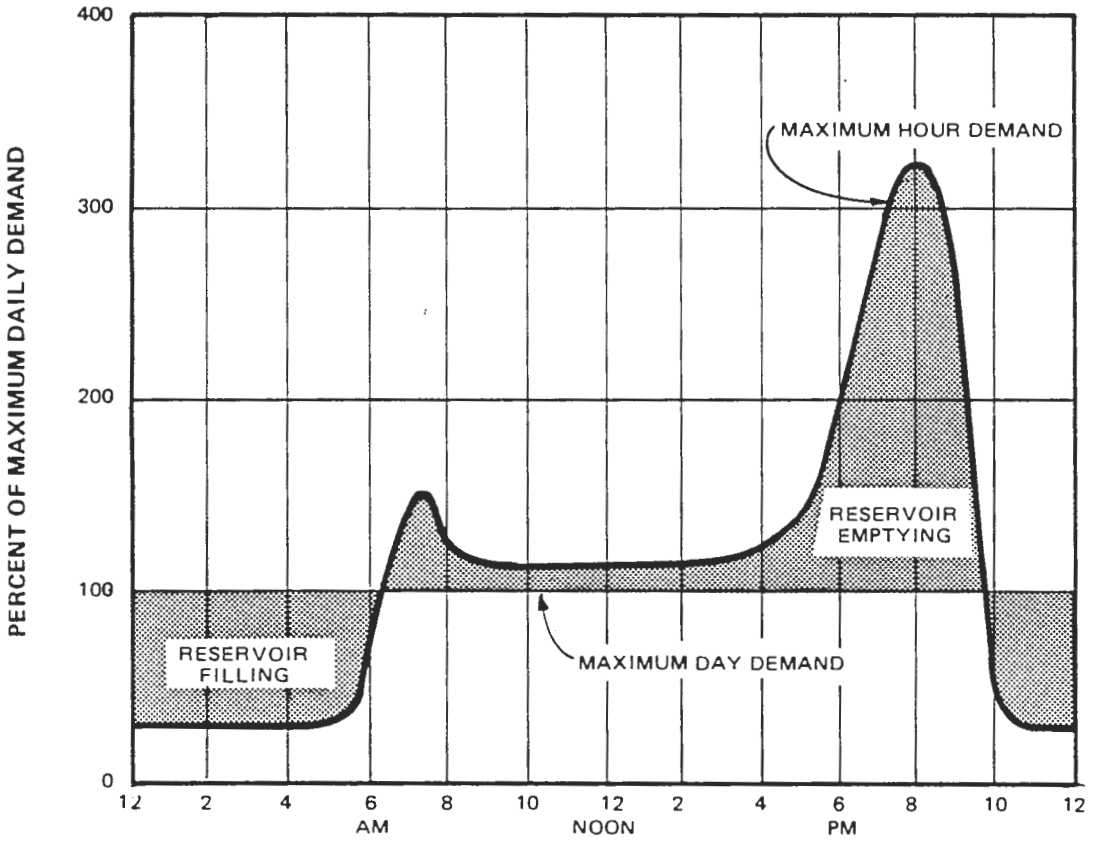


FIGURE 2-3

TYPICAL DEMAND PATTERN
DURING DAY OF MAXIMUM USE

C15738 A0

FUTURE WATER REQUIREMENTS

The City's projected water requirements were based on water use data and the anticipated population identified in the Comprehensive Plan. The residential water requirements were estimated by assuming a uniform distribution of population within the service area. Esimates of commercial demand assumed that water use in areas designated for commercial development in the Comprehensive Plan would be similar to water use in the present commercial areas. All future industrial demand was assumed to be from industries that do not require water to process their products.

Table 2-3 shows the projected per-acre water requirements for specific land uses. The existing residential water requirements were combined into one average value. The 2005 maximum day residential water requirements were separated into specific land use categories as identified by the Comprehensive Plan. For the remaining water user categories, the existing zoning and comprehensive plan designations were used. The system total is the summation of all individual land use categories for the ADD (in gpm). The peaking factors are also the composite of the individual land use categories listed above. Table 2-4 indicates the total future average and peak water requirements at 5-year intervals. As shown, demand is expected to nearly double by the year 2005.

Table 2-3
MAXIMUM DAY WATER REQUIREMENTS BY LAND USE

	Present Maximum Day Demand		2005 Maximum Day Demand	
Land Use Description	gpad	mgd	gpad	mgd
Residential				
0-6 dwellings/acre			1,760	0.77
7-12 dwellings/acre	4,190	1.80	2,100	0.29
13-20 dwellings/acre			2,850	0.29
Outside city limits			3,250	2.27
Commercial				
Office	890	0.02	890	0.02
Retail	450	0.01	450	0.01
Highway	1,850	0.03	1,850	0.03
Industrial Parks			4,200	0.91
WOSC	1,630	0.43	1,630	0.43
Irrigation	1,020	0.02	1,020	0.43
TOTAL		2.31		5.04

gpad = gal/acre/day
mgd = million gal/day

Table 2-4
FUTURE AVERAGE AND PEAK WATER REQUIREMENTS
(million gallons per day)

Year	Population	ADD	MDD	MHD
1980	5,600	0.62	2.31	7.32
1985	6,490	0.85	2.97	8.79
1990	7,520	1.10	3.54	10.10
1995	8,720	1.42	4.07	11.40
2000	10,110	1.71	4.57	12.50
2005	11,720	1.87	5.04	13.40

FIRE PROTECTION

A water system is a community's primary resource for fighting fires. The Insurance Services Office (ISO) provides guidelines for determining the fire flows for various structures. In 1976, ISO completed their most recent survey of Monmouth. In their survey, needed fire flows were identified for the area. These are shown in Table 2-5.

Table 2-5
NEEDED FIRE FLOWS

Location	Fire Flow (gpm)	Structure Classification
Bentley & Wilmot	750	Residential
Ackerman & Monmouth	1,000	Residential
Olive Way & Caroline	1,000	Residential
Walnut & Ackerman	1,000	Residential
Sacre Lane & Church St.	2,000	Institutional
Gentle Ave. & Knox	2,500	Apartments
Monmouth & Whitsell	2,500	Apartments
Broad St. & Main St.	3,500	Commercial
No. of Church & W. of Monmouth	4,500	Institutional

An analysis of these data plus future fire flows is provided in Chapter 4.

WATER QUALITY REQUIREMENT

The water quality requirement for potable water is established by the Federal Safe Drinking Water Act PL 93-523, and Oregon Administrative Rules Chapter 333.42 of ORS 448.205-990, Oregon Drinking Water Quality Act of 1981.

Federal Safe Drinking Water Act

In 1974, the Safe Drinking Water Act was enacted by Congress to assure that water supply systems serving the public met minimum national standards for the protection of public health. The act mandated that the U.S. Environmental Protection Agency (EPA) establish national drinking water regulations for all public water systems throughout the United States. A three-step process for the phased development of drinking water regulations was established.

1. Development of interim regulations based on an update of the 1962 Public Health Service Standards.

2. A 2-year study on the human health effects of exposure to contaminants in drinking water conducted by the National Academy of Science.

3. Development of revised, more comprehensive regulations based on the results of the National Academy of Science study and EPA's ongoing research program.

The regulations are also classified into two categories:

- Primary regulations that aim at the protection of public health and establish maximum contaminant levels in drinking water.

- Secondary regulations that aim at the protection of public welfare and establish secondary maximum contaminant levels which may adversely affect the aesthetic quality of the drinking water.

At the present time, both the National Interim Primary Drinking Water Regulations (NIPDWR) and the National Secondary Drinking Water Regulations (NSDWR) are in effect. The recommendations of the National Academy of Sciences on drinking water and health were published in the Federal Register on July 11, 1977. However, revised primary regulations have been delayed due to the lengthy and complex process of developing standards from background information and recommendations. According to the EPA, revisions will be based on information provided by a number of sources, including the National Academy of Science study, EPA research findings, local governments, water utilities, environmental groups, and independent scientists and engineers from the research community.

Primary Regulations

Generally, each state has the major responsibility for public water systems in that state. However, the State of Oregon did not assume the primary responsibility for enforcing the NIPDWR; therefore, Region X of the EPA is enforcing these regulations in the state. The NIPDWR specifies maximum contaminant levels (MCL's) and monitoring requirements for toxic inorganic chemicals, organic pesticides and herbicides, turbidity, microbiological contaminants, and radionuclides. The highlights of these requirements are summarized as shown in Tables 2-6 and 2-7.

Because of the suspected carcinogenic property of organohalogen compounds formed by chlorine in drinking water, an amendment to the NIPDWR was promulgated by EPA in November 1979, establishing the MCL's and associated monitoring and reporting requirements for total trihalomethanes (TTHM's), a group of organohalogen compounds. At the present time, community water systems serving population less than 10,000 are exempt from this amendment regulation. Highlights of the Trihalomethanes Amendment are summarized in Table 2-8.

In August 1980, EPA published another amendment to the NIPDWR, which established two major monitoring requirements that became effective on February 27, 1982, for all community water systems. These requirements are described below:

- o Sodium Monitoring. Suppliers of water for community water systems are required to monitor sodium levels at the entry point to the distribution system. Surface water is to be monitored annually, and systems using groundwater sources only are to be monitored once every 3 years.

- o Monitoring for Corrosivity Characteristics. Suppliers of water for community water systems are required to monitor the following corrosivity characteristics: water temperature, pH, calcium hardness, alkalinity, total dissolved solids, chloride, and sulfate. The corrosivity of water is to be based on the calculated Langelier index or aggressive index. As a part of the corrosivity monitoring, community water systems are also required to identify construction materials present in their distribution systems.

The amendment did not specify the MCL figures for sodium or corrosivity, nor did it require any treatment to reduce the sodium content or corrosiveness of the water. It only suggested that suppliers having raw water above 20 mg/l in

TABLE 2-6

HIGHLIGHTS OF INTERIM PRIMARY DRINKING WATER REGULATIONS

MAXIMUM CONTAMINANT LEVELS

(TO BE USED ONLY IN CONJUNCTION WITH FULL TEXT OF REGULATIONS)

		TYPE AND NAME OF CONTAMINANT	MAXIMUM CONTAMINANT LEVEL MCL	APPLICABLE TO SOURCE OF SYSTEM	
				SURFACE OR COMBINED	GROUNDWATER
COMMUNITY SYSTEM ONLY	INORGANIC CHEMICALS	ARSENIC	0.05 mg/l	YES	YES
		BARIUM	1.0		
		CADMIUM	0.01		
		CHROMIUM	0.05		
		LEAD	0.05		
		MERCURY	0.002		
		SELENIUM	0.01		
		SILVER	0.05		
		FLUORIDE	1.4 — 2.4 *(VARIES WITH AVERAGE ANNUAL AIR TEMP.)*		
		NITRATE (AS N)	10.0		
COMMUNITY AND NONCOMMUNITY WATER SYSTEMS	PESTICIDES AND HERBICIDES	ENDRIN	0.0002 mg/l	YES	STATE OPTION
		LINDANE	0.004		
		METHOXYCHLOR	0.1		
		TOXAPHENE	0.005		
		2, 4 - D	0.1		
		2, 4, 5-TP (SILVEX)	0.01		
	PHYSICAL	TURBIDITY	1 TU MONTHLY AVERAGE 5 TU AVERAGE OF TWO CONSECUTIVE DAYS	YES	STATE OPTION
	MICROBIOLOGICAL	COLIFORM BACTERIA	MEMBRANE FILTER METHOD SAMPLES EXAMINED PER MONTH / COLIFORMS NOT TO EXCEED ARITHMETIC MEAN OF ALL / 1 PER 100 ml LESS THAN 20 / 4 PER 100 ml IN MORE THAN ONE SAMPLE 20 OR MORE / 4 PER 100 ml IN MORE THAN 5% OF SAMPLES FOR FERMENTATION TUBE METHODS, SEE REGULATIONS	YES	YES
	RADIONUCLIDES	GROSS ALPHA RADIOACTIVITY	15 pCi/l	YES	YES
		RADIUM 226 & 228 COMBINED	5 pCi/l	YES	YES
		MAN-MADE BETA RADIOACTIVITY	4 MILLIREM/YEAR FOR SCREENING LEVEL AND DETAILS, SEE REG'S	POPULATION > 100,000	STATE OPTION

TABLE 2-7

HIGHLIGHTS OF INTERIM PRIMARY DRINKING WATER REGULATIONS

MONITORING REQUIREMENTS

(TO BE USED ONLY IN CONJUNCTION WITH FULL TEXT OF REGULATIONS)

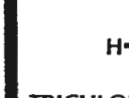
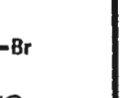
		TYPE AND NAME OF CONTAMINANT	MONITORING REQUIREMENTS: SURFACE OR COMBINED SOURCE SYSTEM	MONITORING REQUIREMENTS: GROUNDWATER SOURCE SYSTEM	ROUTINE REPORTING
COMMUNITY SYSTEM ONLY; COMMUNITY AND NONCOMMUNITY WATER SYSTEMS	INORGANIC CHEMICALS	ARSENIC BARIUM CADMIUM CHROMIUM LEAD MERCURY SELENIUM SILVER FLUORIDE NITRATE (AS N)	EVERY YEAR (INITIAL TEST DUE JUNE 24, 1979)	EVERY 3 YEARS (INITIAL TEST DUE JUNE 24, 1980)	REPORT RESULTS WITHIN 40 DAYS AFTER COMPLETION OF THE TEST
	PESTICIDES AND HERBICIDES	ENDRIN LINDANE METHOXYCHLOR TOXAPHENE 2,4-D 2,4,5-TP (SILVEX)	EVERY 3 YEARS (INITIAL TEST DUE JUNE 24, 1979)	STATE OPTION	REPORT RESULTS WITHIN 40 DAYS AFTER COMPLETION OF THE TEST
	PHYSICAL	TURBIDITY	DAILY	STATE OPTION	REPORT RESULTS WITHIN 10 DAYS AFTER END OF MONTH
	MICROBIOLOGICAL	COLIFORM BACTERIA	SAMPLE AT REGULAR INTERVALS MINIMUM SAMPLES TESTED PER MONTH VARY WITH POPULATION FOR DETAILS SEE REGULATIONS	SAME AS SURFACE SOURCE SYSTEM. EXCEPT WITH STATE PERMISSION, SYSTEMS SERVING 25-1000 PERSONS MAY REDUCE SAMPLING TO ONE PER QUARTER	REPORT SUMMARY OF TEST RESULTS WITHIN 10 DAYS AFTER THE END OF EACH MONTH
	RADIONUCLIDES	GROSS ALPHA RADIOACTIVITY RADIUM 226 & 228 COMBINED	EVERY 4 YEARS ON ANNUAL COMPOSITE OF 4 QUARTERLY SAMPLES INITIAL DUE JUNE 24, 1980		REPORT RESULTS WITHIN 40 DAYS AFTER COMPLETION OF TESTS
		MAN-MADE BETA RADIOACTIVITY	EVERY 4 YEARS ON ANNUAL COMPOSITE OF QUARTERLY SAMPLES INITIAL DUE: JUNE 24, 1979	STATE OPTION	

TABLE 2-8

HIGHLIGHTS OF INTERIM PRIMARY DRINKING WATER REGULATIONS

FINAL RULE FOR CONTROL OF TRIHALOMETHANES IN DRINKING WATER

(TO BE USED IN CONJUCTION WITH FULL TEXT OF REGULATIONS)

APPLICABILITY	COMMUNITY WATER SYSTEMS WITH GROUND OR SURFACE SOURCE USING ANY FORM OF DISINFECTANT			
CONTAMINANTS	 TRICHLOROMETHANE (CHLOROFORM)	 BROMO-DICHLOROMETHANE	DIBROMO-CHLOROMETHANE	 TRIBROMOMETHANE (BROMOFORM)
MAXIMUM CONTAMINANT LEVEL (MCL)	0.10 mg/l SUM OF THE ABOVE 4 COMPOUNDS TOTAL TRIHALOMETHANES (TTHM)			
EFFECTIVE DATES	SYSTEMS SIZE (POPULATION)	MONITORING	COMPLIANCE	
	> 75,000	NOV. 29, 1980	NOV. 29, 1981	
	10,000 TO 75,000	NOV. 29, 1982	NOV. 29, 1983	
	< 10,000	STATE DISCRETION	STATE DISCRETION	
SAMPLING REQUIREMENT	MINIMUM 4 SAMPLES PER QUARTER PER PLANT TAKEN ON THE SAME DAY ANALYZE FOR TTHM			
SAMPLING LOCATIONS	25% AT EXTREME OF DISTRIBUTION SYSTEM 75% AT LOCATIONS REPRESENTATIVE OF POPULATION DISTRIBUTION			
MINIMUM MONITORING FREQUENCY (WHEN APPROVED BY THE STATE)	GROUNDWATER SYSTEMS	SURFACE WATER SYSTEMS		
	ONE SAMPLE PER YEAR FOR MTP (MAX. TOTAL TRIHALOMETHANE POTENTIAL) IF MTP < 0.10 mg/l	ONE SAMPLE PER QUARTER FOR TTHM IF TTHM LEVELS ARE CONSIDERABLY BELOW 0.10 mg/l AFTER ONE YEAR OF DATA COLLECTION		
REPORTING REQUIREMENT	AVERAGE OF EACH QUARTERLY ANALYSIS			
PUBLIC NOTIFICATION	IF RUNNING ANNUAL AVERAGE OF EACH QUARTERLY SAMPLE EXCEEDS MCL			

sodium content should minimize the addition of sodium compounds in their treatment process, and some correction measures should be taken if the corrosion products cause serious health problems (e.g., the presence of toxic materials such as cadmium and lead exceeding the MCL's).

Secondary Regulations

Secondary regulations are not enforceable at the Federal level. They are intended to be used as a goal for suppliers of public water systems to use to maintain the aesthetic quality of the drinking water. The secondary regulations established MCL's for the following parameters and recommended that monitoring intervals be no less frequent than the monitoring required for inorganic contaminants in community water systems.

Parameters	MCL
Chloride	250 mg/l
Color	15 units
Copper	1 mg/l
Corrosivity	Noncorrosive
Foaming Agents	0.5 mg/l
Odor	3 T.O. number
pH	6.5 - 8.5
Sulfate	250 mg/l
TDS	500 mg/l
Zinc	5 mg/l

Oregon Drinking Water Quality Act of 1981

The Oregon State Health Division has issued regulations in the Oregon Administrative Rules, Chapter 333.42, entitled Public Water Systems. All water supply systems in the state must also follow the regulations.

Generally, these rules are more stringent than the Federal Regulations. In addition, the rules also specify construction standards for water supply systems, including source selection, treatment requirement, and design guides for treatment, storage, pumping and distribution facilities. The rules also cover the requirements for submitting and approving of plans, guidelines for fluoridation of domestic water supplies, procedures for conducting sanitary surveys, operation and maintenance requirements, and penalties for failure to comply with these rules.

Oregon standards do not include TTHM requirements nor do they require that corrosivity and sodium levels be monitored. In addition, no state standards have been established for pesticides and herbicides; the State Health

Division will issue standards when they believe such chemicals pose an unreasonable risk. Briefly, the differences between the Oregon rules and the Federal regulations are as follows:

- o Inorganic Chemicals

  The Oregon rules use the same MCL's for nine of the ten inorganic chemicals cited in the Federal regulations. The contaminant not covered is fluoride. However, the nine inorganic contaminants must be monitored, and the standards apply to both community and noncommunity water systems.

- o Secondary Contaminants

  The Oregon rules consider the chemicals listed below as secondary contaminants. The water quality parameters listed are applicable to both community water systems and noncommunity water systems.

Secondary Contaminants	Maximum Contaminant Level (mg/l except for pH)
Sand	2
pH	6.0-9.0
Fluoride	2.4
Hardness	250
Total Solids	500
Chloride	250
Copper	5
Iron	0.3
Manganese	0.05
Sulfate	250
Zinc	5

The Oregon rules also state: "When the presence of secondary contaminants interferes with the ability of a water treatment facility to produce a quality of water complying with the maximum contaminant levels (for primary contaminants), the water supplier shall obtain water from an alternate source complying with the secondary standards or shall install treatment equipment and/or modify operating practices to the extent necessary to produce a quality of water complying with these rules."

o Reporting Requirements

The Oregon rules require water suppliers to continue submitting monitoring reports as required by the Federal regulations to the EPA. In addition, the following reports are to be submitted to the State Health Division:

- Reports that indicate that the average of four followup analyses for inorganic chemicals (other than nitrates) exceeded the maximum contaminant level(s).

- Reports that indicate that the average value of two analyses for nitrate exceeded the maximum contaminant level.

- Reports that indicate that organic chemicals are present in the water at levels posing an unreasonable risk to health.

- Reports that indicate an average turbidity on 2 consecutive days exceeding 5 NTU, or a monthly average exceeding 1 NTU.

- Reports on analyses for coliform organisms that indicate more than four organisms per 100 ml (membrane filter); or three or more positive tubes in one sample (fermentation tube/10-ml portion); or five positive tubes in one sample (fermentation tube/100-ml portion); and reports on consecutive daily check samples taken to follow up on the above violations.

- Reports on measurements of radioactivity that indicate maximum contaminant levels have been exceeded.

QUALITY OF MONMOUTH WATER SOURCES

Existing Water Sources

Water samples were collected from each of the three wells currently operated by the City. The samples were analyzed for chemical and physical qualities. Reports of these analyses are included in Appendix A.

The results indicate that the organic and inorganic chemical contaminants found in these waters are below the allowable limits of both the EPA interim regulations and the Oregon drinking water requirements, except for Well 5. This well

has shown unacceptable levels of iron and manganese repeatedly when tested. Although iron and manganese are secondary contaminants and are not hazardous to health, customers have complained about stained laundry and plumbing fixtures and about discolored drinking water.

Since Well 5 appears to be the only well producing high levels of these minerals, it should only be used when its water can be blended with water from Well 1. If Well 1 is taken out of service before a supplemental well supply has been developed, the water from Well 5 can be blended with water from Well 4. However, the combination of water from Wells 4 and 5 will only be marginally acceptable. The iron will probably be below the 0.3 mg/l maximum limit, but the manganese will exceed the 0.05 mg/l maximum. Therefore, combining water from Wells 4 and 5 should be avoided.

The corrosivity of the water from Wells 1, 4, and 5 is indicated by the environmental laboratory test results in Appendix A. The corrosivity of the water from these wells in terms of the Langelier Index is -2.4, -1.2, and -0.8 for Wells 1, 4, and 5, respectively. A negative Langelier index suggests that these waters are mildly corrosive to ferrous metals; however, corrosiveness of waters to piping systems is much more complex than indicated by the use of indices. The presence of oxygen, chlorides, and sulfates all tend to influence corrosion, and these are not used in calculating the Langelier Index. The combination of the City's experience with these ground waters, the presence of the chemical constituents, and the results of the corrosivity index indicate that the water is not overly corrosive. Cement-lined ductile iron and PVC plastic pipe will give normally acceptable performance in the distribution and transmission piping systems.

Potential Water Sources

Water from the possible future water sources that were studied was found to have the following general quality characteristics:

- Surface Water: The surface water sources considered were the Willamette River, Teal Creek, Rickreall Creek, and Big Rock Creek-Luckiamute Creek. Each of these sources would require complete treatment including coagulation, flocculation, settling, filtration, and disinfection. The water treatment facilities furnished for these waters must be designed to produce water that consistently does not exceed the maximum contaminant levels. The degree of treatment will vary somewhat for each source. A thorough investigation, including pilot plant studies, should be conducted prior to the design

of the treatment facilities to determine the physical, chemical and microbiological characteristics of the water to be treated. These studies must also consider the seasonal and long-term variations as well as identify potential sources of contamination and the risks they impose on the water source.

- Groundwater: The groundwater sources considered were those that take water from the alluvial materials along or within a short distance of the Willamette River. The quality of this groundwater is presently acceptable for potable use without treatment, except for disinfection. The quality reports for the existing Monmouth wells are typical of the physical and chemical characteristics of the groundwater in the area. The younger alluvial deposits along the Willamette River will yield the highest quantities of water, and the potable water will most likely be developed from this formation. The alluvial formation varies in thickness, and the water is subject to the same quality variation as the Willamette River and other adjacent surface waters. In the future, more intensive agricultural activity and increased population are expected in the nearby areas; such development will affect the quality of the water in the relatively shallow and unconfined younger alluvial material. As these sources become contaminated, they will require treatment to render it acceptable for potable use.

/CVR4/054

Chapter 3
WATER SUPPLY

BACKGROUND

The City's existing water supply consists of surface water from Teal Creek and groundwater from two separate well fields. Teal Creek is approximately 9.5 miles due west of Monmouth and, until recently, was the City's primary water supply source. The major groundwater source is the Marion County Well 1, which is located near the east bank of the Willamette River in Marion County along South River Road. The second groundwater source includes two active wells, Wells 4 and 5, on property owned by the City of Monmouth near the southern boundary of the City of Independence.

Teal Creek is a small watershed, and until the 1960's was the City's sole supply. At that time, the City developed the wells near Independence because of increasing water needs. However, inadequate water supplies have continued to be a problem. An engineering investigation in 1977 by C&G Engineering, Inc. reported that Teal Creek, because of its seasonal flow variations, was not suitable for long-term use unless storage (i.e., a dam and impoundment structure on the creek) was provided. Another engineering study in 1978 by Robert E. Meyer Consultants reconsidered water supply alternatives and proposed a long-term water plan briefly described as follows:

- If a dam and impoundment were built by a governmental agency, the City should proceed with the development of the Teal Creek source, including the construction of an 18-inch transmission pipeline and a water treatment plant.

- The City should develop wells as an interim supply until the Teal Creek source was constructed.

- If a dam on the Teal Creek is not built, the City should choose another adequate long-term source that would meet financial and water quality requirements.

The City has proceeded with the development of interim water supplies and constructed the Marion County well in 1978. This well, first used in the late summer of 1980, was designed to pump 750 gpm. However, the use of Teal Creek as a major long-term source of potable water has remained in doubt. Preliminary studies have indicated that constructing a dam along the creek is not economically feasible. Therefore, inadequate flows will continue to be a problem. While

the potential for generating hydroelectric power will improve the cost benefits, the Teal Creek Dam project is not scheduled for construction in the near future.

Teal Creek water is unacceptable as a supply source because of seasonally high turbidity levels that violate the standards set in the Federal Safe Drinking Water Act. The City was granted an exemption from the turbidity standards, which was valid until December 31, 1979; this exemption was later extended to January 1, 1981. Under the terms of the Safe Drinking Water Act, EPA cannot extend the compliance beyond this date. To meet the terms of the exemption, the City is required to carry out control measures that will minimize the health risks involved in the operation of the Teal Creek source. These measures include chlorine disinfection, shutting off the flow when the turbidity is high, and monitoring water quality within the transmission pipeline and distribution system. In addition, the exemption stipulated a schedule for final compliance. To meet full compliance, the City is to develop an additional groundwater supply capable of replacing the existing Teal Creek source.

Because of the uncertainties associated with Teal Creek, the City investigated the area near the Marion County well for future well sites that could be used as long-term water supplies. These investigations, conducted in 1980, determined that constructing additional wells in the area would be feasible. However, it was recommended that the quality of the water from the wells be constantly monitored. Industrial and agricultural activities adjacent to the Willamette River could affect the quality of the Willamette River and of the nearby groundwater supplies.

In 1981, the City authorized CH2M HILL to review Teal Creek as a water source under the conditions set by EPA. Their report of June 1981 (see Appendix B), made the following recommendations regarding the water supply.

- Discontinue the use of Teal Creek for potable water except for standby and emergency use; make only minor repairs to the transmission pipeline, i.e., replace parts and make repairs only to alleviate potential damage and to respond to complaints from property owners.

- Pursue the possibility of developing a separate system to sell Teal Creek irrigation water to WOSC and others.

- Increase the well source capacity as required to offset the loss of the Teal Creek supply, and to provide for population increases by the following:

- Increase the capacity of the Marion County well and pumping facilities.

- Investigate maintenance or construction on the Independence wells and carry out the work to supplement present capacity.

- Construct an equivalent parallel 12-inch-diameter pipeline to connect the well fields to the Monmouth water distribution system.

o Have a comprehensive water study performed to evaluate the City's total water supply, distribution, and storage needs and provide a master plan to provide for the City's future growth. Delay actual source improvements until they are refined in the comprehensive study.

CURRENT SITUATION

Because of low flows and turbidity levels as discussed in the preceding paragraphs, the use of Teal Creek has been discontinued, and the City depends on Marion County Well 1 and two Independence wells for all of its potable water. The well tests proposed in the CH2M HILL 1981 report were completed during the summer of 1982, and a new pump and motor are scheduled to be installed on the Marion County well during the spring of 1983. With the completion of this work, the available water supply from the two-well system will be 2.9 million gallons per day as shown in the following table.

	Gallons per Minute	Million Gallons per Day
Independence Well No. 4	350	0.5
Independence Well No. 5	150	0.2
Marion County Well	1,500	2.2
	2,000	2.9

This available water supply is sufficient for the current water requirements and will satisfy the City's needs until approximately 1984-85 as shown in Table 2-4, Future Average and Peak Water Requirements.

The present well system has redundant facilities to permit the City to maintain water service in the event one or more well is out of service. The largest capacity well is the Marion County Well 1, which will operate at 1,400-1,500 gpm. Should this well's output be interrupted because of a

breakdown or emergency, the remaining two Independence wells will deliver up to about 500 gallons per minute (0.7 mgd). This is sufficient for the present winter time needs, and it will furnish at least the essential water during summertime, provided the City operates under a curtailed usage plan until the outage is corrected or the emergency has passed. The available distribution system storage will also provide water during the period that the well supply may be interrupted. Figure 3-1, which includes the information shown on Figure 2-2, shows the available supply from the two-well system relative to the 1980-81 seasonal water requirements. The distribution system requirements during an emergency outage are discussed further in Chapter 4.

INTERIM WATER SUPPLY

Although the current water requirements will be met by the well systems consisting of the Marion County well and the Independence wells Nos. 4 and 5, additional supply will be required by 1984-85. During the 22-year planning period, an additional 2.1-mgd water supply will be needed to supplement the present 2.9 mgd.

Groundwater from wells is the recommended interim source of water because the existing water quality is satisfactory and because of relatively low operating costs. The Marion County well will deliver about 2.2 mgd after the current modifications are complete. The output from this one well will use the total capacity of the 12-inch pipe crossing the Willamette River on the bridge. The previous investigations have shown that additional groundwater is available in the area near the Marion County well and also on the western side of the river in the younger alluvial material along the river course. The hydrogeology of the area is complex, and the political consequences of a city's encroaching on agricultural lands for water can be significant. Therefore, the development of additional groundwater along the western bank of the Willamette River should be guided by the findings and recommendations of competent groundwater hydrologists and engineers.

Further development of the groundwater near the Marion County well will require an additional pipeline to deliver the water to the Monmouth service area. The capacity of the second transmission pipeline should anticipate the system's long-term needs. An alternate route from the existing 12-inch transmission will permit the system to operate in the event one of the pipelines is taken out of service for maintenance or because of damage. The proposed pipeline options are shown on the Figure 3-2, Potential Well Sites and Transmission Pipe Routes.

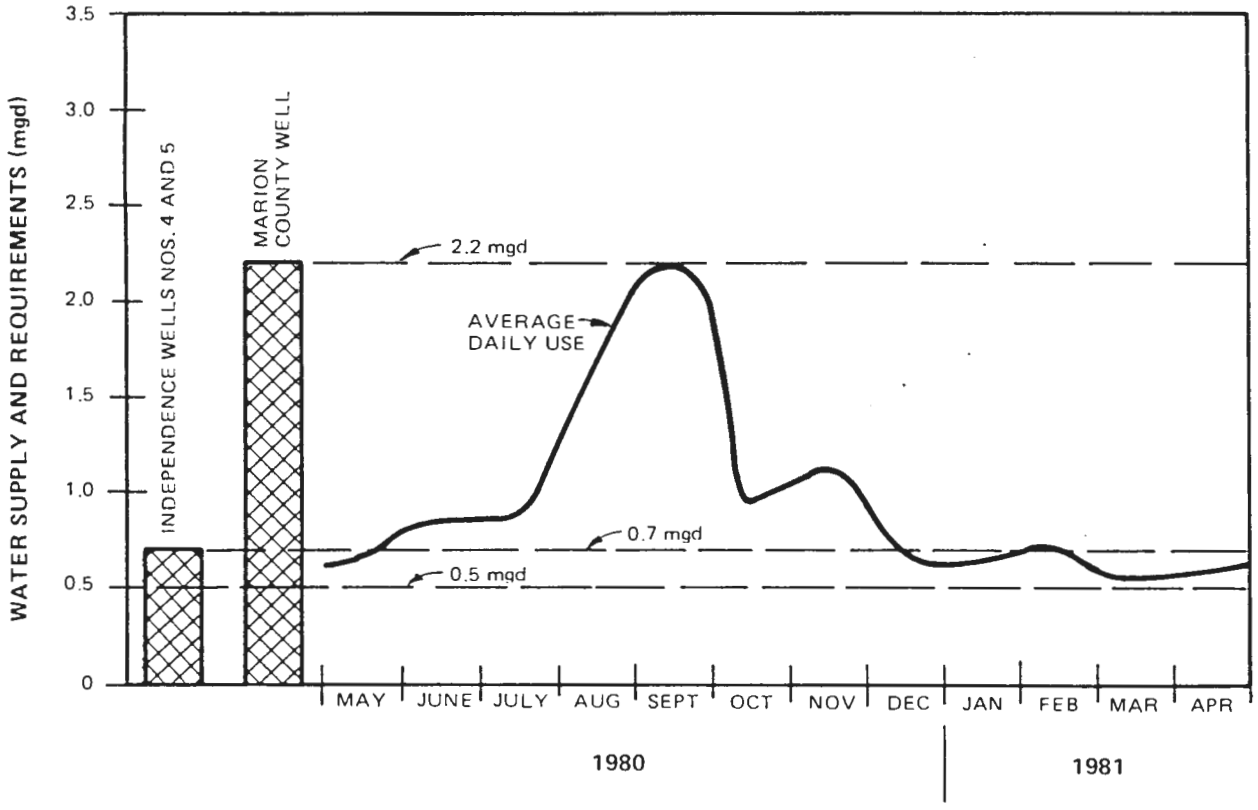


FIGURE 3-1

CURRENT SUPPLY CAPABILITIES
AND WATER USE REQUIREMENTS
CITY OF MONMOUTH, OREGON

C15738.A0

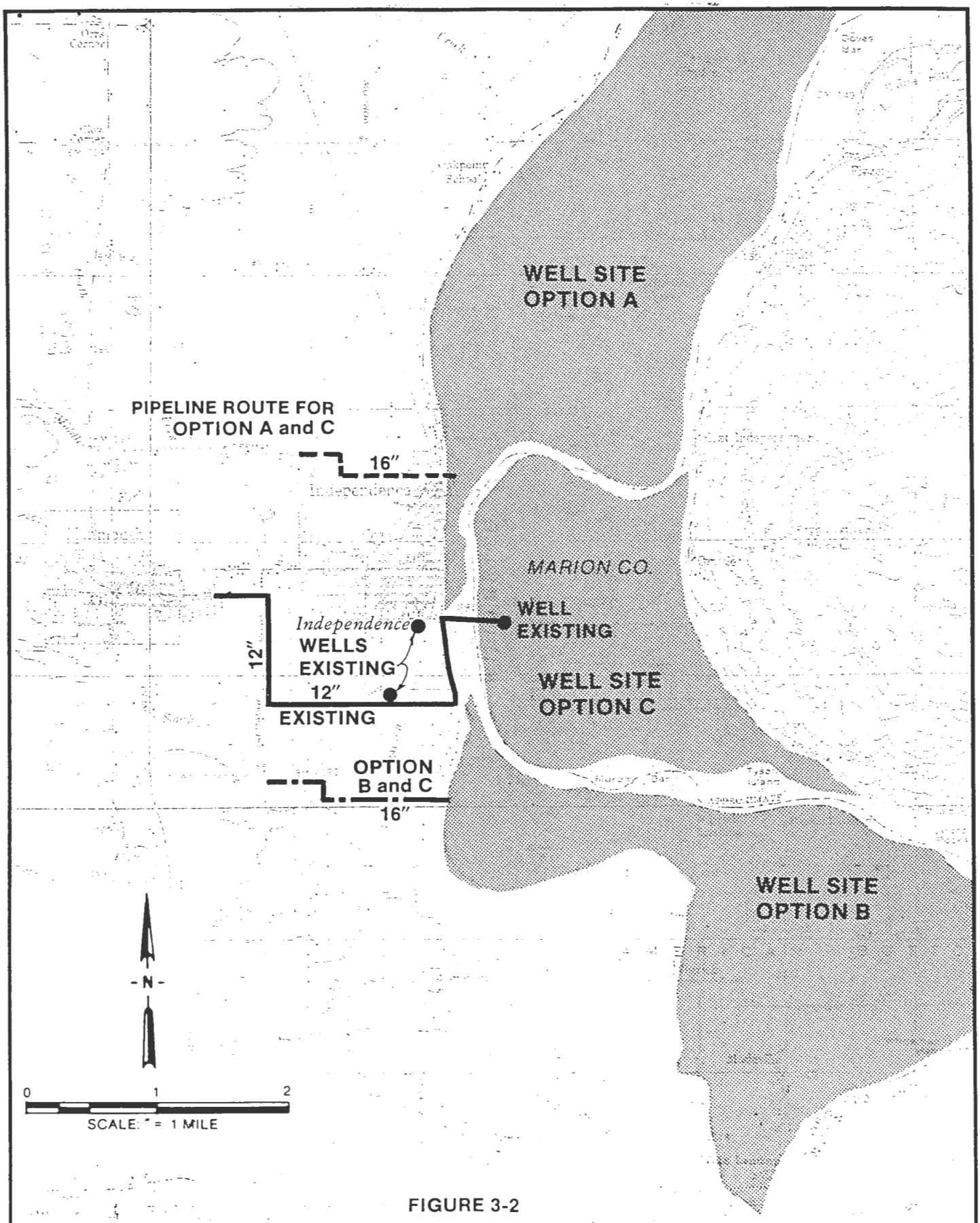


FIGURE 3-2

POTENTIAL WELL SITES AND
TRANSMISSION PIPE ROUTES
CITY OF MONMOUTH, OREGON
WATER PLAN

CH2M HILL

REGIONAL WATER SUPPLY

A regional water supply plan that would provide the total water requirements of the present and future service areas of the Cities of Independence, Monmouth, Falls City, and the Luckiamute Domestic Water System has been studied. The present population residing within this region is estimated to be about 12,000. With an annual growth of 1.5 to 3 percent per year, the population will range between 25,000 and 50,000 people in the next 50 years. The populations for each service area at the 1.5- and 3-percent growth rates are shown in Table 3-1.

Table 3-1
ESTIMATED POPULATIONS OF REGIONAL WATER PLAN SERVICE AREAS

	Estimated Population		
Service Area	1980	Year 2030 @ 1.5% Annual Increase	Year 2030 @ 3% Annual Increase
Monmouth	5,590	11,700	24,500
Independence	4,070	8,600	17,800
Falls City	810	1,700	3,600
Luckiamute Domestic Water	900	1,900	3,900
	11,370	23,900	49,800

To serve the additional population in this region, assuming the 3-percent annual growth, a 15-mgd water supply would be needed.

The cost significance of the regional facility as compared to the development of a separate water system for each of the regional participants is shown in Table 3-2, Relative Cost of Separate and Regional Water Supplies. The cost data shown was prepared from general cost information of basic facilities that are required to serve the participants with either their own separate or regional water system. These costs are relative and were prepared to compare the alternate supply concepts, and are not intended as the estimated costs of actual water supply options. These relative costs provide the cost comparisons and show the general magnitude of the savings that would result from building larger facilities to serve the regional area. The data shows that the costs of a regional water supply system would range between 40 and 80 percent of the costs of the separate water systems.

Table 3-2
RELATIVE COSTS OF SEPARATE AND REGIONAL WATER SUPPLIES

	Population Served		New Water Supply Required	Cost of New Water Supply		Additional Cost of Separate Systems	
	Present (1980)	Year 2030 @C 3%	For Year 2030 (mgd)[a]	Separate System	Regional System[b]	%	$
Monmouth	5,590	24,506	7.6	$6,790,000	$4,725,000	44	$2,065,000
Independence	4,070	17,842	5.5	5,610,000	3,471,000	62	2,139,000
Falls City	810	3,550	1.1	1,229,000	675,000	82	554,000
Luckiamute domestic	900	3,945	1.2	1,305,000	771,000	69	534,000
	11,370	49,842	15.4	$14,934,000	$9,642,000		

[a]Water requirements based on 400 gpcd.

[b]Costs are proportional to population served.

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LONG-TERM WATER SUPPLY

This investigation and the previous water source studies for the City of Monmouth have shown that the Willamette River or the groundwater from the alluvials near the Willamette River are the potable water sources most economical to develop. Five alternatives, using these and other sources, were evaluated in this study.

Alternative A--Groundwater Near the Willamette River, With Treatment

This alternative water source considers the use of wells constructed in relatively shallow young alluvial material. Each well is assumed to produce approximately 1.4 mgd. Filtration and disinfection would be provided by a water treatment plant located at the periphery of the well field. The treatment plant would have sufficient clearwell capacity for the necessary detention times, and the service pumps would deliver the water at system pressures. The finished water pipelines would be sized for maximum pressures of 150 psi and flow velocities of 5 feet per second. A sketch showing the water source evaluated is on Figure 3-3.

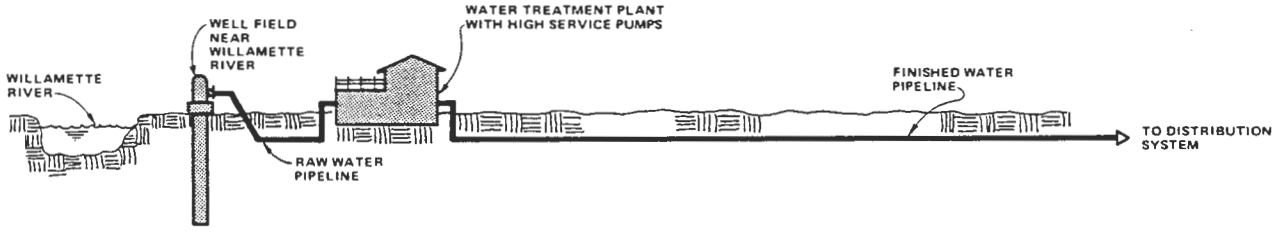


FIGURE 3-3
CONCEPTUAL PLAN
OF SUPPLY ALTERNATIVE A

Alternative B--Willamette River Surface Water With Treatment

This alternative water source uses the surface water directly from the Willamette River. A raw water intake is located at the river's edge and is provided with trash screens and raw water pumps. A water treatment plant is located a short distance from the intake, above the flood levels of the river. Complete treatment including coagulation, flocculation, settling, filtration, and disinfection, are provided by the water treatment plant. The treatment plant would have sufficient clearwell capacity for the necessary detention times, and the service pumps would deliver water at

system pressure. The finished water pipeline would be sized for maximum pressure of 150 psi and flow velocity of 5 feet per second. A sketch showing the water source follows (Figure 3-4).

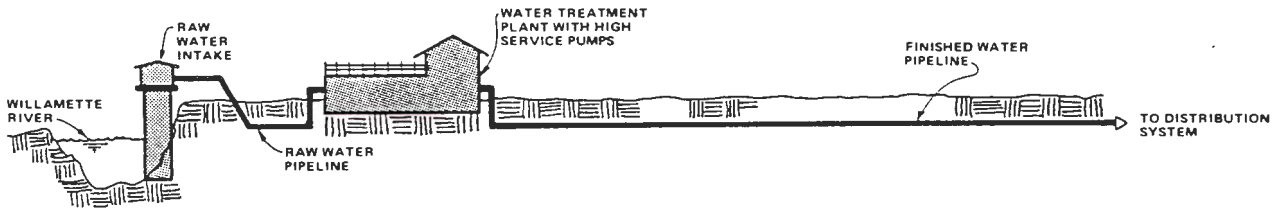


FIGURE 3-4
CONCEPTUAL PLAN
OF SUPPLY ALTERNATIVE B

Alternative C--Rickreall Dam with Dallas Water Treatment Plant Expansion

This alternative would depend on a joint agreement between the Monmouth regional user agencies and the City of Dallas. The City of Dallas has developed the Rickreall Creek as a water source, and the current facilities include a dam and water treatment plant. All of these facilities are expandable. To use this water source, an additional dam would be constructed across Rickreall Creek, as previously studied by the City of Dallas, and the existing water treatment plant expanded. A finished water pipeline would bring the water to the Monmouth region users. This pipe would be sized for maximum pressure of 150 psi and flow velocity of 5 feet per second. A sketch showing the water source follows (Figure 3-5).

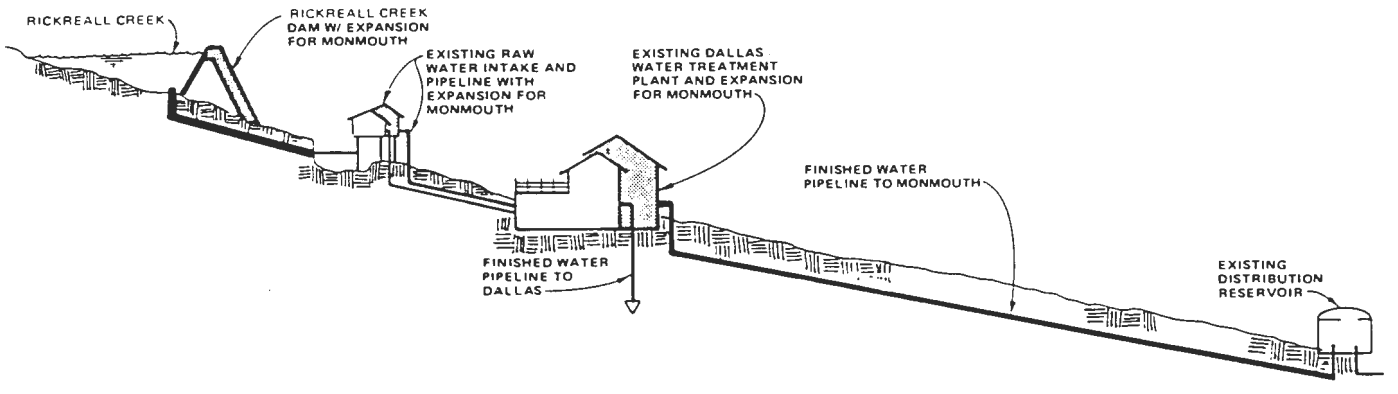


FIGURE 3-5
CONCEPTUAL PLAN
OF SUPPLY ALTERNATIVE C

Alternative D--Teal Creek Dam with Treatment

This alternative water source considers the development of Teal Creek by the construction of a dam at the site studied by the Soil Conservation Service. The Monmouth regional users would be required to participate in the construction cost based upon the benefits derived. The impounded water would require complete treatment, including coagulation, flocculation, settling, filtration, and disinfection. The water treatment plant built to provide this treatment would be located below the dam at an elevation sufficient to serve the Monmouth regional users with gravity flow. The finished water pipeline would be sized for maximum pressure of 150 psi and flow velocity of 5 feet per second. A sketch showing the water source below (Figure 3-6).

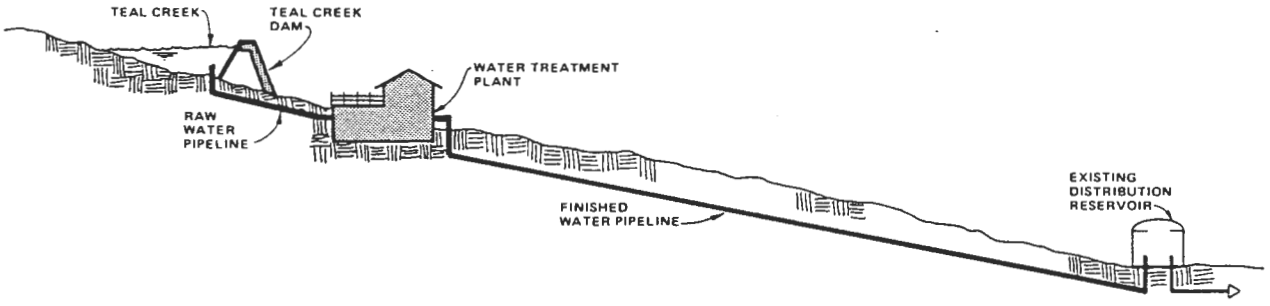


FIGURE 3-6
CONCEPTUAL PLAN
OF SUPPLY ALTERNATIVE D

Alternative E--Luckiamute River with Treatment and Storage Release from Big Rock Creek Dam

The Big Rock Creek Dam is a project studied by the Department of Interior, Water and Power Resource Service. This project considers as one option a dual service plan whereby the impoundment of the Big Rock Creek would provide water to users within both Lincoln and Polk Counties. For Polk County users, a pumping plant, located at the upper portion of the reservoir, would lift the water approximately 250 feet and release it into the Luckiamute River basin. To recover the released water for potable use, a raw water intake would be located in the Luckiamute River, near Helmick State Park. The water would require complete treatment including coagulation, flocculation, settling, filtration, and disinfection.

The treatment plant would have sufficient clearwell capacity for the necessary detention times, and the service pumps would deliver finished water at system pressure. The finished water pipelines would be sized for maximum pressure of 150 psi and flow velocities of 5 feet per second. A sketch showing the water source follows (Figure 3-7).

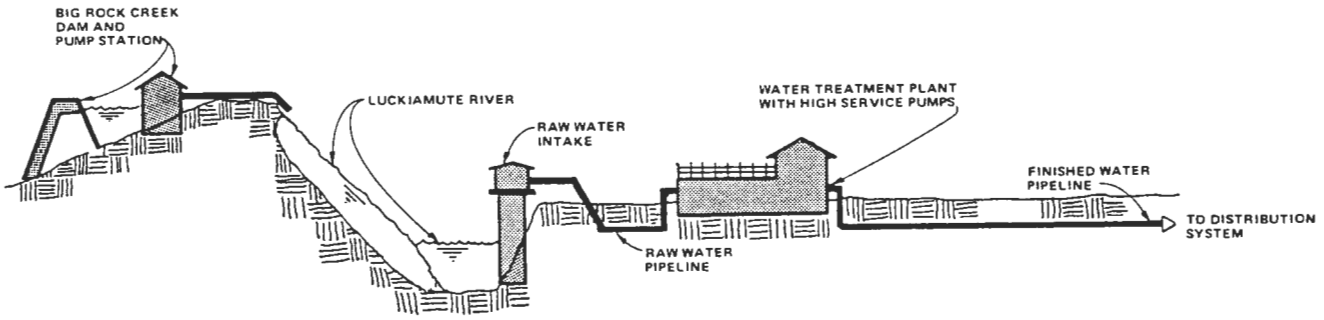


FIGURE 3-7
CONCEPTUAL PLAN
OF SUPPLY ALTERNATIVE E

The location of the major facilities for these alternatives are shown on Figure 3-8.

The opinion of total costs of each alternative for comparative purposes is summarized on Table 3-3. Detailed costs are presented in Appendix C. The comparative costs were prepared on a present worth basis for a 50-year period. Facilities possessing a useful life greater than 50 years were assigned a salvage value using the straight-line method. The interest rate used for present worth was 10 percent, which is close to current rates for municipal bonds.

The most cost-effective water supply system for the City would be the development of wells near the Willamette River. The water quality from this source, as shown by the water taken from the Marion County Well 1, is presently satisfactory with simple disinfection; however, the water quality may be influenced by the quality of the Willamette River, and eventually filtration may be needed. If severe contamination occurs, pretreatment facilities would also be required. However, because of the good water quality experienced to date, the filtration and pretreatment facilities can be delayed until the need for them is shown. Because of potential contamination from upstream point sources, the City must monitor the water quality on a regular basis and be prepared to add treatment facilities when they are needed.

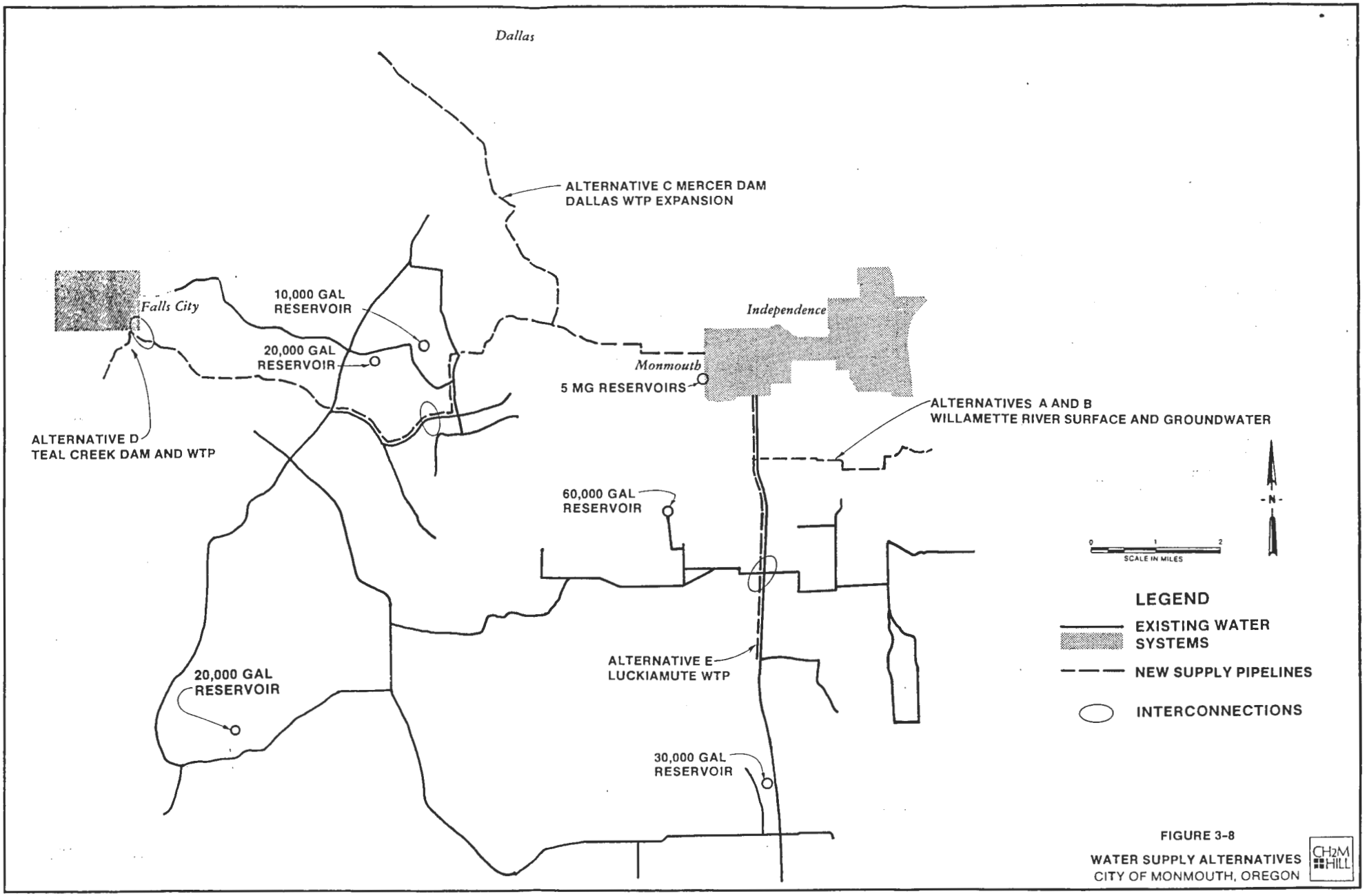


FIGURE 3-8

WATER SUPPLY ALTERNATIVES
CITY OF MONMOUTH, OREGON

CH2M HILL

TABLE 3-3

COMPARATIVE SUMMARY OF THE WATER SUPPLY ALTERNATIVES

ALTERNATIVE DISCRIPTION	COMPARATIVE COST PRESENT WORTH $	ADVANTAGES	DISADVANTAGES
A. GROUNDWATER NEAR THE WILLAMETTE RIVER, WITH TREATMENT	$ 7,853,000	WATER QUALITY IS GOOD; TREATMENT NOT REQUIRED UNLESS DEGRADATION OCCURS; QUALITY IS UNIFORM YEARLY-ROUND; WELLS CAN BE BUILT AS NEEDED	YIELD OF WELLS DIFFICULT TO PREDICT; MORE LAND AND PUMPING REQUIRED THAN FOR OTHER ALTERNATIVES; POTENTIAL CONTAMINATION FROM RIVER
B. WILLAMETTE RIVER SURFACE WATER, WITH TREATMENT	6,316,000	WATER IS PLENTIFUL AND READILY AVAILABLE	TREATMENT REQUIRED; WATER QUALITY VARIES SEASONALLY AND YEARLY; RIVER MAY BECOME POLLUTED; TRAINED OPERATORS REQUIRED; PROCESSES MORE COMPLEX
C. RICKREALL CREEK DAM, WITH DALLAS WTP EXPANSION	11,591,000	NOT RESPONSIBLE FOR O&M DUTIES	DEPENDENT UPON DALLAS FOR WATER; HIGH INITIAL CAPITAL COSTS
D. TEAL CREEK DAM, WITH TREATMENT	10,933,000		HIGH INITIAL CAPITAL COSTS; SPONSORING AGENCY REQUIRED FOR DAM
E. LUCKIAMUTE RIVER WITH TREATMENT AND STORAGE RELEASE	9,783,000		HIGH INITIAL CAPITAL COSTS; SPONSORING AGENCY REQUIRED FOR DAM

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The construction of wells near the Willamette River similar to Marion County Well 1 has the advantage that construction of the wells can be phased as needed by the City to handle immediate water demand.

A risk faced by a water purveyor contemplating any groundwater supply is that the actual yield or longevity cannot be accurately predicted. However, this risk can be mitigated by performing field investigations prior to locating and constructing production wells; these investigations are proposed for the City's water system plan. Figure 3-2 shows the potential sites for the groundwater supply development. A study to identify a suitable well field site and establish the criteria for designing future wells should be undertaken in the near future.

There is also investment risk involved in well drilling; finding adequate and reliable groundwater, even after field investigations are performed, is uncertain. The recommended improvements for the near Willamette River groundwater supply development and the phasing of the construction are discussed in Chapter 5, Water System Plan.

FUTURE STATUS OF TEAL CREEK

This investigation has determined that the Teal Creek water source is a more costly development alternative and it will not be used for the City of Monmouth's future potable water needs. In effect, the Teal Creek water source has become surplus to the City of Monmouth and careful thought must be given to its use or disposal. The alternatives that may be considered are:

- Sell or abandon the facilities and properties
- Rent the facilities and/or sell water to another user
- Use the water for nonpotable use, such as irrigation and fire protection
- Suspend the use and maintenance of facilities, but retain ownership for use at some future time

The possibility of selling Teal Creek water for irrigation has been reviewed. By providing irrigation water from Teal Creek, the existing water rights can be maintained. Based on existing water rates and water consumption data, the annual revenue for irrigation water sale would be about $9,000-$9,500. The value of this annual income, at an interest rate of 10 percent, is about $90,000. The present value of the income derived does not appear to justify the investment into additional facilities to construct a separate irrigation system.

Since time is needed to undertake and develop the near Willamette River wells, we recommend that the City retain the Teal Creek facilities until the new system improvements are in place and operating.

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Chapter 4
DISTRIBUTION AND STORAGE

The existing and future distribution system was evaluated by a computerized water system model. In this analysis, pipes 2 inches in diameter and larger were included in the piping network. Computer simulation of the water demand requirements for the system provided information for the evaluation of various alternatives and helped to optimize the design of the distribution system to best serve the needs of the service area.

PRESENT SYSTEM

Water is pumped from three deep wells through a 12-inch transmission pipeline to the southeast corner of the City. It is here that the water enters the City's arterial piping network. During periods of low demand, when the wells are producing more water than the City is consuming, the excess, or equalization, water flows through the arterial piping into the two upper storage reservoirs on Cupid's Knoll on the west side of Monmouth. Conversely, when demand exceeds the supply from the wells, the equalization water in the reservoirs is used.

The existing transmission and distribution piping system includes the following amount of pipe:

Pipe Diameter	Transmission (linear feet)	Distribution (linear feet)
14 inches	4,500	
12 inches	5,900	7,800
10 inches		100
8 inches	64,400[a]	22,600
6 inches		36,600
4 inches		11,300
3 inches and smaller		28,600
TOTAL	74,800	107,000

[a] Teal Creek transmission main

Since the City of Monmouth is situated on a flat plain, essentially all ground elevations within the urban growth boundary fall within a 50-foot range--170 feet to 220 feet above mean sea level. An exception is a small area in southwest Monmouth adjacent to Cupid's Knoll. The water system schematic is shown on Figure 4-1.

The City presently has three reservoirs: two have a combined capacity of 4 million gallons and the third has a capacity of one million gallons. The small reservoir, with an overflow elevation of 319 feet, is the oldest and was designed to permit gravity flow from Teal Creek. Later, as the City developed, water was needed at higher levels on Cupid's Knoll. This led to the construction of the other two reservoirs with overflows at 361 feet. A small booster pumping station was constructed to transfer the Teal Creek water from the lower reservoir to the two upper reservoirs.

There are a small number of water services on Cupid's Knoll. During peak summer demand periods, pressure to these customers can be as low as 30 psi.

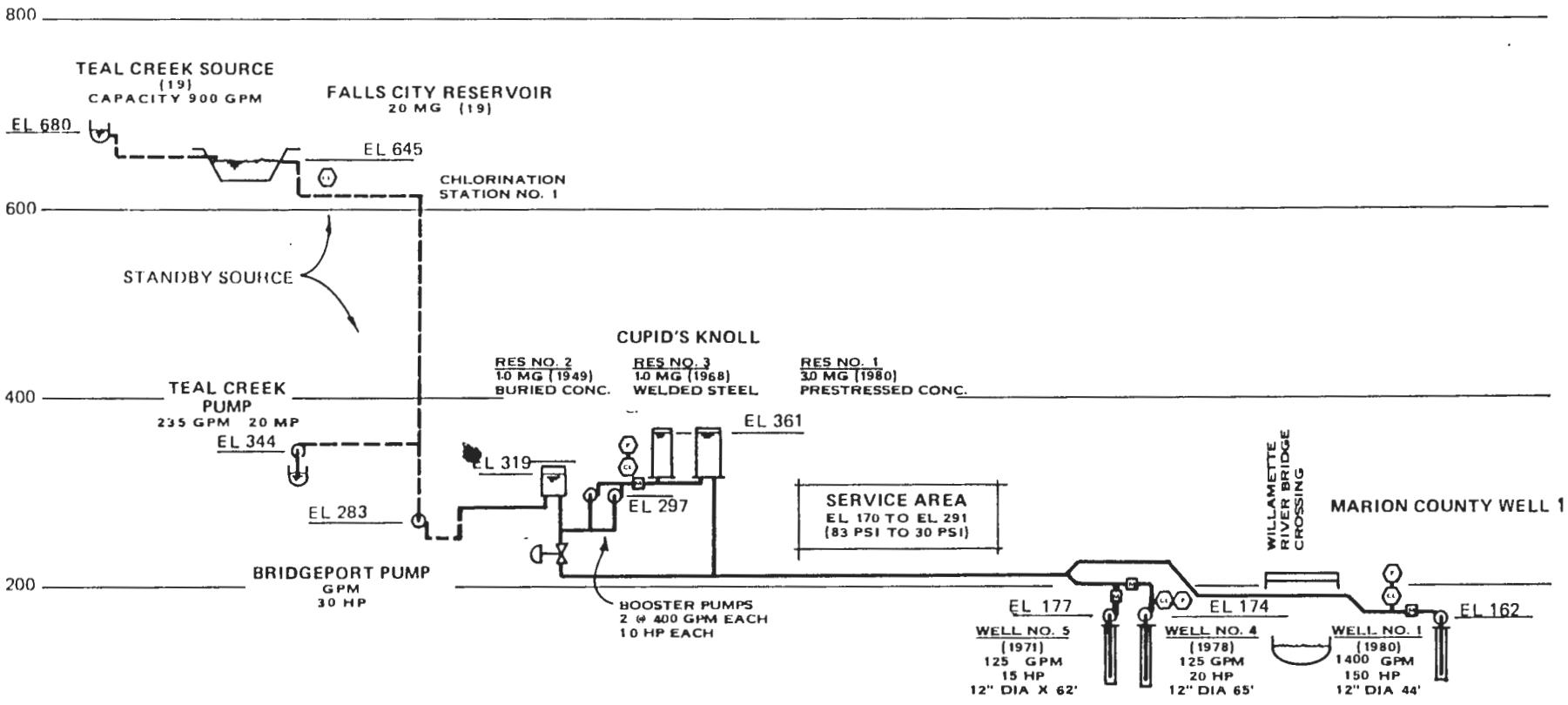
COMPUTER ANALYSIS

A properly designed distribution system is capable of supplying the necessary quantity of water to any given location under many varying conditions. To determine the adequacy of the existing Monmouth water system, a mathematical model of the distribution system was prepared. The model was analyzed by computer to simulate operations during a maximum hour demand (4,975 gpm). A general discussion of the computer model is provided in Appendix D.

To confirm the reliability of a distribution system, three conditions were simulated:

- Supplying the peak hour demand to the entire service area. Reservoir levels were assumed to be 16 feet below overflow during the peak hour demand, to simulate the equalizing storage draft of the reservoir. Evaluation criteria: Minimum pressure of 40 psi at all service connections within the area.

- Delivering fire flows to specified locations while supplying the maximum day demand to the entire service area. Evaluation criteria: Minimum residual pressure greater than 20 psi at the site of the fire flow.



NOTES:

1. WELLS 1, 2, AND 3 IN INDEPENDENCE ARE ABANDONED.
2. DATUM IS MEAN SEA LEVEL.

FIGURE 4-1

WATER SYSTEM SCHEMATIC

COURTESY OF CITY OF MONMOUTH

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- Refilling the reservoirs during low demand periods of the day of maximum use. This scenario evaluates the system's ability to ensure equalizing storage for the following day. Evaluation criteria: Pipelines between the source and storage reservoirs must be sized to prevent excessive pressures in the lower elevations of the service level while the pumps are operating.

The first step of the computer analysis was to simulate the existing system. All pipes 2 inches in diameter and larger were included in the analysis. Historical data for water demands (August 6-8, 1981) were used to develop the water needs for the future. A copy of the estimated 1981 peak hour run is provided in Appendix E.

To determine the arterial pipelines required to meet future conditions, the system model was expanded to include all service areas in the urban growth boundary. Consideration was given to the land uses presented in the Monmouth Comprehensive Plan, and each service area was assigned water demands for the anticipated occupancy.

The analysis of the three conditions provided the following results:

- Maximum Hour Demand. The estimated maximum hour demand in 2005 will be 9,300 gpm. The wells will supply the maximum day demand rate of 3,500 gpm, with the remaining demand satisfied from the reservoirs. The computer run indicated that the existing water transmission pipeline from the Marion County and Independence wells is inadequate to serve future needs. A second transmission pipeline from the wells should be constructed at the time an additional well is constructed.

- Fire Flow Demands. Several computer analyses examined individual fire flow demands for 2005. The system demand was at the maximum day rate and the appropriate fire flows were modeled. The fire flow conditions selected for modeling were those felt to be the most critical for maintaining minimum pressures. The analyses performed assumed only one fire requirement at a time. The fire flow demands and their locations were as follows:

Fire Flow Demand	Location
4,500 gpm	WOSC
3,500 gpm	North Industrial Area

Both of these analyses showed that the system would maintain pressures in excess of 40 psi.

- Reservoir Refill. During reservoir refill, the system demand will be approximately 25 percent of maximum day demand. Surplus flow from the wells will be used to refill the reservoirs. Pressures within the urban growth boundary were found to be acceptable (below 100 psi).

RECOMMENDED SYSTEM

Service Levels

The computer analysis showed that the existing service level is adequate to respond to the demands of the future system. The one possible exception is in the Cupid's Knoll area. As explained previously, the existing pressure to serve the limited number of customers in this area is marginal. As this subarea grows, one of two options is available to the City:

1. Require individual property owners to provide booster pumps to supply adequate water at a suitable pressure.

2. Have the City provide a booster pumping facility to supply domestic water to all properties above approximately 270 feet in elevation. Fire protection could be provided from the base system.

This report recommends that the first option be adopted until such time as economics show that the second option is more cost-effective.

Storage Reservoirs

Storage reservoirs must be sized to satisfy the following three major functions:

- Equalizing storage--the water needed to make up the difference between the supply rate and the water used during peak demand periods

- Fire reserve--the water needed to satisfy the specified fire flows for the durations listed in Table 2-5

- Emergency storage--the water required to supply system needs during emergency conditions such as electrical outages, broken mains, or equipment breakdowns

Equalizing Storage. The equalizing storage requirement is the volume of water consumed by a demand rate that exceeds the water supply rate. For example, if water is supplied at the maximum day demand rate, equalizing storage will be required for demands greater than the maximum day demands. The amount of equalizing storage required can be conveniently expressed in fractions of one day's flow at the maximum day demand rate. Typically, peaking requirements are between 20 and 25 percent of maximum day demand. For this report, 25 percent was used.

Fire Storage. Fire storage is the amount of water needed to deliver the required fire flow for a specified duration. Typical fire flow requirements for the City service area were listed in Table 2-5. In 1980, ISO published revised guidelines entitled "Fire Suppression Rating Schedule." These guidelines identified two types of fire flow requirements for improvements to a property that requires fire protection. The two types are class-rated properties and specifically-rated properties. Class-rated properties require fire flows of 3,500 gpm or less. Specifically-rated properties require over 3,500 gpm. Typically, over 95 percent of all structures are class-rated properties. In Monmouth, the only specifically-rated properties are located on the WOSC campus.

The present required fire storage for the class- and specifically-rated properties is 0.63 and 0.45 million gallons, respectively, bringing the total fire storage required to 1.08 million gallons. The 1.08 million gallons of fire storage is sufficient for present and future needs.

Emergency Storage. Emergency storage within the distribution system is necessary to continue service in the event of a facility shutdown, mechanical failure, or power outage. However, the amount of actual emergency storage necessary depends on the type and duration of the failure. The ISO "Grading Schedule for Municipal Fire Protection" provides a basis for determining the storage needed to maintain a system that will be adequate and reliable during emergency situations. To meet the standards of the ISO grading schedule, emergency storage facilities must provide water for either 2, 3, or 5 days, at the maximum daily consumption rate. The Insurance Services Office also permits the development of a detailed curtailed usage plan (emergency plan). Emergency storage requirements are then based upon the emergency plan, which identifies anticipated outages. In Monmouth's case, emergency storage requirements would be less under a detailed plan.

An emergency plan should be based upon two general criteria from which the necessary volume of emergency storage can be

established. These include the water consumption characteristics of Monmouth during an emergency outage and duration of the outage. We recommend that the first criteria follow the general ISO guidelines for emergency outages, i.e., that the emergency should occur during a maximum water use condition (a day of maximum demand). For this analysis, the outage occurred during the peak hour demand period. It was further assumed that a public notification program be undertaken and within a total period of 12 hours, the total system demand would decrease from a MDD to an ADD.

The second factor in developing an emergency plan is to determine types of outages and associated downtimes. A list of possible outages is provided in Table 4-1.

Table 4-1
EMERGENCY OUTAGES

Outage Type	Duration (Days)	Wells Affected
Power outage	1	All
Equipment failure at well	2 or 3	1
Pipeline break	1 or 2	2 or 3
Cross-connection contamination	1 or 2	None
Contamination of groundwater	Indefinite	1

To determine the impact of the emergency outages on the total system, it was assumed the three existing wells would remain on the existing 12-inch transmission main and the new wells (Options A, B, or C) would be connected to a 16-inch transmission main. The new wells were assumed to produce 1,000 gpm each. The City of Monmouth is upgrading Marion County Well 1 to include an auxiliary diesel engine driver, which will operate the pump during power outages. With these assumptions, Table 4-2 has been prepared. Specific assumptions for each outage type are provided on the table.

Table 4-2 shows that, by developing a workable emergency plan, the City of Monmouth has adequate storage through the planning period.

Transmission and Distribution Pipelines

Figure 4-2 shows the major arterial pipelines, 12 inches or more in diameter, needed to meet the projected year 2005 water requirements. The locations of these pipelines are shown for conceptual planning purposes only. Their final locations must be determined before final design. Future pipelines should be built at the same time streets are constructed in the areas to be developed.

TABLE 4-2
STORAGE REQUIREMENTS FOR EMERGENCY

	1985[a]			1995[a]			2005[a]		
STORAGE (Million Gallons)									
EXISTING	5.00			5.00			5.00		
EQUALIZATION	−0.74			−1.02			−1.26		
FIRE	−1.08			−1.08			−1.08		
AVAILABLE FOR OUTAGE	**3.18**			**2.90**			**2.66**		
WATER REQUIREMENTS (mgd)									
ADD	0.85			1.42			1.87		
MDD	2.97			4.07			5.04		
REQUIRED WATER BY OUTAGE TYPE (Million Gallons)	1-DAY	2-DAY	3-DAY	1-DAY	2-DAY	3-DAY	1-DAY	2-DAY	3-DAY
POWER OUTAGE	0.78	–	–	1.32	–	–	1.81	–	–
EQUIPMENT FAILURE AT WELL[b]	–	1.1	1.24	–	0.97	0.97	–	0.74	0.74
TRANSMISSION PIPELINE BREAK	1.91	2.76	–	1.32	1.32	–	0.60	0.60	–
CROSS-CONNECTION CONTAMINATION	–[d]	–	–	–	–	–	–	–	–
CONTAMINATION OF GROUNDWATER AT WELL[d]	1.20	d	d	0.97	NO ADD'L REQ'D		0.74	NO ADD'L REQ'D	
MAXIMUM STORAGE REQUIRED FOR OUTAGE	**1.91**	**2.76**	**1.24**	**1.32**	**1.32**	**0.97**	**1.81**	**0.74**	**0.74**

[a]1985 – EXISTING WELLS
1995 – ONE NEW 1,000-gpm WELL
2005 – ONE ADD L NEW 1,000-gpm WELL

[b]LARGEST WELL OUT

[c]LOCAL OUTAGE ONLY

[d]NEW WELL NEEDED TO SATISFY REQUIREMENT.

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Pipeline sizing for small service areas (less than 300 acres) will be generally controlled by maximum day demands plus recommended fire flows. Figure 4-3 shows an idealized distribution grid with 12-inch pipelines on 1/2-mile grid spacing and 8-inch pipelines on 1/4-mile grid spacing.

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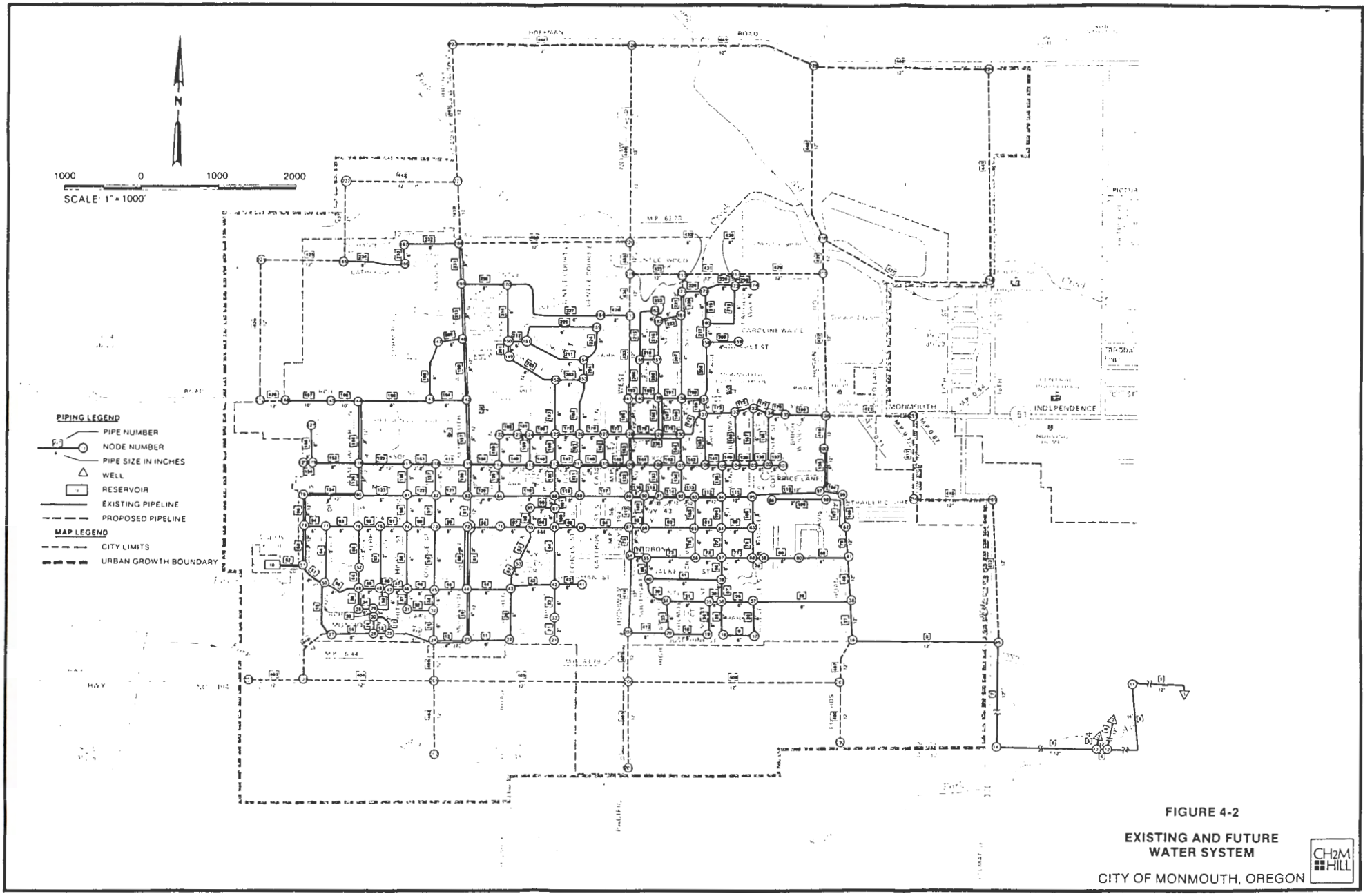


FIGURE 4-2

EXISTING AND FUTURE WATER SYSTEM

CITY OF MONMOUTH, OREGON

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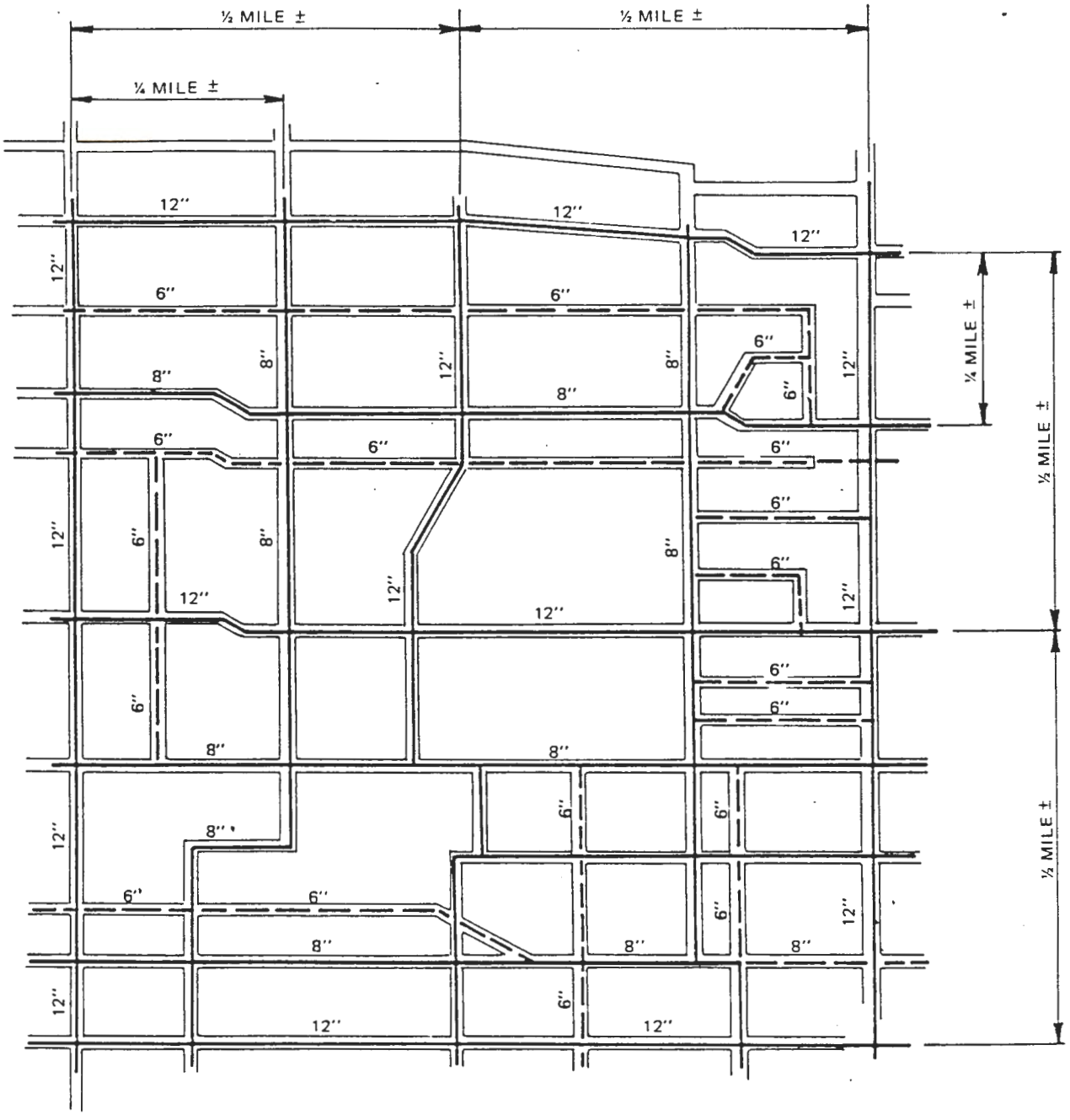


FIGURE 4-3
IDEALIZED DISTRIBUTION GRID
CITY OF MONMOUTH, OREGON

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Chapter 5
WATER SYSTEM PLAN

The water system recommended in this study is consistent with the Monmouth Comprehensive Plan and historical water use data. Water demands were determined for the present system customers, and the water requirements to serve the development within the urban growth boundary were estimated to the year 2005. The capability of the water system to meet these needs was evaluated with respect to the distribution system, storage reservoirs, and water supply. From that evaluation, proposed improvements were identified and assigned priorities in two groups--Phase I and II. Priority assignments were based on importance and immediacy of need.

Phase I improvements are required to improve the existing system capability and should be constructed within the next 1 to 2 years. Phase II improvements and extensions are necessary to handle growth as it occurs over the next 20 years.

RECOMMENDED IMPROVEMENTS

The recommended water system plan is shown on Figure 4-2; A summary of the recommended improvements is given in Table 5-1.

Table 5-1
RECOMMENDED IMPROVEMENTS AND PROJECT COSTS
(at ENR 4000)

Phase I--Immediate (1983-1984)	
New Pipelines	
12"--3,500 feet	$ 264,000
8"--1,600 feet	83,000
Replacement of Existing Piping	
20"--300 feet	41,000
12"--16,900 feet	1,276,000
Supply System Improvements	
Well	125,000
16"--10,500 feet[a]	1,084,000
10"--200 feet[a]	13,000
	$2,886,000
Phase II--Future (beyond 1984)	
New Pipelines	
12"--51,300 feet	3,873,000
8"--400 feet	21,000
Source Improvements	
Well	125,000
10"--500 feet	33,000
	$4,052,000
TOTAL	$6,938,000

[a]Approximate lengths based upon well site Option B, Figure 3-2.

Pipelines recommended for Phase I consist of improving the major east-west transmission capabilities, strengthening the north-south piping system, and increasing fire flows to existing structures. The Phase II improvements consist of transmission and arterial pipeline extensions to developing areas.

Phase I improvements to the water supply system include the construction of a new well and the addition of a 16-inch transmission main to the City's distribution system. Phase II supply system improvements include the construction of a second new well.

In addition, the City should continue inspecting all piping less than 6 inches in diameters to determine system adequacy and to identify deficient lines to be replaced.

COST ESTIMATES

The cost estimates shown in Table 5-1 were prepared to assist the City in project evaluation and implementation and were based on information available at the time of the estimate. The financial costs of the project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors. As a result, the final project costs will vary from the estimates presented in Table 5-1. Because of this, project feasibility and funding needs must be carefully reviewed prior to making specific financial decisions to help ensure proper project evaluation and adequate funding.

Estimated costs for installed pipe assumed polyvinyl chloride (PVC) pipe would be used for 6- to 10-inch pipe, and ductile iron (DI) pipe would be used for 12-inch and larger pipe. Fittings, valves, and fire hydrants were included in the total piping costs. Table 5-2 shows the cost development for the pipeline costs. A 25-percent allowance should be added for project legal, administrative, engineering, and contingency costs. This 25 percent has been added into Table 5-1 costs.

FINANCING

During the summer of 1981 the City imposed new water user rates to finance anticipated capital improvement projects. The total projected revenue requirement for 1981-82 fiscal year was $1,053,600 with $812,460 designated for capital outlays. Within the capital outlay budget, $600,000 was earmarked for capital improvements. We recommend that the City compare the projected revenues to the monies received. This analysis will identify the monies actually available for capital improvement projects on a yearly basis.

TABLE 5-2

ESTIMATED COST OF INSTALLED PIPELINES ($/LINEAR FOOT — ENR INDEX 4000)

PIPE SIZE	PIPE TYPE[a]	IN-PLACE COST	TRENCH EXCAVATION AND BACKFILL	FITTINGS & VALVES[b]	FIRE HYDRANT[c]	SURFACE RESTORATION[d]	SUBTOTAL	OTHER WORK[e]	CONTRACTOR ADMINSTRATION[f]	TOTAL
6"	CLASS 150 PVC	$5.00	$9.40	$2.45	$2.95	$8.85	28.65	$5.75	$2.00	$36.40
8"	CLASS 150 PVC	7.85	9.90	3.00	3.10	8.85	32.70	6.55	2.30	41.55
10"	CLASS 150 PVC	11.05	10.20	4.40	3.40	8.85	37.90	7.60	2.65	48.15
10"	CLASS 51 DI	15.65	10.20	4.40	3.05	8.85	42.15	8.45	2.95	53.55
12"	CLASS 51 DI	20.00	10.75	4.75	3.20	8.85	47.55	9.50	3.35	60.40
16"	CLASS 51 DI	29.05	13.00	7.60	3.55	11.80	65.00	13.00	4.55	82.55
20"	CLASS 51 DI	38.35	15.55	11.75	4.95	14.75	85.35	17.05	6.00	108.40

[a] PVC - AWWA C-900, DI - AWWA C-151

[b] ASSUME FITTING GROUP @ 600 LINEAR FEET EACH.

[c] ASSUME FIRE HYDRANT @ 500 LINEAR FEET EACH.

[d] COST TO REMOVE AND REPLACE ROADWAY PAVEMENT

[e] ADDITIONAL 20 PERCENT; INCLUDES STERILIZATION, TESTING, THRUST BLOCKING, ETC.

[f] ADDITIONAL 7 PERCENT; INCLUDES MOBILIZATION, TEMPORARY FACILITIES, BONDS, AND INSURANCE.

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The costs for Phase I improvements are estimated at $2,886,000. Based upon a 20-year repayment period and 10 percent interest, the annual repayment will be $340,000. If the annual revenues received are close to the values projected, it is possible to fund all of the Phase I improvements within the existing rate structure.

Phase II improvements are tied to expansion of the system within the urban growth boundary. As development occurs, additional improvements will be necessary. By establishing system development fees, which assess future development, it is reasonable that most of the future costs for Phase II improvements can be paid for by the benefited property owners.

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Chapter 6
RECOMMENDATIONS

On the basis of this study, we recommend that the City of Monmouth take the following actions:

1. Adopt this plan for water system improvements and submit the plan to the appropriate government agencies for their review and comment.

2. Review and adjust this plan periodically to meet the needs and changing conditions of the community.

3. Proceed with a source reconnaissance study to identify the locations for the new well field.

4. Proceed with the design and construction of Phase I work.

5. Continue to upgrade the existing undersized distribution system piping.

6. Retain the Teal Creek source until a new well and transmission pipeline are constructed.

7. Develop a detailed emergency plan for the water system.

/CVR4/066

Appendix A
WATER QUALITY DATA

The following statements present the results of the drinking water analyses conducted at the CH2M HILL laboratory on January 27, 1983.

Environmental Laboratory

Date: January 27, 1983
Invoice No.: C29759

Drinking Water Analysis: Safe Drinking Water Act, PL 93-523

Client: City of Monmouth
151 W. Main
Monmouth, Oregon 97361

Sample Information

Type: Raw
Date: Jan. 11, 1983
Place: Well #1

Analysis Information

Date Received: Jan. 11, 1983
Reference No.: 8509
Date Analyzed: Jan. 11-27, 1983
Analyzed By: Mary Murphy

Chemical, mg/l	Found	Standard
Arsenic, As	< 0.005	0.05
Barium, Ba	< 0.05	1
Cadmium, Cd	0.0016	0.010
Chromium, Cr	< 0.005	0.05
Lead, Pb	< 0.005	0.05
Mercury, Hg	< 0.0005	0.002
Nitrate, N	0.557	10
Selenium, Se	< 0.005	0.01
Silver, Ag	< 0.001	0.05
Sodium, Na	9.57	20**

< Indicates "less than."
*EPA Primary Drinking Water Standards, Public Law 93-523.
**See regulations.

CVLAB/005-1

Drinking Water Analysis: Safe Drinking Water Act, PL 93-523

Client: City of Monmouth
151 W. Main
Monmouth, Oregon 97361

Sample Information

Type: Raw
Date: Jan. 11, 1983
Place: Well #4

Analysis Information

Date Received: Jan. 11, 1983
Reference No.: 8510
Date Analyzed: Jan. 11-27, 1983
Analyzed By: Mary Murphy

Chemical, mg/l	Found	Standard
Arsenic, As	<0.005	0.05
Barium, Ba	<0.05	1
Cadmium, Cd	<0.0005	0.010
Chromium, Cr	<0.005	0.05
Lead, Pb	<0.005	0.05
Mercury, Hg	<0.0005	0.002
Nitrate, N	0.295	10
Selenium, Se	<0.005	0.01
Silver, Ag	<0.001	0.05
Fluoride, F	0.41	1.4-2.4**
Sodium, Na	26.1	20**

< Indicates "less than."
*EPA Primary Drinking Water Standards, Public Law 93-523.
**See regulations.

CVLAB/005-3

Drinking Water Analysis: Safe Drinking Water Act, PL 93-523

Client: City of Monmouth
151 W. Main
Monmouth, Oregon 97361

Sample Information	Analysis Information
Type: Raw	Date Received: Jan. 11, 1983
Date: Jan. 11, 1983	Reference No.: 8511
Place: Well #5	Date Analyzed: Jan. 11-27, 1983
	Analyzed By: Mary Murphy

Chemical, mg/l	Found	Standard
Arsenic, As	<0.005	0.05
Barium, Ba	<0.05	1
Cadmium, Cd	<0.0005	0.010
Chromium, Cr	<0.005	0.05
Lead, Pb	<0.005	0.05
Mercury, Hg	<0.0005	0.002
Nitrate, N	0.044	10
Selenium, Se	<0.005	0.01
Silver, Ag	<0.001	0.05
Fluoride, F	0.44	1.4-2.4**
Sodium, Na	37.4	20**

< Indicates "less than."
*EPA Primary Drinking Water Standards, Public Law 93-523.
**See regulations.

CVLAB/005-5

Environmental Laboratory

Date: January 27, 1983
Invoice No.: C29759

Drinking Water Analysis: State of Oregon Secondary Requirements

Client: City of Monmouth
151 W. Main
Monmouth, OR 97361

Sample Information	Analysis Information
Type: Raw	Date Received: Jan. 11, 1983
Date: Jan. 11, 1983	Reference No.: 8509
Place: Well #1	Date Analyzed: Jan. 11-27, 1983
	Analyzed By: Mary Murphy

Parameter, mg/l	Found	Standard
Sand	<0.002	2
pH	6.6	6.0-9.0
Hardness, total as $CaCO_3$	45.9	250
Total Solids	119	500
Chloride, Cl	3.16	250
Copper, Cu	<0.02	5
Iron, total Fe	<0.05	0.3
Manganese, Mn	<0.01	0.05
Sulfate, SO_4	6	250
Zinc, Zn	0.044	5

< Indicates "less than."
* Oregon Administrative Rules, Ch. 333, Sec. 42-200 to 42-245.

CVLAB/005-7

Drinking Water Analysis: State of Oregon Secondary Requirements

Client: City of Monmouth
151 W. Main
Monmouth, OR 97361

Sample Information	Analysis Information
Type: Raw	Date Received: Jan. 11, 1983
Date: Jan. 11, 1983	Reference No.: 8510
Place: Well #4	Date Analyzed: Jan. 11-27, 1983
	Analyzed By: Mary Murphy

Parameter, mg/l	Found	Standard
Sand	<0.002	2
pH	7.1	6.0-9.0
Fluoride, F	0.41	2.4
Hardness, total as $CaCO_3$	99.8	250
Total Solids	232	500
Chloride, Cl	9.74	250
Copper, Cu	<0.02	5
Iron, total Fe	0.09	0.3
Manganese, Mn	0.02	0.05
Sulfate, SO_4	4	250
Zinc, Zn	0.008	5

< Indicates "less than."
* Oregon Administrative Rules, Ch. 333, Sec. 42-200 to 42-245.

CVLAB/005-9

Drinking Water Analysis: State of Oregon Secondary Requirements

Client: City of Monmouth
151 W. Main
Monmouth, OR 97361

Sample Information	Analysis Information
Type: Raw	Date Received: Jan. 11, 1983
Date: Jan. 11, 1983	Reference No.: 8511
Place: Well #5	Date Analyzed: Jan. 11-27, 1983
	Analyzed By: Mary Murphy

Parameter, mg/l	Found	Standard
Sand	<0.002	2
pH	7.1	6.0-9.0
Fluoride, F	0.44	2.4
Hardness, total as $CaCO_3$	147	250
Total Solids	296	500
Chloride, Cl	15.5	250
Copper, Cu	<0.02	5
Iron, total Fe	0.64	0.3
Manganese, Mn	0.55	0.05
Sulfate, SO_4	5	250
Zinc, Zn	0.008	5

< Indicates "less than."
* Oregon Administrative Rules, Ch. 333, Sec. 42-200 to 42-245.

CVLAB/005-11

Environmental Laboratory

Date: January 27, 1983

Invoice No.: C29759

Subject: Analysis of well water samples for the City of Monmouth, OR. The samples were received January 11, 1983, and assigned reference Nos. 8509-8511.

Parameter as mg/l	Well #1	Well #4	Well #5
Alkalinity, Total as $CaCO_3$	47.9	147	222
Calcium, Ca	10.8	20.5	31.4
pH	6.6	7.1	7.1
Temperature, °F (on site)	54	53	53
Total Dissolved Solids	119	232	296
Corrosivity, Langelier Index	-2.4	-1.2	-0.8

All tests are performed in accordance with current Environmental Protection Agency guidelines as published in the Federal Register.

The information shown on this sheet is test data only and no interpretation is intended or implied.

Samples will be retained 30 days unless otherwise requested.

Reported by: _____
Mary Murphy

/CVLAB/005-13

Appendix B
1981 WATER SOURCE STUDY

This appendix contains a reprint of the Water Source Study that CH2M HILL submitted to the City of Monmouth on June 29, 1981.

CH2M HILL
engineers
planners
economists
scientists

June 29, 1981

C15044.A0

City of Monmouth
151 W. Main Street
Monmouth, Oregon 97361

Honorable Mayor and Council Members

Subject: Water Source Study

This report summarizes the study of the City of Monmouth water supplies and presents our findings and recommendations in accordance with the engineering agreement of June 1, 1981. This study included the investigation of the alternative water supply sources which were previously identified as the most feasible for supplying the long term needs for the City and reconsidered these alternatives under current conditions and growth protections. We have also made a cursory investigation to identify other water supplies that may now be feasible for development for the City's future needs.

BACKGROUND

The City of Monmouth has recently completed major improvements to its water system which included the construction of a 3-million-gallon prestressed concrete reservoir and a well now rated at 750 gallon per minute. These improvements were financed by the sale of municipal bonds in 1977. A portion of this money has been allocated for the replacement of a section of the Teal Creek supply transmission pipeline and contractor's proposals for the construction have been received. Prior to proceeding with the award of the contract for this work the City decided to review the role of the Teal Creek supply as a future supply source and if the expenditure for the replacement of transmission pipeline is justified.

Previous engineering investigations of the water system were carried out by C&G Engineering in 1977 and Robert E. Meyer Consultants in 1978. The earlier study found that the Teal Creek source was subject to seasonal flow variation and therefore it was not suitable for the long term unless storage was provided. Also, the seasonally high turbidity made the Teal Creek source unacceptable unless treatment to remove turbidity was provided.

The 1978 engineering study reconsidered the previous findings and made the recommendations for the long term water source for the City. The recommendations were: 1) to proceed with the development of the Teal Creek source only if impoundment is provided and this source facilities would include an 18-inch transmission pipeline and a water treatment plant to ensure adequate long-term quality and quantity; 2) until the Teal Creek source could be completed, it was proposed that ground water from wells be developed for an interim supply; and 3) if the Teal Creek dam does not proceed, then another adequate long-term source that meets the financial and water quality requirements should be chosen for development.

The City has proceeded with the development of the interim ground water supply by the construction of the Marion County well. This well was constructed in 1978 and the pump, chlorination equipment, and transmission pipeline were installed which permitted the initial use of the new well in the late summer of 1980. It is reported that the well, as constructed, can deliver approximately 750 gallons per minute; however, Aqua-Tech, the engineering geologists and consultants who designed the well, reported in a letter to the City in 1978 that the well has a production capacity of 1,000-1,150 gallons per minute.

Following the successful development of the Marion County well, Aqua-Tech carried out additional investigations in 1980 relative to the availability of ground water and to determine the feasibility of constructing a second well. They concluded that a second well was feasible; however, the report also recommended that although the water quality was acceptable, it should be constantly monitored because of the industry and agriculture activities adjacent to the Willamette River. The water quality may be influenced by the chemical quality of the Willamette River and local practices.

The emphasis for the development of a suitable long-term water supply source has been the enforcement provisions of the Federal Safe Drinking Water Act which is administered by the Environmental Protection Agency (EPA). On June 9, 1978, in accordance with the provisions of the Safe Drinking Water Act, the City of Monmouth was granted an exemption from the maximum contaminant level for turbidity until December 31, 1979; however, the exemption was extended to January 1, 1981. The Safe Drinking Water Act established a statutory deadline of January 1, 1981, for compliance, and EPA cannot extend the compliance beyond this date. Under the terms of the exemption, the City is

required to carry out interim control measures which will minimize the risk to health involved in the interim operation of the Teal Creek source. These measures included very strict chlorine disinfection, shutting off the flow when the turbidity was high, and the monitoring of the quality within the transmission pipeline and distribution system. In addition, the exemption stipulated a schedule for the final compliance. To meet full compliance, the City is to: 1) develop additional ground water supply capable of replacing the existing Teal Creek source; and, 2) cooperate and coordinate with the Luckimute Water Cooperative toward the common goal of providing ground water to the existing rural users of the Teal Creek source.

Based upon the previous investigations and the need to comply with the EPA exemption, there is still some uncertainity as to the continued use of the Teal Creek source and the development of a suitable long-term supply source. Because of this uncertainty, the City has requested that its status be reviewed under the present conditions and recommendations made relative to the replacement of the transmission pipeline and reaffirm or redefine the status of the Teal Creek supply.

DISCUSSION

Water Requirements

The amount of water to be used by the City of Monmouth to meet the needs of its customers is related to the population served plus the industrial and commercial usage. The per capita water consumption is generally the basis used for determining the present and future water requirements.

The City's population is projected in the Monmouth Comprehensive Plan to the year 2000. The population was further projected at a similar growth rate to the year 2020 to use as an estimate of long-term water requirement. The resulting population projection is as follows:

Year	Estimated Population
1980	6,800
1990	9,500
2000	12,400
2010	15,200
2020	18,000

The per capita water usage was obtained from Monmouth water department records, and is obtained by dividing the total water used by the estimated population. Included in the total water used is residential, commercial, and industrial usages, as well as system leakage and unmetered water usages such as fire fighting or street cleaning.

For this study, 140 gallons per capita per day for the annual average demand, and 350 gallons per capita per day (gpcd) for the maximum day demand were found to be the best approximation of the per capita useage. The 350 gpcd compares with other cities nearby as shown in the following table:

	Annual Average	Maximum Day
Dallas	208 gpcd	436 gpcd
McMinnville	297 gpcd	773 gpcd
Corvallis (all users)	143 gpcd	335 gpcd
Corvallis (residential only)	148 gpcd	575 gpcd
Monmouth	140 gpcd	350 gpcd

Using the per capita demands, the following table lists the resulting projected demands:

Year	Population	Average Annual Demand, mgd	Maximum Day Demand, mgd
present	6,200*	0.87	2.17
1990	9,500	1.33	3.33
2000	12,400	1.74	4.34
2010	15,200	2.13	5.32
2020	18,000	2.52	6.30

*Estimated 1981 population.

The present summer water supply capacities are as follows:

	Gallons Per Minute (gpm)	Million Gallons Per Day (mgd)
Independence Wells	250	0.36
Marion County Well No. 1	750	1.08
Teal Creek	300	0.43
	1,300	1.87

Based on the projected maximum day demands and the present summer supply capacities, the required additional supply capacities needed are as follows: These capacities are calculated based upon using Teal Creek and not using Teal Creek.

Year	Projected Maximum Day Demand	Additional Supply Required w/Teal Creek	Additional Supply Required w/o Teal Creek
present	2.17 mgd	0.30 mgd	0.73 mgd
1990	3.33 mgd	1.46 mgd	1.89 mgd
2000	4.34 mgd	2.47 mgd	2.90 mgd
2010	5.32 mgd	3.45 mgd	3.88 mgd
2020	6.30 mgd	4.43 mgd	4.86 mgd

As shown, there is insufficient water supply for the present population. Although this shortage may not have been evident in past years, there were times when reservoirs could not be refilled during periods of high useage. This is an indication of insufficient supply capacity; further more, recent summer periods have been wetter than normal and the system cpacity has not been as severely drawn upon as it would have with drier and hotter seasons. The projections shown above are reasonable estimates for use in the planning of the water supply requirements.

WATER QUALITY

The quality requirements of water are determined by the State and Federal regulations, the quality of water available, the public's safety and health, and the local user's preferences.

The State of Oregon and the Federal Government have requirements for physical, chemical, bacterial, and radioactivity properties of water. Tests have been made in the past to determine compliance with these requirements and the results have been tabulated in

previous reports and the Monmouth Comprehensive Plan. The Teal Creek source is typical of most surface water, it is a soft water, but has turbidities in excess of the standards during higher rainfall periods. During some periods the turbidity exceeds State and Federal standards and for that reason the City needs an exemption to the turbidity limits by EPA in order to continue using Teal Creek. The exemption required more monitoring and eventually compliance with the reulation. The City is meeting the regulation at this time by not using the Teal Creek source during high turbidity periods and using well water.

The well water from both the Marion County well and the Independence well field have harder water than Teal Creek. The harder water does not exceed State or Federal standards but its hardness can be detected by taste and some soaps are less effective in the harder water. Tests have indicated that the Marion County well has nitrates that are roughly one-half the EPA maximum contaminant level. The nitrate level is not a concern at this time but should be monitored seasonally.

The Teak Creek supply is a surface supply that is vulnerable to varying amounts of bacterial contamination. Tests of the unchlorinated water have indicated presence of coliform bacteria (bacteria from animal or human waste). The presence of coliform bacteria means that a malfunction of the chlorinator would cause contaminated water to be introduced into the water distribution system. State of Oregon regulaions would not permit use of a surface source such as Teal Creek, without complete treatment, if proposed for a new water supply. Also, major improvements to the Teal Creek supply would probably be contingent upon the water receiving full treatment.

SUPPLY SOURCES

Several sources have been identified in previous studies and are currently under consideration as long-term and/or short-term supply sources. As long-term sources, any surface source will require a water treatment plant. Some well sources may require treatment if adequate filtering and protection from surface or laterial contamination is not present in the natural geologic features.

TEAL CREEK SUPPLY

Presently, the Teal Creek supply consists of surface water diversion from springs and Teal Creek that are collected and transmitted approximately 12 miles by a gravity pipeline to the City reservoirs. Chlorination is near the head of the pipeline at the source. In addition, there is an infiltration pipeline and pump from Teal Creek that is used sometimes in summer months. The Teal Creek supply has a relatively high count of bacteria before chlorination which places a high importance on the operation and maintenance of the chlorinator. Expansion or long-term use of the Teal Creek supply without a water treatment plant would not be permitted under state laws or good water supply practice.

The flow of available water in the summer is about 300 gpm which is a low percentage of the higher summer water demands. Dam storage would allow higher summer flows. To effectively use Teal Creek, a larger pipeline, a water treatment plant, and dam storage is needed.

The Teal Creek source is typical of the other small streams that flow from the Coast Range mountains and the water from these would require the same treatment as Teal Creek.

WILLAMETTE RIVER SURFACE SUPPLY

To use surface water from the Willamette River, or any of its tributary streams, a screened surface water intake with pumps and a water treatment plant, together with the necessary transmission pipelines are needed.

The Willamette River is a source of supply for several Cities along the river. Ample quantity of water is available. The major disadvantage of the source is the seasonal and daily changes in quality and vulnerability to contamination. The frequent changes in quality require more intensive treatment.

GROUND WATER NEAR WILLAMETTE RIVER

In general, wells near the Willamette River are fairly shallow. Heavy pumping of these wells will cause water to be pulled from the river, and the resulting water will be similar in quality and also subject the same contamination hazards of the river. The hydraulics and water quality aspects of wells are complex and not easy to predict. The selection of a well site must be made carefully, considering such factors as the quality, quantity, and the economics.

Investigations have been made by Ranney Method, Inc. for a horizontal collection system along the Willamette River which is similar to shallow wells. Although the Ranney system may require less land, they also have inherent problems due to the withdrawal of larger volumes of water from a relatively small area.

Although wells or infiltration systems near the Willamette River should yield an adequate quantity of water, the water quality is of concern. Relatively shallow, high yielding wells are more vulnerable to bacteria or other contaminants than deep wells. Chlorination treatment alone is not suitable treatment for waters that contain bacteria nor will it affect industrial and agriculture pollutants. A conventional water treatment plant is needed if bacteria normally exists in the untreated water. A well field may initially not need treatment but water quality could change and require treatment in later years.

COMPARITIVE COST ESTIMATES

Cost estimates were developed for three basic alternative long-term (40 years) sources of supply. The costs were estimated based upon CH2M HILL cost data and data from previous studies done for Monmouth. The costs are approximate and are used only to make comparisons between the alternatives. For each of the alternatives, there would be some reductions in short-term costs due to staging parts of the facilities. The estimates are as follows:

	Teal Creek	Willamette River Surface Water	Near Willamette River Ground Water
Wells or collector	--	--	$1,400,000*
Dam storage share	$ 675,000	--	--
Intake Facilities	220,000	$ 260,000	--
Water Treatment Plant	1,425,000	1,765,000	1,260,000
Transmission Pipeline	1,739,000	450,000	420,000
Engineering, Legal, Adm.	1,015,000	619,000	770,000
Contingency	1,015,000	619,000	770,000
Total Project Cost	$6,089,000	$3,713,000	$4,620,000

*Includes land or water right cost of $650,000.

DISCUSSION OF LONG-TERM SUPPLY OPTIONS

The Teal Creek source has the best water quality, if treated. Teal Creek water is not suitable untreated. Summer flows would not be adequate unless dam storage is available. The cost of dam storage and the long transmission pipeline make this option quite costly, especially on the initial construction since dam storage, pipeline, and at reatment plant would have to be built prior to use of Teal Creek.

Willamette River surface water is economical from a capital cost standpoint but will require more intensive operation at the water treatment plant. Operation time and chemical costs will be higher for treating the surface water. The surface water will be vulnerable to spills of chemicals or other contaminates.

Ground water near the Willamette River has a low cost as long as treatment is not required, however, even if treatment is required, this option is probably cost competitive with Willamette River surface water and much lower cost than Teal Creek supply option. Like the Willamette River surface water, ground water near the river will be vulnerable to chemical spills and contaminants in solution. The natural filtering should keep the water relatively free of turbidity. Full treatment may be avoided for many years which could save a large amount of money. There is no good basis to predict when full treatment may be needed.

DISCUSSION OF SHORT-TERM SUPPLY OPTIONS

The Teal Creek supply is expensive because of operation and maintenance costs for a relatively small supply. Also there are the quality problems that require more attention to handle and also are a concern to regulatory agencies. The safety of the water supply is dependent upon operation of the chlorinator since the water routinely has bacteria present. We conclude that the Teal Creek should not be used in its present state except for emergencies.

Wells are the best short-term supply because of existing water quality and the relatively low cost of operation. The capacity of the Marion County well can probably be increased without much added cost. There are some possibilities for increasing the Independence well field capacity by maintenance and/or new construction. The Independence well water contains higher

hardness content, so large expansion of this supply is not desirable even if feasible hydraulically.

DISCUSSION OF THE ENERGY CONSIDERATIONS

Because of the significance of the electric energy requirments and the potential for power generation from Monmouth's share of the Teal Creek impoundment, the annual cost of pumping and power sold has been computed at 10-year intervals for the three supply options. For purposes of comparisons the electricity has been valued at 2-1/2 cents per kWhr.

Year	Ave. Annual Demand		Teal Creek	Willamette River Surface Water	Near Willamette River Ground Water
1990	1.33	Generated	$15,800	--	--
		Used	2,200	$12,400	$13,600
2000	1.74	Generated	15,200	--	--
		Used	3,000	16,300	17,700
2010	2.13	Generated	14,600	--	--
		Used	3,600	19,900	21,700
2020	2.52	Generated	14,000	--	--
		Used	4,200	23,500	25,700

CONCLUSIONS AND RECOMMENDATIONS

Based upon this investigation, we conclude that the City should proceed with its water source development program utilizing the ground water supplies near the Willamette River. This program was a commitment to EPA to fulfill compliance with the Federal Safe Drinking Water Regulations. The development of this water supply source may ultimately require the treatment, depending upon degree of influence from the Willamette River and the degradation of these waters from both the short-term and long-term industrial use and agriculture practices along the Willamette River. The Marion County Well No. 1 can currently deliver about 1.0 mgd and it is capable of modifications to increase its output to approximately 1.7 mgd which is sufficient for the City's short-term requirements, and this quantity is also the maximum that the 12-inch bridge crossing pipe can carry. Supplemental ground water can be obtained from the Independence Wells. The previous investigations have shown that additional

create a separate irrigation system would be relatively easy and inexpensive. A rate for the sale of irrigation water could help to pay for the installation, provide the funds for O&M, and also the use of irrigation water would relieve the demand for the potable water from the well fields near the Willamette River.

RECOMMENDATIONS

1. Discontinue the use of the Teal Creek supply for potable water except for standby and emergency use; make only minor repairs to the transmission pipeline; do not make the contemplated replacement, and in the future only make the replacement and repairs to alleviate potential damage and property owner complaints.

2. Pursue the possibility of developing a separate system for the selling of Teal Creek irrigation water to Western Oregon College and others.

3. Increase the well source capacity as required to offset the loss of the Teal Creek supply, and to provide for population increases by the following:

    a. Increase the capacity of the Marion County Well and pumping facilities.

    b. Investigate maintenance or construction on the Independence wells and carry out the work to add to present capacity.

    c. Construct an equivalent parallel 12-inch diameter pipeline to connect the well fields to the Monmouth water distribution system.

4. Have a comprehensive water study performed to evaluate the City's total water supply, distribution, and storage needs and provide a master plan to provide for the City's future growth. Delay actual source improvements until they are refined in the comprehensive study.

We appreciate the opportunity to conduct this study and to present our findings and recommendations. We will be happy to

ground water is available in the area near the Marion County Well No. 1 and also on the western side of the river near the area commonly called American Bottom. The development of the second well should be undertaken carefully and the program should be guided by the findings and recommendations of a competent ground water hydrologist and engineers. A second well will also require that additional pipeline capacity be provided to deliver the water to the Monmouth service area. The second transmission should be at least 12-inch diameter and it should take a different route than the current 12-inch pipe to provide protection of service should one pipe be damaged or out of service for some unplanned reason.

Also, since the ground water quality may degenerate, treatment facilities may be required in the future. This eventually should be considered in the location and routing of the new supply facilities.

When the Teal Creek source use is discontinued and all water is furnished from the Marion County and Independence Wells, it will be difficult to replenish the reservoirs during the summer periods of high useage. The present distribution system is weak in its ability to handle cross city flows. Additional major arterial pipelines are needed to handle current conditions.

Since the Teal Creek source cannot be relied upon for quality water and its use must be discontinued during times of high turbidity, its use should be discontinued, which in turn will permit the operational and maintenance expenditures to be reduced. Complete abandonment of the Teal Creek source is not advocated and the City should exercise sufficient control and management of the system to retain their water right. This is considered essential so that the City will have priority rights to the natural runoff should the Teal Creek Dam be built in the future.

The Teal Creek water rights may be preserved also by negotiating with Fall City for interim use of the City of Monmouth right; however, this will require discussion with the State Water Resources Board to determine its legality.

Also, we are recommending that the City of Monmouth investigate the use of the Teal Creek supply for the irrigation of lawns and turf at the Western Oregon College and others within City sites. The Western Oregon College athletic fields are fairly close to the Teal Creek pipeline and additional pipelines to

furnish any further information and answer any questions you may have. We would also like to convey our special thanks to the City staff for their help throughout the study.

Respectfully submitted,

Charles R. Meek
Project Manager

Archie E. Meadows
Project Engineer

dmk/RPT118E

Appendix C
COST COMPARISONS OF ALTERNATIVES A-E

This appendix contains a series of five tables detailing the costs of Alternatives A-E. These costs have been calculated for a regional water system and for a Monmouth-only system. In addition, the tables indicate Monmouth's share of the costs for a regional system, so they can be compared with the costs of a separate system.

TABLE C-1
ALTERNATIVE A
COST COMPARISON DETAIL FOR
GROUNDWATER NEAR THE WILLAMETTE RIVER WITH TREATMENT

	REGIONAL WATER SUPPLY	MONMOUTH'S SHARE OF REGIONAL WATER SUPPLY		SEPARATE WATER SUPPLY FOR MONMOUTH ONLY	
IMPROVEMENTS	15.4 mgd (50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)
LAND	$500,000	$245,000	–	$245,000	–
INTAKE AND PUMP STATIONS					
WATER TREATMENT PLANT	3,800,000	931,000	$931,000	1,200,000	$1,200,000
WELLS AND EQUIPMENT	4,880,000	1,200,000	1,200,000	2,440,000	2,440,000
MAJOR TRANSMISSION PIPELINE	4,132,000	2,020,000	–	1,560,000	–
DAM AND RESERVOIR	–	–	–	–	–
OTHER	3,330,000	1,700,000	533,000	1,360,000	910,000
TOTAL	**$16,642,000**	**$6,096,000**	**$2,664,000**	**$6,805,000**	**$4,550,000**
OPERATION AND MAINTENANCE					
OPERATION & MAINTENANCE EXPENSE	$123,000	$24,000	$60,000	$26,000	$66,000
PURCHASED WATER OR STORAGE	–	–	–	–	–
OTHER	31,000	6,000	15,000	6,000	16,000
TOTAL	**$154,000**	**$30,000**	**$75,000**	**$32,000**	**$82,000**
PRESENT WORTH SUMMARY (50 YEAR PERIOD)					
IMPROVEMENTS	$16,642,000	$6,483,000		$7,466,000	
OPERATION & MAINTENANCE	1,527,000	361,000		387,000	
TOTAL	**$18,169,000**	**$6,844,000**		**$7,853,000**	

C-H2M HILL

TABLE C-2
ALTERNATIVE B
COST COMPARISON DETAIL FOR WILLAMETTE RIVER SURFACE WATER WITH TREATMENT

	REGIONAL WATER SUPPLY	MONMOUTH'S SHARE OF REGIONAL WATER SUPPLY		SEPARATE WATER SUPPLY FOR MONMOUTH ONLY	
IMPROVEMENTS	15.4 mgd (50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)
LAND	$25,000	$12,000	–	$12,000	–
INTAKE AND PUMP STATIONS	700,000	340,000	–	440,000	–
WATER TREATMENT PLANT	6,600,000	1,620,000	$1,620,000	2,100,000	$2,100,000
WELLS AND EQUIPMENT	–	–	–	–	–
MAJOR TRANSMISSION PIPELINE	4,130,000	2,020,000	–	1,560,000	–
DAM AND RESERVOIR		–	–	–	–
OTHER	2,860,000	1,000,000	405,000	1,030,000	525,000
TOTAL	$14,315,000	$4,992,000	$2,025,000	$5,142,000	$2,625,000
OPERATION AND MAINTENANCE					
OPERATION & MAINTENANCE EXPENSE	$246,000	$48,000	$120,000	$53,000	$132,000
PURCHASED WATER OR STORAGE	–	–	–	–	–
OTHER	61,000	12,000	30,000	13,000	33,000
TOTAL	$307,000	$60,000	$150,000	$66,000	$145,000
PRESENT WORTH SUMMARY (50 YEAR PERIOD)					
IMPROVEMENTS	$14,315,000	$5,286,000		$5,523,000	
OPERATION & MAINTENANCE	3,044,000	721,000		793,000	
TOTAL	$17,359,000	$6,007,000		$6,316,000	

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TABLE C-3

ALTERNATIVE C

COST COMPARISON DETAIL FOR
RICKREALL CREEK DAM WITH DALLAS WTP EXPANSION

	REGIONAL WATER SUPPLY	MONMOUTH'S SHARE OF REGIONAL WATER SUPPLY		SEPARATE WATER SUPPLY FOR MONMOUTH ONLY	
IMPROVEMENTS	15.4 mgd (50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)	3.0 mgd (20 YEARS)	4.5 mgd (20-50 YEARS)
LAND	$25,000	$12,000	–	$12,000	–
INTAKE AND PUMP STATIONS	360,000	176,000	–	228,000	–
WATER TREATMENT PLANT	6,600,000	1,620,000	$1,620,000	2,100,000	$2,100,000
WELLS AND EQUIPMENT	--	–	–	–	–
MAJOR TRANSMISSION PIPELINE	6,120,000	3,000,000	–	3,510,000	–
DAM AND RESERVOIR	3,000,000	1,470,000	–	2,200,000	–
OTHER	4,030,000	1,570,000	405,000	2,010,000	525,000
TOTAL	$20,135,000	$7,848,000	$2,025,000	$10,060,000	$2,625,000
OPERATION AND MAINTENANCE					
OPERATION & MAINTENANCE EXPENSE	$246,000	$48,000	$120,000	$53,000	$132,000
PURCHASED WATER OR STORAGE	60,000	29,000	29,000	29,000	29,000
OTHER	76,000	19,000	37,000	20,000	40,000
TOTAL	$382,000	$96,000	$186,000	$102,000	$201,000
PRESENT WORTH SUMMARY (50 YEAR PERIOD)					
IMPROVEMENTS	$20,135,000	$8,142,000		$10,441,000	
OPERATION & MAINTENANCE	3,787,000	1,078,000		1,150,000	
TOTAL	$23,922,000	$9,220,000		$11,591,000	

TABLE C-4
ALTERNATIVE D
COST COMPARISON DETAIL FOR TEAL CREEK DAM WITH TREATMENT

	REGIONAL WATER SUPPLY	MONMOUTH'S SHARE OF REGIONAL WATER SUPPLY		SEPARATE WATER SUPPLY FOR MONMOUTH ONLY	
IMPROVEMENTS	15.0 mgd (50 YEARS)	6.0 mgd (20 YEARS)	15.0 mgd (20-50 YEARS)	3.0 mgd (20 YEARS)	7.5 mgd (20-50 YEARS)
LAND	$25,000	$12,000	–	$12,000	–
INTAKE AND PUMP STATIONS	700,000	340,000	–	440,000	–
WATER TREATMENT PLANT	6,600,000	1,620,000	$1,620,000	2,100,000	$2,100,000
WELLS AND EQUIPMENT	–	–	–	–	–
MAJOR TRANSMISSION PIPELINE	710,000	3,500,000	–	4,100,000	–
DAM AND RESERVOIR	1,700,000	830,000	–	830,000	–
OTHER	4,030,000	1,580,000	405,000	1,920,000	525,000
TOTAL	**$20,155 000**	**$7,882,000**	**$2,025,000**	**$9,402,000**	**$2,625,000**
OPERATION AND MAINTENANCE					
OPERATION & MAINTENANCE EXPENSE	$246,000	$48,000	$120,000	$53,000	$132,000
PURCHASED WATER OR STORAGE	60,000	29,000	29,000	29,000	29,000
OTHER	76,000	19,000	37,000	20,000	40,000
TOTAL	**$382,000**	**$96,000**	**$186,000**	**$102,000**	**$201,000**
PRESENT WORTH SUMMARY (50 YEAR PERIOD)					
IMPROVEMENTS	$20,155,000	$8,176,000		$9,783,000	
OPERATION & MAINTENANCE	3,787,000	1,078,000		1,150,000	
TOTAL	**$23,942,000**	**$9,254,000**		**$10,933,000**	

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TABLE C-5

ALTERNATIVE E

COST COMPARISON DETAIL FOR LUCKIAMUTE RIVER WITH TREATMENT AND STORAGE RELEASE FROM BIG ROCK CREEK DAM

	REGIONAL WATER SUPPLY	MONMOUTH'S SHARE OF REGIONAL WATER SUPPLY		SEPARATE WATER SUPPLY FOR MONMOUTH ONLY	
IMPROVEMENTS	15.0 mgd (50 YEARS)	6.0 mgd (20 YEARS)	15.0 mgd (20-50 YEARS)	3.0 mgd (20 YEARS)	7.5 mgd (20-50 YEARS)
LAND	$25,000	$12,000	–	$12,000	–
INTAKE AND PUMP STATIONS	700,000	340,000	–	440,000	–
WATER TREATMENT PLANT	6,600,000	1,620,000	$1,620,000	2,100,000	$2,100,000
WELLS AND EQUIPMENT	–	–	–	–	–
MAJOR TRANSMISSION PIPELINE	4,000,000	1,960,000	–	1,850,000	–
DAM AND RESERVOIR	3,000,000	1,470,000	–	2,200,000	–
OTHER	3,600,000	1,350,000	405,000	1,650,000	525,000
TOTAL	**$17,920,000**	**$6,752,000**	**$2,025,000**	**$8,252,000**	**$2,625,000**
OPERATION AND MAINTENANCE					
OPERATION & MAINTENANCE EXPENSE	$246,000	$48,000	$120,000	$53,000	$132,000
PURCHASED WATER OR STORAGE	60,000	29,000	29,000	29,000	29,000
OTHER	76,000	19,000	37,000	20,000	40,000
TOTAL	**$382,000**	**$96,000**	**$186,000**	**$102,000**	**$201,000**
PRESENT WORTH SUMMARY (50 YEAR PERIOD)					
IMPROVEMENT	$17,920,000	$7,046,000		$8,633,000	
OPERATION & MAINTENANCE	3,787,000	1,078,000		1,150,000	
TOTAL	**$21,707,000**	**$8,124,000**		**$9,783,000**	

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Appendix D
COMPUTER MODEL DISCUSSION

GENERAL DISCUSSION

Computerized hydraulic analyses enable the engineer to determine the effects of system modifications without actually constructing the modifications in the field.

The five phases of computer analysis are briefly outlined below. They are presented in detail in the following sections.

1. The basic considerations involved when studying distribution hydraulics are presented. These apply regardless of whether or not the computations are computerized.

2. The computer program logic is explained. Certain acceptable approximations are used to comply with the computer program's limitations.

3. The information (input) that must be known by the computer and its formats are described.

4. Analyses of the results (output) that must be applied to the computations are discussed.

5. Engineering judgment must be applied to evaluate the output and make necessary adjustments or improvements in the system.

The specific alternative system improvements and results of the analyzed computations are discussed in the body of the report.

The following terms are used in describing the computer analysis procedure and are therefore defined:

- Output is the computer answer.
- Specified input is used to indicate data that are input by the engineer for each analysis. As an example, demand at a pipe junction (nodal demand) will probably vary for each analysis.
- The model represents the system facilities described mathematically and is part of the input. The term is used to differentiate the specified input from the system facilities.

BASIC CONSIDERATIONS

The goal of a distribution system is to meet demands with an adequate residual pressure. This is done by conveying water from few facilities to many demand areas. However, head loss (energy loss) occurs when water flows through pipes.

The hydraulic elevation minus ground elevation is the residual pressure. As head loss increases, the hydraulic elevation and pressure are reduced from the existing under static or no-flow conditions. However, even if high head losses occur in a pipe where water is flowing from supply to demand at a lower elevation, the residual pressure at the demand may be acceptable. This is because ground level is reducing and, even though the hydraulic elevation is depressed, the ground elevation is low enough to result in an adequate residual pressure.

A distribution system is often a complex pipe network, and the number of pipeline combinations through which water can flow from supply to demand is infinite. Water will seek the path--or a combination of paths--of least resistance when flowing from supply to the demand sites. This situation is further complicated by other conditions such as:

- Water in a distribution system can flow in several directions simultaneously.

The computer program analyzes instantaneous situations only. Demand, reservoir water levels, and the operating status of sources are usually not varied during each computer analysis. However, the system just be analyzed using many different instantaneous sets of conditions because reservoir levels and other conditions are continuously changing.

The most realistic, stringent demand criteria for analysis are the maximum hour demand (MHD), average demand of the maximum day plus a major fire requirement, or reservoir refill. The successful use of computerized analyses depends on the engineer's ability to specify suitable conditions that meet these criteria.

INPUT

Input is the information that must be known and supplied to the computer. For the purposes of this discussion, it consists of two categories:

- Information that is not normally changed, such as pipeline size, interior roughness, reservoir location, etc. This information describes the system's physical facilities and is known as the model.

- Information which is continually changing such as nodal demands and reservoir water levels.

These categories and the constraints associated with them are discussed in the next two sections.

Model Information

Model information is the mathematical information that describes the distribution system. The computer can use this information to compute the effects of varying conditions on a system almost as accurately as if a real system were constructed and pressures measured. Whenever possible, the existing system model is "checked" by specifying flows measured in the actual system and comparing computer pressures with measured pressures.

The model is verified by field survey data of measured flows, reservoir water surface elevations, and pressures. The computer output pressures are compared with the actual pressures. The model is revised as necessary until actual and computer pressures agree.

Specified Information

Specified information is input such as nodal demand and reservoir water level. These data are subject to the engineer's judgment. They are of a changing nature as opposed to physical facilities, which do not normally change from day to day.

The method of estimating the nodal demands is described in the report. Reservoir water level is specified at an elevation that reflects the probability that the reservoir is drawn down (partially drained) during the peak hour.

COMPUTER LOGIC

The computer analyses began with development of the system model. The system model, which was discussed in detail in the preceding section, is a description of the system facilities and characteristics--pipelines, storage and supply locations, etc.

After the system model is mathematically developed (coded), the engineer then specifies certain conditions such as:

- Water surface elevations at reservoirs and number of pumps running at pump stations.

- Demand at each pipeline junction (node) in the system.

Adding up the demands from these conditions is the start of computations with the computer.

As discussed above, head loss will occur between the zone "supply" (treatment plant or reservoir) and junction demands. The computer successively "tries" combinations of flow rates and routes from supply to demand until the sum of head losses from any system point to another, after returning to the starting point regardless of route taken, equals zero. A second constraint is that the sum of inflow and outflow at all junctions must be zero. Water flowing to a node must be consumed (node demand), replenish a reservoir, or flow on to another node.

In a later section of this appendix, other important engineering considerations needed to make final conclusions from the computations are discussed.

OUTPUT

The output consists of a portion of the computed results. Once the model has been verified, the primary output is the nodal pressure because the goal of system operators is to meet demands with at least the City's standard minimum pressure. Other results printed in the output are valuable to the engineer in deciding which system improvements will result in adequate performance. These are discussed in the following section. An example of output is shown in Appendix C.

ENGINEERING JUDGMENT

The output data are not a complete indication of system performance. Even though the computer is fast and accurate, it lacks the judgment to correct mistakes; it also does not suggest improvements.

As noted above, the computer calculates an instantaneous flow rate from the supply facilities. There is no direct consideration whether this flow can be maintained or whether the storage has adequate capacity. Further analyses are required to consider this because each analysis is for a single instant in time.

Distribution systems also have a characteristic curve, called a system curve, that indicates the head loss caused by flow. When flow increases, head loss increases. The characteristic curves have an effect upon the analysis because the computer is successively attempting to calculate the flow that will result in the sources' total dynamic head (TDH) intersecting with the system head loss.

In summary, the analyses of all zones in the system supplied by sources and reservoirs have been made using the following criteria:

- Head loss caused between two junctions is the same regardless of the route taken.
- The summation of inflow and outflow at every junction must equal zero.

Sustained supply from storage is analyzed separately. Hourly demands during the afternoon and evening are normally greater than the daily average demands. Therefore, during high demand periods equalizing storage is depleted. During low demands it is replenished. The depleted volume is equivalent to equalizing storage volume.

The ability of each reservoir to complement flow in this service area with supply to that area from the source is analyzed using the equalizing storage concept. The distribution analysis output includes direction of flow in each pipe and hydraulic elevation at each node. From these computations, the area served by the reservoir is determined by drawing a line along the lowest hydraulic grade lines computed between reservoirs, water sources, or any combination of these. The sum of nodal demands in this influence area is equal to the computed reservoir flow rate and is the average maximum day demand (MDD) for the area of influence. Other hourly demands of the same day will vary according to the diurnal demand curve.

The flow from the reservoir and other supplies must be sufficient to meet all hourly demands in the area. These flows are a function of the available equalizing storage volume combined with demand rates and available supply to the area. The storage analysis computer program compares the interaction of these three factors--supply rate, demand rate, and reservoir volume--as they vary throughout the day. The computation results in a needed equalizing volume and replenishment flow for the specific area's demand pattern.

The major arterial capability to convey the replenishment flow to the area is tested using the computerized hydraulic analysis by specifying an equivalent reservoir replenishment "demand" and minimum hourly demands simultaneously. If the computer hydraulic elevation available to the reservoir during the replenishment simulation is not as high as the reservoir maximum water level, the reservoir cannot be refilled. Improved arterial capacity or increased equalizing storage volume is then considered.

CONTINUING USE OF COMPUTER PROGRAM

The computer program can assist staff during future operations by determining:

- Effect on the system if individual facilities are taken out of service.
- Adequacy of flushing programs and suggested modifications to provide sufficient velocity.
- Verification of size and location of proposed water mains.
- Location of closed or partially closed valves.
- Capacity of the system to provide fire flows.

The system model used during this study has been retained for future use. Necessary data required for continued use of the program are:

- The location, length, diameter, pipe material, and ground elevation at each end for each new pipeline constructed.
- Changes in supply location and characteristics.
- Addition or removal of reservoirs with corresponding maximum water surface elevations.
- Location and normal rate of demand of large customers.
- Recognition of new or developing service areas.

The last item is needed to determine demand for water use in these areas. To determine developing areas, a map should be prepared showing new services, numbers and locations of building permits issued, or an estimate of the number of houses in a newly developed area.

/COR4/063

Appendix E
COMPUTER PRINTOUT OF 1981 PEAK HOUR DEMAND

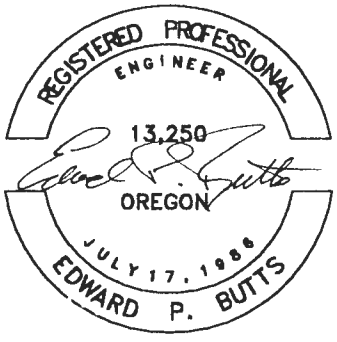
This appendix will be included in the final printing of this report.

CITY OF MONMOUTH
MONMOUTH, OREGON



RECEIVED
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WATER RESOURCES DEPT
SALEM, OR

WATER SYSTEM MASTER PLAN



EXPIRES: 12-31-01

Prepared By:
Stettler Company
Salem, Oregon
February, 2000

151 West Main Street
Monmouth, Oregon 97361-2199
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CITY OF
MONMOUTH

Promoting pride, progress, and friendly hometown values.

City of Monmouth
Polk County, Oregon
Water System Master Plan
2000

Paul Evans, Mayor

City Council
Beverly Davis
Tom Hall
Kim Marr
Joe Presler
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City Staff
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CITY OF MONMOUTH, COUNTY OF POLK

STATE OF OREGON

A Resolution Adopting a Water Master)
Plan for the City of Monmouth.)

RESOLUTION NO. 1381

WHEREAS, the Monmouth Public Works Department contracted with Stettler Company in July 1998 for the preparation of a Water System Master Plan; and

WHEREAS, said Water System Master Plan has been completed to the satisfaction of the Public Works Department; and

WHEREAS, once adopted, said Water System Master Plan will become the basis for identifying development needs, impacts, and requirements for the Monmouth Water System; NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF MONMOUTH, OREGON, AS FOLLOWS:

Section 1. That the Water System Master Plan, dated February 2000, prepared by Stettler Company, a copy of which is on file in the office of the City Manager, is hereby adopted as the official Water System Master Plan for the City of Monmouth.

Adopted and approved by the City Council and signed by the Mayor: April 4, 2000.

MAYOR

ATTEST:

CITY RECORDER

2\monmouth\ResoWaterMasterPlan

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Glossary

Average Day Demand	The total amount of metered water in one year divided by 365
Average Summer Demand	The estimated average daily demand in summer months, typically June, July, and August
Average Winter Demand	The estimated average daily demand in Winter months. Typically December, January, and February
AWWA	American Water Works Association
Cubic Feet	A measure of water volume often used for water billing purposes. 1 cubic foot =7.48 gallons
CFS	Cubic feet per second, a measurement of rate of flow (1 CFS=448 GPM)
DEQ	Oregon Department of Environmental Quality. Responsible agency for wastewater collection, treatment, and discharge as well as air quality and solid waste disposal
EDU	Equivalent Dwelling Units; used to equivalize water usage against a reference standard. Generally, used to compare commercial, institutional, and industrial water use to residential water use. For this study: 1 EDU=1 residential water service connection
EPA	Environmental Protection Agency, Federal government agency responsible for calculating, establishing, and enforcing drinking water quality standards.
GPCD	Gallons per capita per day (gallons per person per day)
GPD	Gallons per day
GPM	Gallons per minute
GR or G	Ground water registrations-Identifies a Groundwater application or permit on WRD forms Ex: (G-XXXXX)
FPS	Feet per second, usually used to indicate water velocity in a pipeline 5 FPS is the generally accepted maximum desired pipeline velocity
Head	An engineering term for pressure, expressed in feet: 1 foot of water head= .43 psi
HP	Horsepower-mechanical power necessary to perform work, typically used to calculate the work required to transfer a given volume of water against a given total dynamic head.
Maximum Day Demand	The maximum projected daily consumption in a given year. Source capacity and storage requirements are frequently based on this demand.
Monmouth or City	City of Monmouth; including all water customers supplied and billed from the City of Monmouth as well as water distribution
MCL	Maximum contaminant level-Enforceable levels
MCLG	Maximum contaminant Level Goal- A desirable but non-enforceable level
MG or $\overline{M}$G	Million Gallon(s)
MG/L or mg/l	Milligrams per liter, roughly equal to one part per million
MGD	Million gallons per day (1MGD= 694 GPM)
ND	None detected-Non detectable
OHD/or Health Division	State of Oregon Health Division, responsible agency for regulation of Public Water Systems in Oregon
Peak Hour Demand	The maximum instantaneous flow rate anticipated at any one time in a given year- usually expressed in gallons per minute (GPM)
Per Capita Demand (GPCD)	The rate of water consumed per person per day expressed in gallons. Distribution system sizing, water storage requirements, and pump equipment size are frequently based on this demand
PSI	Pounds per square inch, a measurement of pressure. Note that 1 PSI= 2.31 Feet of water head
S	Identifies a surface water application or permit on WRD forms. Ex: S-XXXX
TDH	Total dynamic head (in feet)- The sum of vertical lift plus delivery pressure, pipe friction loss, valve friction, and minor friction losses.
Unit (Water)	Used to determine volume of water for billing purposes. For Monmouth:1 Unit=7.48 gallons of water (1 cubic foot)
USGS	United States Geological Survey
WRD	Oregon Water Resources Department

Executive Summary

Executive Summary

General: This Water System Master Plan for the City of Monmouth outlines the water system improvements and expansion necessary to accommodate anticipated growth and current deficiencies. The time span of this study is 20 years outlining the projected needs of the water system from Year 2000 to 2020, inclusive.

Scope of Study: A well prepared water system master plan will evaluate several factors. Among these are: projected population growth, adequacy of existing sources, evaluation of water quality parameters, distribution system adequacy for varying demands, water storage requirements, capital improvement requirements, and implementation schedule.

Existing System: The existing water system obtains all of its source water exclusively from three individual groundwater wells. Two of these wells are grouped together in a well field commonly referred to as the Independence Fourth Street Well Field. This well field is located in the southeastern area of Independence. The combined reliable yield from this well field is 250-300 GPM (400 GPM is currently withdrawn.) The remainder of currently available source water is obtained from the Marion County well. This single well is capable of over 1200 GPM. All source water is pumped to ground level storage reservoirs located on Cupids Knoll. The combined available water storage is 5,000,000 gallons. Water storage consists of a 3,000,000 and 1,000,000 gallon ground level storage reservoir and a partially buried 1,000,000 gallon reservoir. The only water treatment currently performed is air stripping (for pH correction) and injection of zinc orthophosphate for corrosion control; chlorination, to control coliform bacteria; and fluoride injection. All treatment is performed at the Marion County Well.

Population Projections: The City of Monmouth, in 1999, had an estimated population of 8310. Due to presently confirmed and planned development, the City's population is projected to increase to 15,128 by the year 2020, a growth rate of 3% per year. This level of growth represents a total rate of growth in population of 82% (2.9% per year) above 1999 levels.

Water Requirements: The City's current average daily demand of water is approximately 985,000 gallons per day which equates to a per person usage of 119 gallons per day and includes all water lost through system leakage. This value of water consumption is typical for a city of this size and population distribution. Current maximum day water demand is approximately 2,341,000 gallons, an increase of 2.4 times the average day. The maximum day typically occurs in July or August. System leakage and non-revenue water is currently averaging between 10%-12%. The distribution of water usage within the city is comprised of 82% for residential (all types) usage, 11%-15% for institutional use (Western Oregon University), and 4%-5% of commercial/industrial use. The currently available water sources can provide water for all current daily uses with 24 hour pumping but as the city continues to grow, additional wells will be required to accommodate the increased demands.

Future Water Requirements: Average daily water demand is projected to rise to 1,950,000 gallons per day with maximum day demands as high as 4,950,000 gallons,

by the year 2020, an increase of 50% over 2000 values. This value reflects total volume of unaccounted for water (water lost to system leakage) to 10% and limiting well operation to 20 hrs/day.

Source of Supply: The City currently derives all source water from groundwater sources. Although surface water rights for the Willamette River are available, future planning has been performed using additional groundwater sources exclusively. This will avoid the high cost and complexity associated with treatment of surface water supplies. Future water supplies are projected to be evenly divided between the Buena Vista well field (2100 GPM) and the Marion County wells (2000 GPM).

Water Quality Considerations: Since the City of Monmouth uses groundwater exclusively, recent modifications to the Safe Drinking Water Act that affect surface water supplies will have little or no impact to Monmouth. Proposed regulations, however, due in 2002, may require mandatory disinfection of all groundwater sources. Since Monmouth routinely chlorinates water delivered to customers, this potential does not represent a substantial concern. In addition, new monitoring requirements for synthetic and volatile organic contaminants represent an expensive and time consuming task for all water systems. Currently, the greatest water quality concerns for Monmouth is control of nitrates at the Marion County well, monitoring of synthetic organics at the Fourth Street field, and iron and manganese control at the Buena Vista wells.

Water Storage: The present available water storage of 5,000,000 gallons represents a surplus over current water demands and population by 1,400,000 gallons. As the City continues to grow, additional water storage will be required and is planned at the Cupids Knoll location. Total anticipated water storage volume in 2020 is 6,000,000 gallons.

Hydraulic Analysis: Computer modeling indicates that the water distribution system can accommodate current average and maximum day demands. Fire flow for specific locations such as Western Oregon University, however, is severally limited due to present pipeline and hydraulic limitations. Improvements are recommended to alleviate this situation.

Capital Improvement Program: Specific improvements have been divided into five phases of work at roughly 4 - 5 year intervals. This will allow improvements to occur commensurate with system growth. Phase I improvements, planned for Years 2000-2002, represent improvements that are immediately needed to correct current hydraulic deficiencies and provide needed additional source capacity. Phase I includes development of the first Buena Vista well, drilled in 1997, and a 16" transmission pipeline to convey the water to the city's existing pipeline in Independence. The estimated cost of Phase I is $1,717,749.00. Phase II (2002-2005) work includes seismic reinforcement of the Willamette River bridge crossing, land acquisition for future well sites and reservoir, and developing a second well at the Buena Vista well field. Phase II is estimated to cost $493,000.00. Phase III (2005-2010) improvements include extension of the 16" transmission main, installed in Phase I, to the city. Also included are waterline improvements within the city itself to improve flow characteristics and fire flow supply. Phase III is projected to total $1,390,272.00. Phase IV (2010-2015) improvements include construction of a new 2,000,000 gallon reservoir on Cupids Knoll, drilling and

developing Buena Vista Well #3, and additional waterline improvements to enhance water delivery to the reservoirs from the wells. Phase IV is estimated to total $1,399,000.00. Phase V (2015-2020) is the last phase in the study period and includes development of an additional Marion County well and various pipeline replacements within the city. The total estimated cost of Phase V is $837,360.00. The total cost of all phases of work I-V, is $5,837,381.00. (2000 dollars).

Recommendations

1) Review, revise if necessary, and adopt this Master Plan.

2) Immediately begin Phase I, Priority I improvements.

3) Begin monitoring program for Buena Vista and Marion County wells-Monitor static and pumping levels, nitrates, iron and manganese, corrosion potential, and discharge rates.

4) Complete the Wellhead Delineation Report

5) Determine funding options for Phase I-V improvements

6) Develop an inventory of existing asbestos cement pipe in the distribution system and implement a yearly or biannual testing and monitoring program for AC waterline integrity. Prepare a replacement schedule based on condition of tested sections.

7) Develop an agreement with the City of Independence for water exchange criteria and procedures

8) Verify the operational status of the Fourth Street intertie

9) Develop an Emergency Plan applicable to water system functions for storms, earthquakes, source contaminations, extreme well failure, or waterline breaks

10) Upon completion of the Delineation Report, prepare and develop a Well Recharge Protection Plan. Work with local landowners to develop alternate methods of fertilizer application. Verify operational status of nearby septic tanks and drainfields.

11) Track distribution system and lead and copper corrosion effects upon implementation of the Buena Vista well field. Install treatment facilities to correct corrosive water quality chemical conditions if water quality does not improve after 1-2 years of pumping or initial correction does not effectively control corrosion.

Chapter One

Introduction and Background

Introduction and Background

Introduction

Water is essential for the survival of all life on earth. Without it, crops and cities fail and entire civilizations have been known to collapse. A primary responsibility of a municipality is the delivery of safe and adequate water supplies to its citizenry. As cities grow and expand, water supplies often become scarce, contaminated, and overdburdened. A Water System Master Plan assists the citizens and leaders of government in making the necessary decisions regarding preserving and enhancing current water supplies as well as planning for future needs. A properly prepared Master Plan must include predictions of population growth, current and future water use projections, water quality impacts, and other factors necessary to make informed and intelligent decisions. A Master Plan should not be considered a political document, the authors are not concerned with any particular resistance or endorsement of growth within a given community. What it should be is a dynamic technical reference and planning document that is used as an informational resource and guide and is periodically reviewed and updated. With this goal in mind, this Master Plan is dedicated to the citizens of Monmouth.

Background

The City of Monmouth is the second largest incorporated city in Polk County and the 48th largest city in Oregon. The city is located in the East-Central Willamette Valley, approximately 14 miles southwest of Salem, the State Capitol. The eastern boundary of the city limits abuts the westernmost city limits of Independence. Monmouth is generally regarded as a residential community with Western Oregon University serving as the largest single employer within the city. The State of Oregon and the Willamette Valley have recently seen an increase in population due to the influx of new residents. Polk County and Monmouth have each been a beneficiary of this trend. The city is divided east-west by Highway 99W and north-south by Highway 51, both are state highways. The official elevation of the city is 213' (MSL).

City History

The history of Monmouth began in 1852 when a group of settlers left Illinois to start a church and bible institute in Oregon. The covered wagon caravan arrived in Oregon around 1854 and settled in the area now known as Monmouth. The sole purpose of this migration was the establishment of a church and a college, the town was regarded as an incidental benefit. Monmouth, named after Monmouth, Illinois, the original home of many settlers, was selected over Dover as the township's name when Ira F.M. Butler cast the deciding vote to break a tie. The original townsite consisted of 640 acres, donated from land claims by several settlers that took advantage of the Donated Land Law of 1850. On January 18, 1854, the Oregon Territorial Legislature granted a charter for organization of Monmouth University. The townsite was surveyed in 1855 and the plat recorded on March 18, 1856. The original plat consisted of 16 city blocks, each 300' square. The first organized church service was held on July 27, 1856 with 35 charter members present. The Reverend John E. Murphy served as the first minister. The first session of school was held on November 19, 1856.

In 1859, the town had 21 families, 3 dry good stores, a grocery store, drug store, 2 blacksmith shops, and a saddle/harness shop. The local post office was established in 1859 with H.B.V. Butler serving as the first Postmaster.

In 1865, Monmouth University merged with Bethel College to become Christian College. The town was incorporated in October, 1880. The original government consisted of a mayor, city council, marshal, recorder, and treasurer. The first bank in the town also opened in 1880. The population of the town in 1880 was 267. On October 26, 1882, the governor signed a bill chartering the Oregon State Normal School. The school did not receive its first appropriation from the state, however, until 1893. In December, 1879, a massive fire destroyed almost the entire business section of town. Additional fires occurred in 1890 and 1897. Train service between Independence and Monmouth began in the 1880's and continued until the 1920's. The Monmouth Hook and Ladder Company began on September 7, 1894 with 21 original members. Early city councils of Monmouth could often not get quorums between May-September due to local farming demands. Typical problems of Monmouth's city councils during the 1880's-1890's were bike riders, sidewalk maintenance, and the issue of impounding of pigs. Several newspapers, such as the Christian Messenger, Monmouth Democrat, and the Monmouth Monitor, existed between 1890-1908. The Monmouth Herald was in circulation from 1908 into the 1960's. In 1898, the north wing of Campbell Hall at Oregon State Normal School was dedicated.

By 1909, the state withdrew support of all normal schools and the university was re-established in 1911 as the Oregon Normal School. Monmouth's population in 1910 was 493. This level almost doubled over the next 30 years to a 1940 population level of 965. In 1939, the legislature gave final approval to a bill which changed the name of the school to the Oregon College of Education. The city owned electrical distribution system was started in 1940 with an initial debt of $40,000. In 1956, the base rate for electrical service was .75 per kwhr and the system had $180,000 of assets. The population of the city continued to grow as the college expanded, and by 1960, Monmouth had 2,229 residents. In 1981, the governor signed a bill changing the name of the college to Western Oregon State College. The name was changed again in 1997 to Western Oregon University, the current name of the institution. The University continues to be the city's major employer with 656 employees. The second largest employer in the city is Boise Cascade with 56 employees. The period of 1990-1999 resulted in a population increase of 2,022 residents, an average growth rate of 3.2% per year. The estimated 2000 population of Monmouth is 8,310 residents. Monmouth has the distinction of being the only "dry" town (where liquor is not allowed to be sold within the city limits) in the State of Oregon.

Water System History

The original water system for Monmouth was built between 1895-1900. It consisted of a gravity supply pipeline from Teal Creek. Teal Creek, a tributary of the Luckiamute River, is a small water source located in the foothills of the Coast Range Mountains, 9½ miles west of Monmouth. Early pipeline materials consisted of wood stave and steel pipe. The city's first water storage reservoir was constructed in 1913 on Cupids Knoll and

consisted of a 250,000 gallon concrete structure. The city obtained water rights for Teal Creek in 1925 with a priority date of October 13, 1924 for .13 cubic feet per second (CFS). Applications for additional capacity were filed in 1932 (The 1932 application modified the earliest priority date to August 19,1919),1935, 1936, 1937, 1946, and 1965. Total permitted flow from Teal Creek eventually amounted to 4.13 CFS(1852 GPM). The Teal Creek supply was used exclusively until 1969-1970 when the city drilled and developed 4 wells. These wells, located at the south end of Fourth Street in Independence, were permitted for a total flow of .88 CFS. In 1949, a one million gallon concrete reservoir was constructed alongside the existing Cupids Knoll reservoir.

The decades of the 1950's and 1960's saw the installation of most of the current distribution system. The material of choice during this period was Asbestos-Cement (AC) or transite pipe. This material was strong, corrosive resistant, inexpensive, and light in weight compared to cast iron or steel, the other predominant pipeline materials of the day. In 1969, the city constructed a new one million gallon reservoir on Cupids Knoll. During the 1970's, the city drilled several test wells in the Independence area, however, due to low capacities these wells were not developed. A fifth well was added in the Independence Fourth Street well field in 1978, however, the Teal Creek source remained the principal source of water until 1979-1980 when the Marion County Well was activated. This well was initially developed for 750 GPM and immediately became the primary source for the city. The well pump was expanded in 1983 to a capacity of 1400 GPM. The 1983 project also included the installation of an auxiliary engine to back up the electrical system. In 1980, the city constructed a three million gallon concrete reservoir which replaced the 250,000 gallon reservoir constructed in 1913. The water system remained mostly unchanged from 1983-1987. In 1987, the cities of Independence and Monmouth jointly constructed an intertie booster pump/pressure reducing facility for emergency use. This facility, which to date has not been used, provides both cities with a manually activated supplemental water supply should an emergency develop.

In late 1992, the city began to receive complaints from customers regarding plugging of aerators and washing machine screens. Investigation determined the source to be asbestos fibers leaching from the distribution system pipelines. Water from the Marion County Well was determined to be corrosive to the cement component of the asbestos-cement pipe. This condition resulted in liberation of asbestos fibers which were used as the primary reinforcement material in AC pipe. Immediate interim corrective action was undertaken and, by mid-1993, asbestos levels fell to virtually non-detectable levels. In 1995, an air stripper/chemical feed facility was activated at the Marion County well site. This equipment is used to raise the water pH and chemically "reseal" the pipe. The results of this effort were excellent and asbestos levels have consistently been below detectable levels since late 1993.

Also, in 1994, the State Health Division determined that the Marion County well was not hydraulically connected to the Willamette River and only groundwater was being produced from this well. This distinction is important as a surface water classification would have required installation of expensive and complex filtering equipment. As of 1999, the city operates the Marion County Well (1200-1300 GPM) and Wells Number 4 and 5 (400-500 GPM). Wells #1,2, and 3 in the Independence well field were not

reliable sources and in 1979 were fully abandoned. The Teal Creek supply has not been used since approximately 1981. In 1993, the city obtained land in the American Bottom area, which is southeast of the city, and, in 1997, drilled a series of test wells and a new production well. This well is capable of up to 1,000 GPM and is projected to be added to the city's water system by 2001.

Topography

The City of Monmouth is situated in a large floodplain landscape west of the Willamette River. The topography within the city is relatively flat with elevations ranging from 320 feet MSL on Cupids Knoll in the west end of the city to 170 feet MSL near the sewage treatment facility. The general trend of the topography is sloping from the west to east, towards the Willamette River. Drainage topography exists within the city with three forks of Ash Creek dominating the natural landscape.

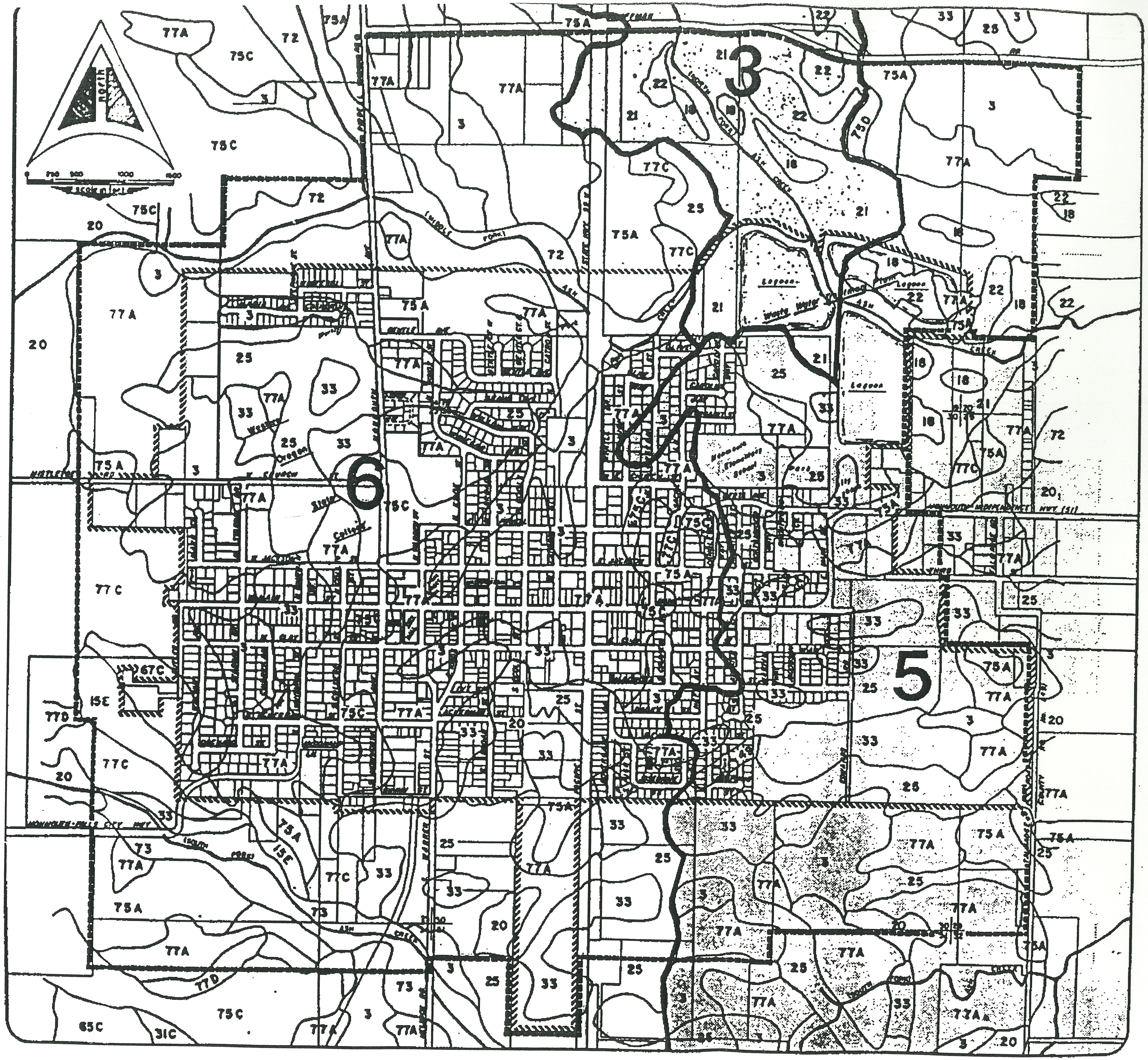
Soils and Geology

The soils of Monmouth are classified in three general groups. The first group, found in the valley flood plains, are deep, often poorly drained, slightly acidic, silty clay loam. Typical of these are soils known as Wapato, Woodburn, and Amity. Poorly-drained silty clay loam soils were found while drilling groundwater observation wells in the city. Soils along river channels are well drained, very deep, silty clay loams, underlain with gravely subsoils and are variously known as Willamette, Carlton, Chehalis, and Salem. In the western foothills, the soils are well drained, silty clay loams, ranging in depth from shallow to moderately deep. Typical of this group are those known as Honeygrove, Willakenzie, and Peavine.

Principal subsurface geological formations in the Monmouth area consist of tertiary marine sediments. Willamette River terrace gravels begin at Monmouth's eastern City limits. In 1982, the Soil Conservation Service published a detailed report, which included maps showing the approximate locations of Polk County soil types. Figure 1-1 shows soil types within the planning area.

Climatic Conditions

The climate of Monmouth resembles that of most Willamette Valley communities. The area has a temperate climate with definite seasonal changes consisting of moderately warm, dry summers and mild, wet winters. The annual average precipitation of 40.4 inches occurs during the fall/winter/spring seasons with very little rain occurring during the summer months. The average yearly temperature ranges between 51 and 54 degrees. Normal minimum January temperatures is 33 degrees and the normal maximum August temperature is 83 degrees. The driest month is usually July. Prevailing winds are from the west and northwest during the summer months and from the south and southwest during winter storm periods.



LEGEND

\\\\\\\\\\\\\\\\\\\\\\ MONMOUTH CITY LIMITS

▬▬▬▬▬▬▬ UGB (URBAN GROWTH BOUNDARY)

+ SECTION CORNER

SOILS LEGEND

3	AMITY SILT LOAM
15E	CHEHULPUM SILT LOAM, 12% to 40% SLOPES
18	COBURG SILTY CLAY LOAM
20	CONCORD SILT LOAM
21	COVE SILTY CLAY LOAM
22	COVE SILTY CLAY LOAM, THICK SURFACE
25	DAYTON SILT LOAM
31C	HELVTIA SILT LOAM, 0 to 12% SLOPES
33	HOLCOMB SILT LOAM
49	McBEE SILTY CLAY LOAM
65C	SANTIAM SILT LOAM, 6% to 15% SLOPES
67C	STEIWER SILT LOAM, 3% to 12% SLOPES
72	WALDO SILTY CLAY LOAM
73	WAPATO SILTY CLAY LOAM
75A	WILLAMETTE SILT LOAM, 0 to 3% SLOPES
75C	WILLAMETTE SILT LOAM, 3% to 12% SLOPES
75D	WILLAMETTE SILT LOAM, 12% to 20% SLOPES
77A	WOODBURN SILT LOAM, 0 to 3% SLOPES
77C	WOODBURN SILT LOAM, 3% to 12% SLOPES
77D	WOODBURN SILT LOAM, 12% to 20% SLOPES

GENERAL SOIL TYPES:

- (3) COVE - BASHAW: POORLY DRAINED SILTLY CLAY LOAD
- (5) DAYTON - AMITY - CONCORD: SOMEWHAT POORLY DRAINED AND POORLY DRAINED SILT LOAMS
- (6) WOODBURN - WILLAMETTE: MODERATELY WELL DRAINED AND WELL DRAINED SILT LOAMS.

NOTE

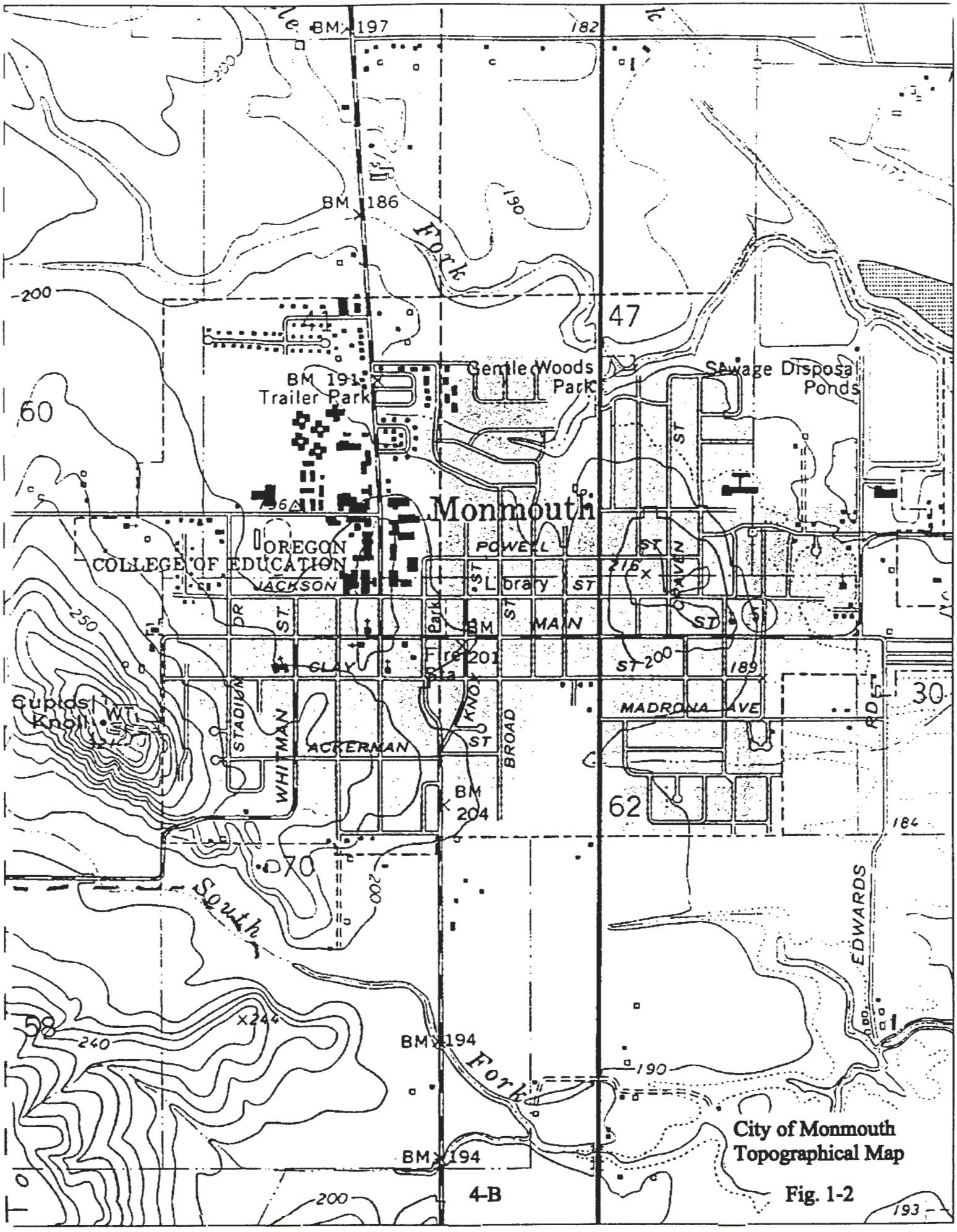
1.) SOILS DATA FROM: SOIL SURVEY OF POLK COUNTY, BY U.S. DEPT OF AGRICULTURE, SOIL CONSERVATION SEC. (BOOK ISSUED 1982)

SOILS DATA	GS	2-24-86	RWF 2·
BASE MAP	GS	1-22-86	RWF
DESCRIPTION	BY	DATE	APPROVED

SOILS MAP

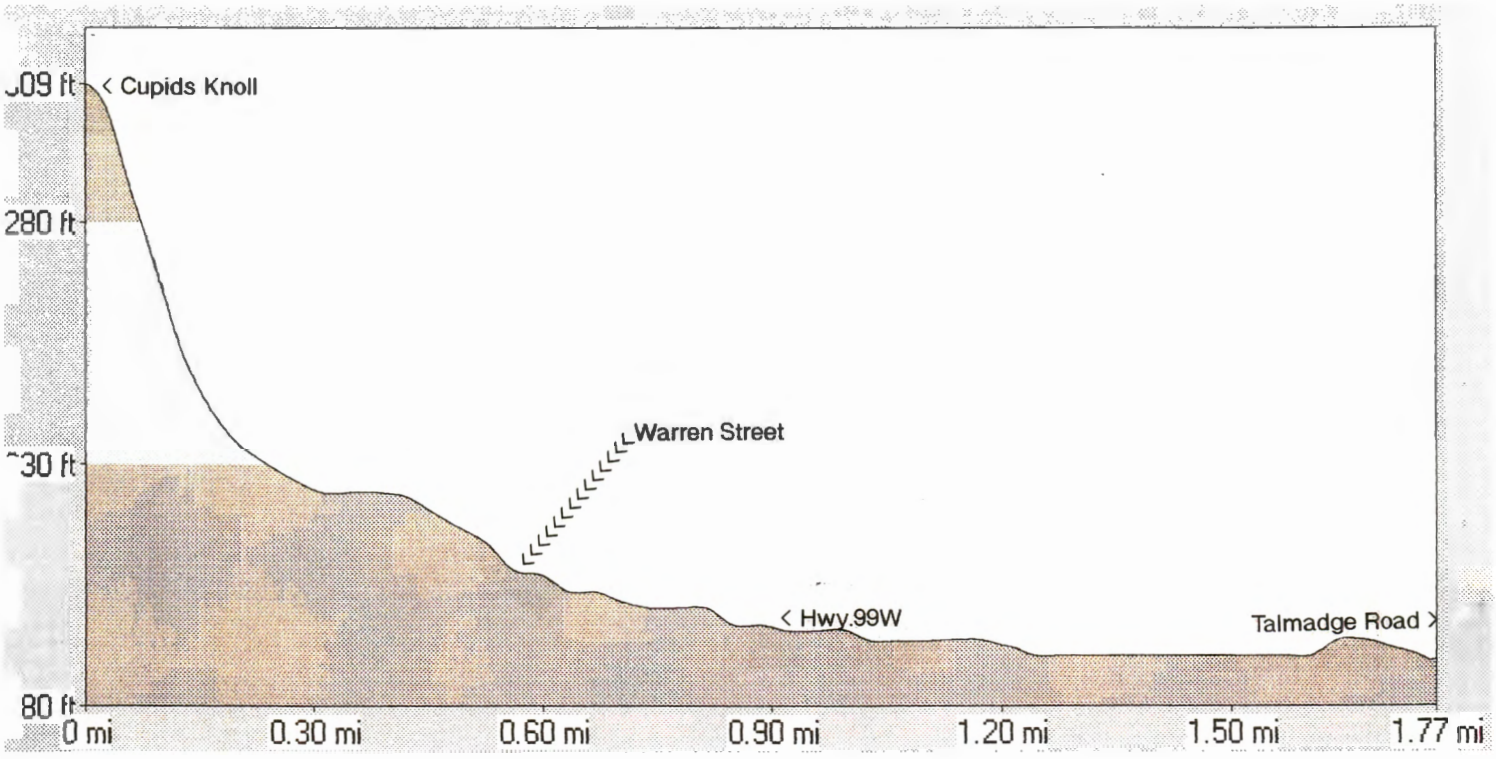
CITY OF MONMOUTH
151 W. Main, Monmouth, Oregon 97361
Phone (503) 838-0722

Fig. 1-1



City of Monmouth Topographical Map

Fig. 1-2



Topographical Profile

Fig. 1-3

Authorization

Preparation of this Master Plan was authorized by the City Council of the City of Monmouth in July, 1998.

Scope of Study

The primary purpose of this master plan is to replace all previous master plans using current population and water use data in addition to evaluation of allowable growth in specific areas. The scope of study and planning includes the following specific items:

1. Evaluate the existing water source, distribution system, and storage facilities to determine adequacy and reliability.

2. Address appurtenant water quality and water rights issues affecting existing and potential sources.

3. Perform hydraulic analysis of the existing distribution system, using computer modeling, to determine if inadequacies exist, and if so, the degree of correction required.

4. Evaluate existing storage facilities for average day, maximum day, and peak hour adequacy and determine if additional storage is needed to accommodate present and future demand and for the adequacy of flow for fire protection.

5. Prepare cost estimates and determine potential sources of funding for necessary system improvements along with a proposed timetable for implementation.

Time Span of Study

This master plan evaluates and estimates needed improvements between the years 2000 and 2020, inclusive. Specific improvements may be delayed or advanced depending on actual city growth, economic factors, and City Council direction.

Chapter Two

Existing System

Existing System

General: Specific details regarding the early water system are not known, however, general data is available as well as improvements performed after 1970.

Year	Improvement
1895-1900	Establishment of original water system, consisting of a transmission pipe (most likely wood stave) from Teal Creek- Population: 606
1913	Construction of the city's first reservoir, .25 MG at Cupids Knoll
1919	Established earliest priority date for water rights from Teal Creek- Population: 570
1925	First application for water rights from Teal Creek filed (.13 CFS)
1932	Application #56716 filed for .45 CFS-Priority date: August 19,1919
1935	Application #516134 filed for 1.0 CFS- Population: 950
1936	Application #516248 filed for 1.0 CFS from unnamed springs (1)
1937	Application #516832 filed for .25 CFS from unnamed springs (1)
1946	Application #522133 filed for 1.0 CFS from unnamed springs (1)
1949	Construction of one million gallon reservoir on Cupids Knoll completed Population: 1,900
1950-1975	Construction of most of the current distribution system
1965	Application of S41310 filed for 1.0 CFS from Teal Creek- Population: 3,487
1969	Construction of a second one million gallon reservoir on Cupids Knoll completed
1968-1970	Construction of Wells #1,2, 3,4, and 5 in Independence-Population: 5,237
1977	Change in point of diversion of Teal Creek filed
1978	Well #6 in the Fourth Street well field constructed- Population: 5,580
1978	Construction of the Marion County Well completed (750 GPM)
1979	Wells #1,2, and 3 abandoned
1980	Construction of a three million gallon concrete reservoir completed replacing the 1913 reservoir, which was removed-Population: 5,600
1981-1982	Last regular use of the Teal Creek supply-Population: 5,500
1983	Upgrade of the Marion County well to 1400 GPM and installation of back up facilities completed-Population: 5,310
1987	Construction of the Independence/Monmouth emergency intertie pump Station completed-Population: 5,660
1992-1993	First indication of asbestos leaching from pipelines
Early-1993	Interim asbestos corrective action begun- Population: 7,000
Mid-1993	Asbestos levels fall to almost non-detectable levels
March, 1995	Activation of permanent air stripping/chemical facility at Marion County Well Design Capacity- 1200-1300 GPM
1995	Installation of Fluoride saturator at Marion County Well
1997	Construction of new 1000 GPM well in American Bottom
1999	Approximate current Population: 8,300

(1) The unnamed spring was recorded as a tributary of Teal Creek.

Groundwater Sources

The City currently has access to three individual groundwater well sites with a recently constructed well planned for activation by 2001. Two of the wells (wells 4 and 5) are located in the Independence Fourth Street well field (older alluvium) and the Marion County Well #1 (younger alluvium) is located at the east end of the Willamette River bridge.

Table 2-1
Well Data

Well Number	Year Drilled	Elevation (MSL)	Depth	Well Diameter	Well Casing Depth	Yield	SWL
1	1978	162'	46' (1)	12"	32'6"	725 GPM @ 25' PWL	23'
4	1970	177'	62'	12"	62'	280 GPM @ 54' PWL	40'
5	1969	174'	62'	12"	62'	160 GPM @ 52' PWL	38'
6 (2)	1997	170'	57'	12"	34'	1000 GPM @ 41' PWL	19'

Well Number	Screen Diameter	Slot Size	Screen Length	Seal Depth	Seal Material	Current Production
1	11"	150	23'6"-43'	21'	Cement and Bentonite	1200 GPM
4	Perforations	3/8" x 8"	40'-60'	18'	Bentonite and clay	250 GPM
5	Perforations	3/8"	41'-60'	18'	Clay and Bentonite	150 GPM
6 (2)	12"	250	34'-44'	25'	Cement	NA

Table 2-2
Well Pump Data

Well Number	Pump Type	Pump Make and Model	Pump HP and Speed	Pump Setting	Drop Pipe Size	Design Capacity
1	Vertical Turbine	National H12HC-6 stg	40 x 1200 RPM	≅ 40'	8" x 1½"	1400 @ 96'
4	Vertical Turbine	Worthington 10L22-6 stg	25 x 1800 RPM	51'±	5" x 1"	200-250 GPM
5	Vertical Turbine	Johnston 7BC-13 stg	15 x 1800 RPM	50'±	Unknown	100-200 GPM

(1) Measured from ground surface in 1978- Add 6.51' to top of well head
(2) Data for undeveloped new well drilled in 1997

Water Rights

The City of Monmouth currently (2000) has approved and active permits or certificates for the following groundwater sources with the Oregon Water Resources Department

Table 2-3
Water Rights

Application Number	Permit Number	Certificate Number	Well Number	Priority Date	Permitted Flow
G-8926	G-8579	NA	1 (Marion County Well)	August 14, 1978	5 CFS (2 Wells)
G-5106	G-4818	62436	4 (Fourth Street Well)	February 17, 1970	.55 CFS
G-5106	G-4818	62436	5 (Fourth Street Well)	February 17, 1970	.33 CFS
G-13521	G-12976	NA	6 and 7 (Buena Vista Wells)	October 1, 1993	6 CFS
Inactive					
G-4332	G-4087	39278	1, 2, and 3	April 17, 1968	1.27 CFS

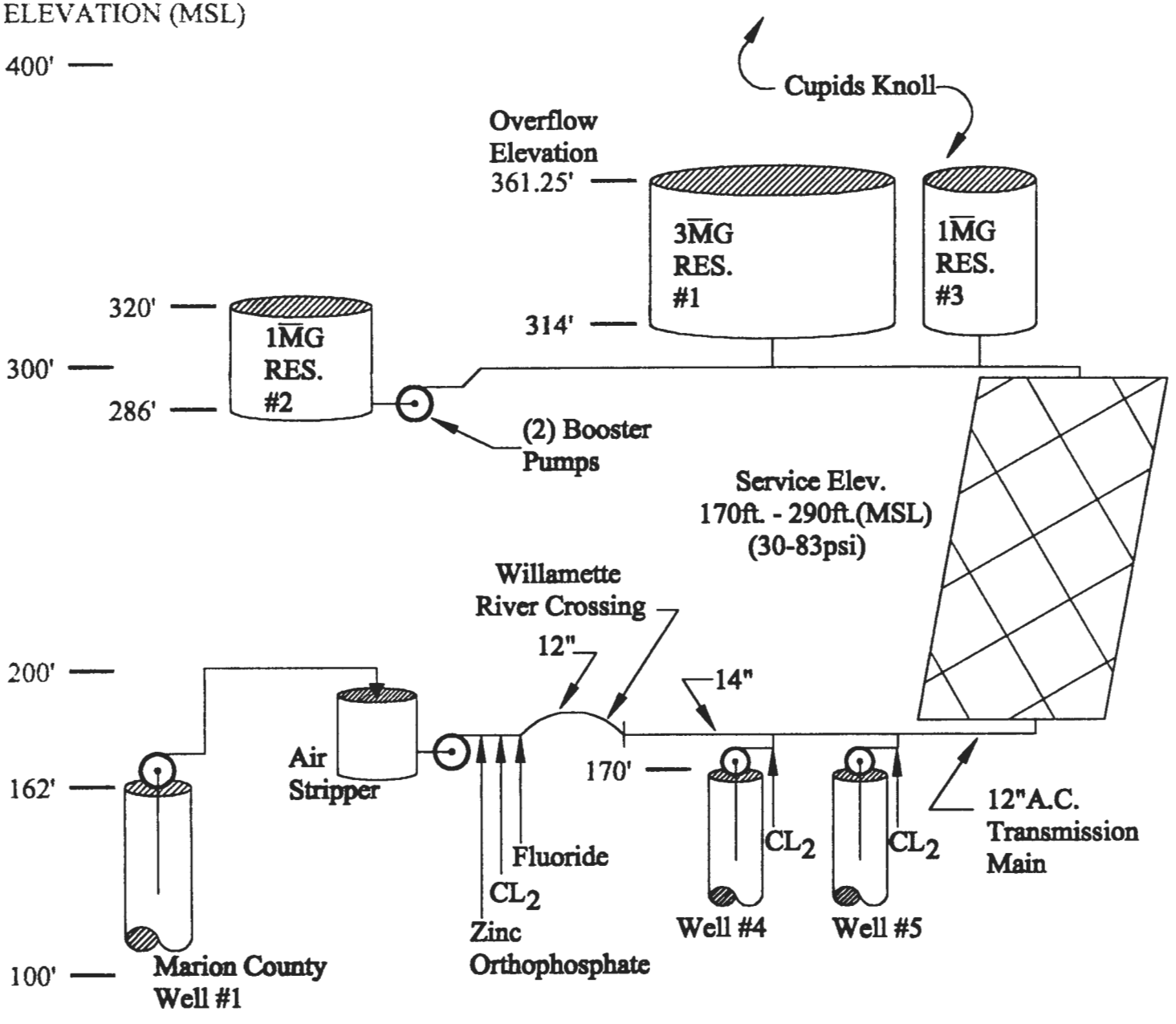
Total Current Permitted Flow: 5.88 CFS (2,637 GPM)
Total Permitted Flow (with new well field): 11.88 CFS (5,328 GPM)

Inactive Surface Water Rights

Application Number and Type	Permit Number	Certificate Number and Date of Proof	Source	Priority Date	Permitted Flow
S 9883	S 6521	45801-Sept. 10, 1929	Teal Creek	Oct. 13, 1924	.13 CFS
S 6716	S 4305	9761- Oct. 10, 1932	Teal Creek	August 19, 1919	.45 CFS
S 16134	S 11941	11656- Dec. 7, 1936	Falls City Reservoir	Nov. 7, 1935	.30 CFS
S 16248	S 12058	11662- Dec. 7, 1936	Unnamed spring	Feb. 13, 1936	1.0 CFS
S 16832	S 12602	15055- May 15, 1947	Unnamed spring	April 2, 1937	.25 CFS
S 22133	S 18321	16992- Jan. 30, 1950	Unnamed spring	Dec. 11, 1946	1.0 CFS
S 41310	S 30886	36021-May 7, 1969	Teal Creek	August 31, 1965	1.0 CFS

Total : 4.13 CFS (1850 GPM)

Why are "inactive" sources considered inactive?
→ See Pg 9 of Master Plan



CITY OF MONMOUTH
Water System Profile
2000 Configuration

no scale

Fig 2-1

Water Distribution System

The city's distribution system consists of primarily older asbestos-cement (AC) pipe and newer PVC pipe with a minor amount of steel and cast iron. Most of the distribution system was installed during the period between 1950-1975. The city currently utilizes PVC (AWWA class C-900) pipe as the standard pipe of choice. The approximate distribution of pipe sizes is as follows:

Table 2-4
Distribution System

Size	Total Length and Type	Total
14"	4,480' (AC)	4,480'
12"	15,590' (AC) + 2,963' (PVC)	18,553'
10"	393' (CI) + 1,482' (AC)	1,875'
8"	21,649 (AC) + 16,039' (PVC)	37,688'
6"	1,423' (CI) + 21,056 (PVC) + 53,918' (AC)	76,397'
4"	4,703' (AC) + 1,783' (CI) + 705' (DI) + 575' (STL) + 520' (PVC)	8,286'
2"	6,965' (PVC) + 2,879' (Galvanized steel)	9,844'

Total length: 157,123'- Miles: 29.75

The system has adequate isolation valving and good fire hydrant distribution throughout the system. Most of the fire hydrants in the city were manufactured by Waterous, which is the city's primary brand. Hydrants manufactured by Kennedy or Clow are also present. New services are exclusively made from 200 psi polyethylene tubing installed from the main to service meter. Most of the distribution system is looped and intertied, where possible, to improve delivery and lessen water quality impacts to customers.

Treatment Facilities

All of the current treatment facilities are located at the Marion County Well #1.
The city operates an air stripping facility (installed in 1994-1995) at the Marion County Well site for removal of Carbon Dioxide gas. This stripper consists of a 7' diameter structural grade aluminum packed tower. The tower has an overall height of 23' and is equipped with an 8' layer of 3.5" Lanpac packing material. The system utilizes a 1.5 horsepower blower capable of 3,200 cubic feet per minute of air to assist in the stripping process. Water is introduced from the well to the top of the tower where it is forced to trickle down through the packing. This action, combined with an upward draft of air from the blower, removes approximately 95% of the Carbon Dioxide present in the raw water. The water pH is elevated from a level of 5.5-6 to 7.0-7.5 following this procedure. Additional control for pipeline corrosion is obtained through the injection of zinc orthophosphate ($ZnPO_4$). Chlorination is performed using gaseous chlorine at the Marion County well. Sodium Fluoride is also introduced into the water at Well #1.

Booster Pump Systems

Because the city operates only one pressure zone, there are no booster pump stations within the system. A booster pump is used at the Marion County Well to transfer water from the air stripper. This pump is a Cornell model 5YBCC-100-2, 100 HP close coupled end-suction centrifugal pump. The pump's design flow rate is 1300 GPM. Due to the differential in reservoir levels at Cupids Knoll, two 10 horsepower booster pumps, each capable of 400 GPM, are used to transfer water from the lower one million gallon buried reservoir to the two upper reservoirs. These pumps are capable of either manual or automatic operation.

Control System

The city currently operates all wells manually and on an "as needed" basis. Typically, the city will operate the Marion County Well continuously for 1-2 days to refill the reservoirs and then allow the well 1-2 days of deactivation. While this system has worked well for several years, a concern remains regarding reliability and high flow (fire or main break) events. A primary element of the Master Plan, therefore, will include installation of a control system for all wells.

Storage Facilities

The city operates three ground-level reservoirs, all located on Cupids Knoll. Two reservoirs are located at grade while one is partially buried:

Table 2-5
Existing Storage Facilities

Water Storage and Reservoir Number and Year Constructed	Diameter	Rated Water Storage (Gallons)	Material of Construction	Reservoir Floor Elevation (Ft-MSL)	Maximum Water Surface Elevation (Ft-MSL)	Maximum Water Depth (Ft.)
1) 1980	104'	3,000,000	Concrete	314'	361.25'	47.25'
2) 1949	82'	1,000,000	Reinforced Concrete	295'	320'±	25'
3) 1969	60'	1,000,000	Steel	314'	361.25'	47.25'

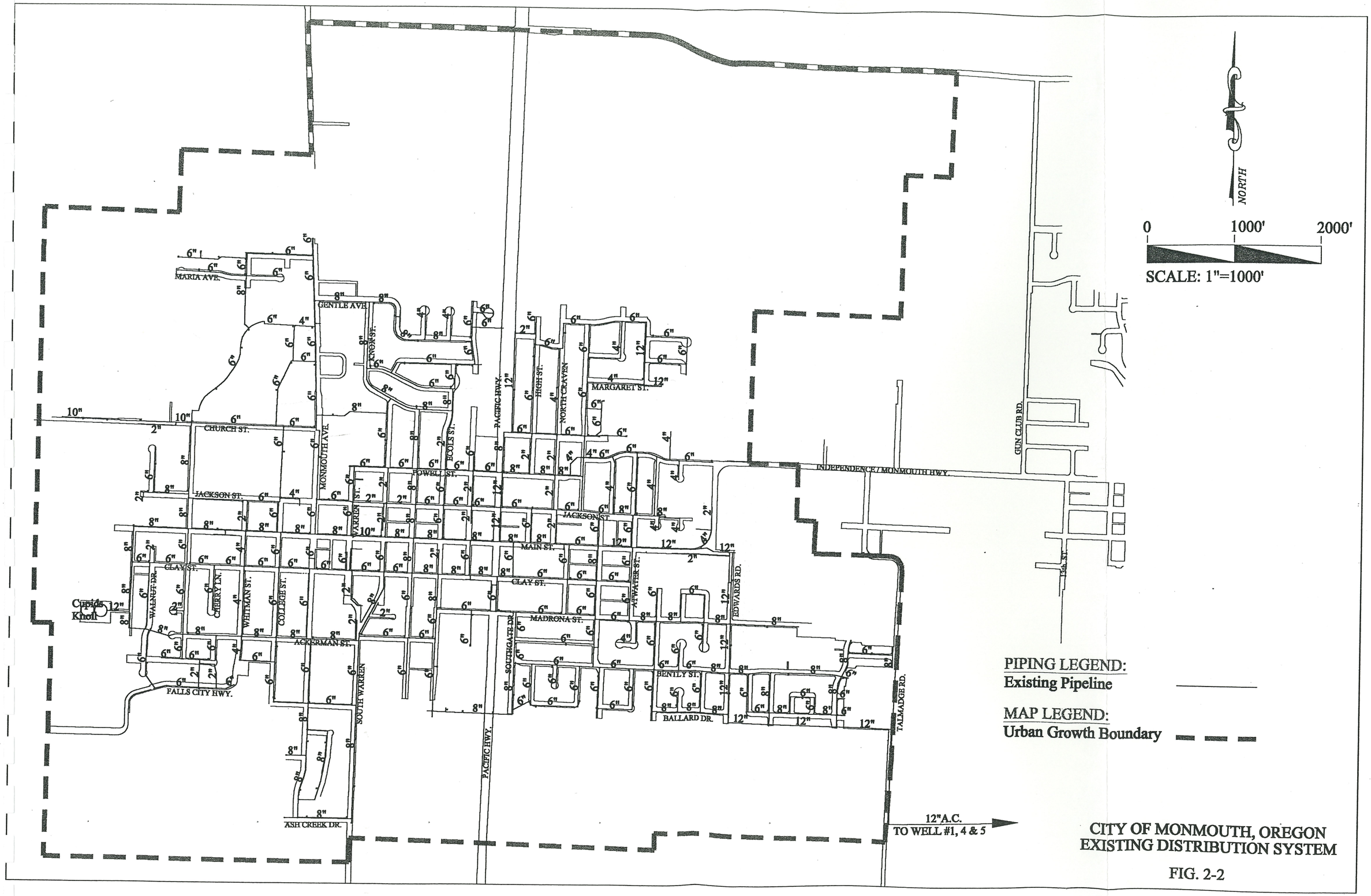
The reservoirs are mostly in good condition, however, reservoir number two is in need of inspection and may possibly need pressure grouting of several cracks

Service Levels

The city provides water to one service level throughout the city. The elevations within the city range from 170' MSL to 291' MSL which results in delivery pressures to customers ranging from 30-83 psi. Maximum water surface elevation is 361.25 MSL, however, under normal conditions this level can vary between 350'-360'. Growth within the upper Cupids Knoll area of the city will require eventual establishment of a second service level.

Regulatory Classifications

The City of Monmouth is classified by the Oregon State Health Division as a "Public Water System," specifically a "Community Water System," which is defined as a system that provides water to 15 or more service connections or 25 or more year round residents. The city's water system currently serves a population between 3,300 and 10,000 for the purpose of determining water quality monitoring requirements. The Oregon Health Division identification number is PWS ID# 4100537. The city water system, by Health Division rules, must be operated by a certified operator. The current level of certification required is WD (Water Distribution) 2 and WT (Water Treatment) I.



CITY OF MONMOUTH, OREGON
EXISTING DISTRIBUTION SYSTEM

FIG. 2-2

Chapter Three

Population and Land Use

Population and Land Use

Population Increase Projection

As indicated in Table 3-1, the population in Polk County, during the years 1990-1999, increased greater than the overall state average. Several independent projections were consulted during preparation of this study to obtain a realistic and objective estimate of population growth over the next 20 years. These sources include: Mid-Willamette Council of Governments, Portland State University Center for Population Research and Census, State Office of Economic Analysis, and other local municipalities of similar size. All of these sources project an increase of population within Polk County and Monmouth over the next 20 years. This is due to the influx of new residents as well as an expected shift of urban population.

Table 3-1
1990 U.S. CENSUS

	Polk County	Oregon State Average
1990 Population	49,541	2,842,321
1999 Population	60,100	3,300,800
% of Change, 1990-1999	21.3% (2.5%/year)	16.1%
Estimated 2,010 Population	69,402	3,773,678
Expected % of Change - 1999-2010	15.5%	14.3%

1999 Revised Projections
Polk County (1)

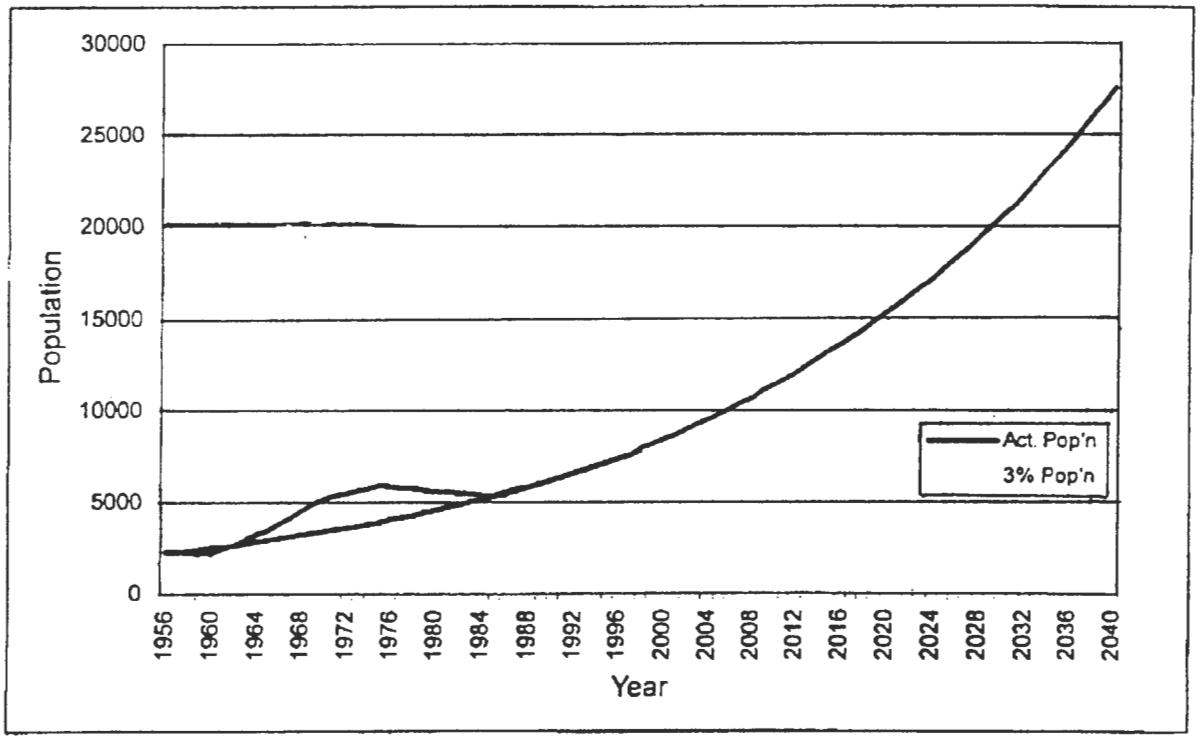
Year	Polk County (Total)	% Increase
1999	60,100	21.3% (from 1990)
2000	65,040	8.2%
2010	69,402	6.7%
2015	73,940	6.5%
2020	78,502	6.2%

The period of 1999-2020 represents a net county projected population growth of 18,402 or 1.3% per year. In the case of Monmouth, this value is felt to be somewhat low due to the current rate of growth seen in the communities of Independence and Monmouth and available land for additional residential development. A recent population update for Monmouth between 1990-1999 indicated a net growth of 2022 residents, an increase of 3.2% per year.

(1) Source: PSU Center for Population Research- State Office of Economic Analysis

Historic and projected populations for the City of Monmouth

Historic Population			Projected Population		
Year	Population	Growth Rate	Year	Population	Growth Rate
1956	2,282	---	2000	8,376	3.0%
1960	2,229	-0.55%	2005	9,710	3.0%
1965	3,487	9.55%	2010	11,256	3.0%
1970	5,237	8.52%	2015	13,049	3.0%
1975	5,970	2.68%	2020	15,128	3.0%
1980	5,600	-1.18%	2025	17,537	3.0%
1985	5,390	-0.74%	2030	20,330	3.0%
1990	6,288	3.14%	2035	23,568	3.0%
1995	7,225	2.82%	2040 (UBO)	27,322	3.0%
1998	7,980	3.48%	2019 (20-yr)	14,845	---



Historic and projected population for the City of Monmouth from 1956 to 2040 (UBO).

Historic and Projected Population for the City of Monmouth

Figure 3-1

Population Increase Projection-Statewide and Marion County

Between 1980 and 1997, the population of Oregon increased from 2.64 million to 3.22 million, an increase of 21.9%. Based on current projections, the population of Oregon is expected to continue to grow faster than the United States as a whole over the next fifty years. Several forces will affect the future demographics of Oregon's population:

1. During the next 5-10 years, rapid growth is expected for age groups 18-24 years old, 45-64 year olds, and those over 75.

2. After Year 2010, the population of retirement eligible people will rise rapidly.

3. Migration of residents from other states is expected to continue at a rapid pace.

4. Slower growth is expected for those of school age population (5-17 year olds), 25-44 year olds, and 65-74 year old people over the next 5-10 years.

Table 3-1 summarizes United States census data and projected populations for both Polk County and the State of Oregon.

To analyze the specific population projection for Monmouth in the Year 2020, several additional sources were consulted. These included a previous Water Supply Master Plan for Independence (Stettler, 1997), Monmouth Sewer System Master Plan (1999-HBH Consulting Engineers), and 1983 Water Master Plan (CH2MHill). For the purposes of this study, the following population projections will be used:

Table 3-2
City of Monmouth
Projected Population Equivalent

Year	Population	% Increase/Year	Residential Units (EDU)
1990	6,288 (actual)	- - -	1,600
1999	8,310 (estimate)	3.2%	2,078
2000	8,376	3.0%	2,094
2005	9,710	3.0%	2,428
2010	11,256	3.0%	2,814
2015	13,049	3.0%	3,263
2020	15,128	3.0%	3,782

Impact of Western Oregon University

Due to the high level of yearly water consumption, the impact of Western Oregon University on water usage and future growth must be considered in this report. Information provided by the University indicates a reasonably stable campus population since 1970. Recent information obtained, from the University projects an expansion of the university and substantial growth over the next decade. Table 3-3 illustrates the student enrollment at WOU between 1960-1999.

Table 3-3
Western Oregon University
Student Population History

Year	Equivalent Full Time Students
1960	1,102
1965	2,073
1970	3,946
1975	3,494
1980	3,129
1985	3,042
1990	4,017
1995	3,908
1997	4,088
1999	4,515

For planning purposes, a full time student population of 6,500 will be assumed at the end of the study period (2020). This represents an increase of approximately 2000 students above the current population, an increase of 44% over current levels.

Future Service and Study Area

The City currently operates within established geographical and political boundaries that comprise the City limits and the Urban Growth Boundary (UGB) (Figure 3-2). The City is bounded on the east by the City of Independence, and the UGB to the north, west, and south. Most of the land presently available for future development is in the northern and southern sections of the City with a smaller percentage available in the western area. The total area within the UGB is 1,923 acres of which approximately 1315 acres (68%) is listed as net developable area for residential use.

Although a potential exists for expansion of the UGB or a future water-use agreement with a nearby community, for the purposes of this study, only the area within the UGB shall be considered. The total population assumed at ultimate build out in Year 2040 is calculated to be as high as 27,322 residents which is 45% greater than the projected 2020 population.

Land Use

General: Land use within the City of Monmouth is defined in four basic categories: Residential, Public, Commercial, and Industrial. These land uses are further categorized as follows:

Residential

RS- Single Family Residential (0-6 dwellings per acre)
RM- Limited Multi-Family Residential (up to 12 dwellings per acre)
RH- Multi-Family Residential (up to 20 dwellings per acre)

Public

PS- Public Service (parks and other public facilities)
PSC- Public Services College (land occupied by Western Oregon University and the Oregon Police Academy)

Commercial

CO- Commercial Office
CH- Commercial Highway
CR- Commercial Retail
CRT- Commercial Retail Transitional

Industrial

IP- Industrial Park

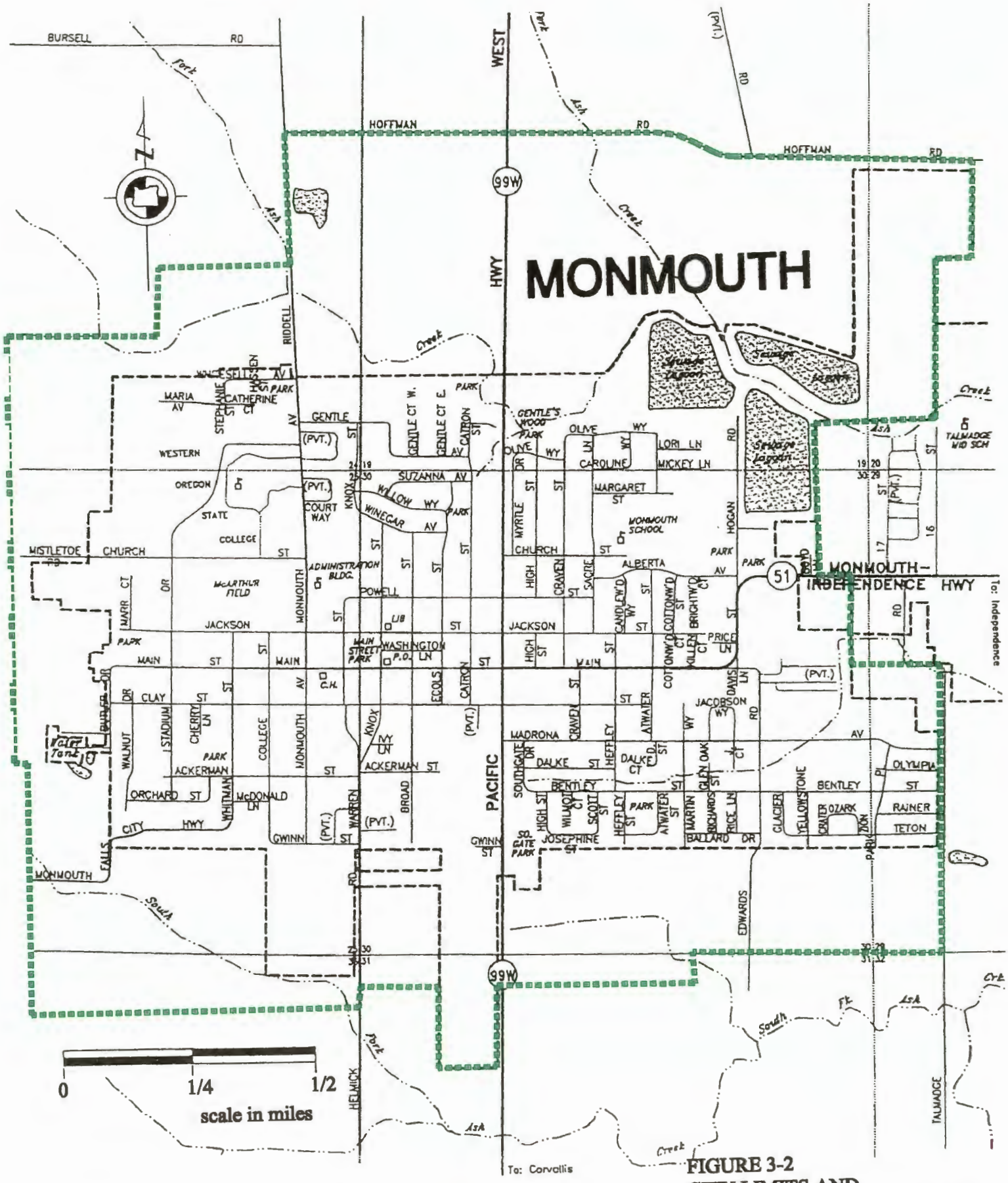
Existing Land Uses and Growth Potential

Existing Land Use

The existing land use for the City of Monmouth is shown in Figure 3-3 and in Table 3-4. Currently, there are 1,239 acres of land within the City Limits. A total of 684 acres is held as urban reserve (within the Urban Growth Boundary, but outside the City Limits). Thus, the total land available within the Urban Growth Boundary is 1,923 acres.

Future Land Use

As shown in Table 3-4, there are 684 acres of land currently within the Urban Growth Boundary, but outside the City Limits. This land is comprised largely of future residential land. The 524 acres of future residential land has not been further classified as RS, RM, or RH. For the purpose of this Master Plan, it is assumed that this residential land will develop with the same percentages of RS, RM, and RH as currently exist. Table 3-5 details the assumed growth distribution for the residential land outside of the City Limits.



CITY LIMITS
URBAN GROWTH BOUNDARY

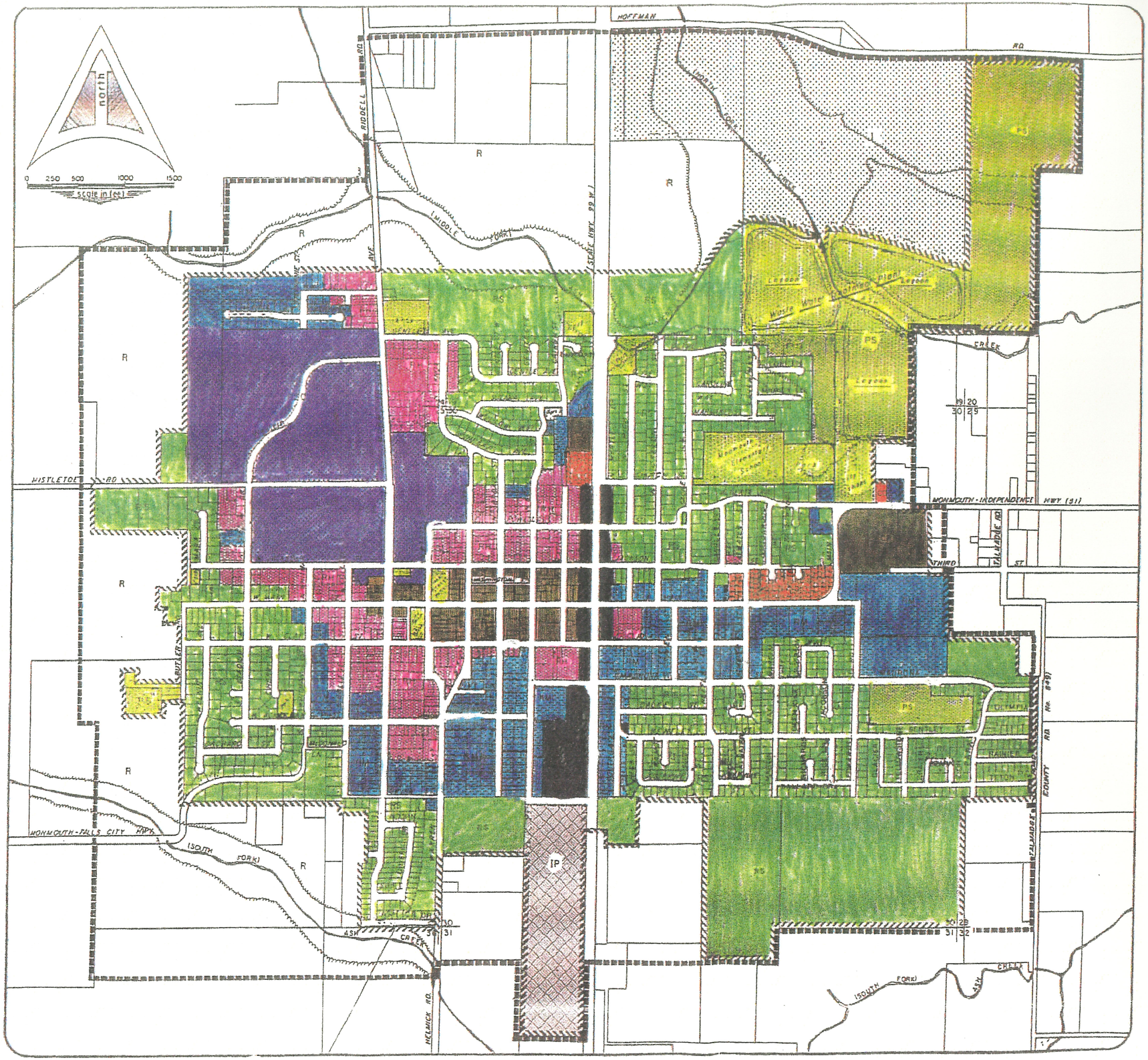
FIGURE 3-2
CITY LIMITS AND
URBAN GROWTH BOUNDARY

Table 3-4
Status of Land Use in Monmouth

	Current Status (as of 9-1-98)	
Land Use	**In City (Acres)**	**Urban Growth Reserve (Acres)**
Residential		
RS-Single Family Residential	531	
RM- Limited Multi-Family Residential	163	
RH- Multi-Family Residential	97	
SUBTOTAL	*791*	*524*
Public		
PS- Public Service	188	
PSC- Public Service College	128	18
SUBTOTAL	*316*	*18*
Commercial		
CO- Commercial Office	20	
CH- Commercial Highway	26	
CR- Commercial Retail	36	
CRT-Commercial Retail Transitional	13	
SUBTOTAL	*95*	*0*
Industrial		
IP- Industrial Park	37	142
TOTAL	**1,239**	**684**
TOTAL LAND IN UGB (acres)	**1,923**	

Table 3-5
Development Distribution of Residential Land Currently Outside the City Limits

Land Use	Development Percentage	Predicted Acreage
RS- Single Family Residential	67	351
RM- Limited Multi-Family Residential	21	110
RH- Multi-Family Residential	12	63
TOTAL		**524.0**



LEGEND

MONMOUTH CITY LIMITS (FEB. 1, 1986)

U.G.B. (URBAN GROWTH BOUNDARY)

SECTION CORNER

LAND USE DESIGNATIONS

R — FUTURE RESIDENTIAL

IP — FUTURE INDUSTRIAL

OUTSIDE CITY LIMITS INSIDE URBAN GROWTH BOUNDARY

ZONING

LDR — LOW DENSITY RESIDENTIAL (0 to 6 D.U. per Acre)

MDR — MEDIUM DENSITY RESIDENTIAL (UP to 12 D.U. per Acre)

HDR — HIGH DENSITY RESIDENTIAL (UP to 20 D.U. per Acre)

COMMERCIAL RETAIL

COMMERCIAL OFFICE

COMMERCIAL HIGHWAY

PS — PUBLIC SERVICE

IP — INDUSTRIAL PARK

PUBLIC SERVICE - COLLEGE

CRT — COMMERCIAL RETAIL TRANSITIONAL

NOTE:

1.) FOR FLOOD PLAIN INFORMATION SEE "ASH CREEK, FLOOD PLAIN MANAGEMENT STUDY," U.S. SOIL CONSERVATION SERVICE, DECEMBER 1985.

REVISED	MW	11-25-87 / 8-30-88 / 11-10-97/11-17	
ADDED CRT ZONE	RWF	9-22-87	DAD 9-23
LAND USE & ZONING DATA	G.S.	2-3-86	RWF - 2-4-86
BASE MAP	G.S.	1-22-86	RWF
DESCRIPTION:	BY:	DATE:	APPROVED BY:

ZONING AND LAND USE MAP

CITY OF MONMOUTH
151 W. Main, Monmouth, Oregon 97361
Phone (503) 838-0722

Drawings Prepared By:
William L. Peterson Engineering Inc.
890 Promontory Pl. SE., Salem, Ore. 97302

FIG. 3-3

Chapter Four
Water Requirements

Water Requirement

The City of Monmouth has utilized groundwater sources exclusively since the early 1980's. The current wells in use are Well #1 (Marion County Well) and Wells #4 and 5 (Independence 4th Street Wells). Water production and sales (metered consumption) for the period of 1995-1996 is summarized in Table 4-1.

Table 4-1
Yearly Water Production and Metered Sales (in Gallons)
1995-1996

Year and Well Number	Total Production	Metered Sales	Percentage of Unaccounted Water
1995- Population: 7,225			
Well #1	283,989,808 g		
Well #4	3,540,000 g		
Well #5	7,567,500 g		
1995 Total	**295,097,308 g**	272,036,664 g	7.8 %

Average Daily Demand: 808,486GPD- Average Per Capita Usage: 112 GPCD
Maximum Day Demand: 1,959,412 GPD (August 2, 1995)
Maximum Day/Average Day: 2.42
Maximum Day Per Capita Usage: 271 GPCD

1996- Population: 7,385			
Well #1	300,344,200 g		
Well #4	4,995,000 g		
Well #5	2,683,100 g		
1996 Total	**338,022,300 g**	**Not Available**	**NA**

Average Daily Demand: 926,088 GPD- Average Per Capita Usage: 125 GPCD
Maximum Day Demand: 2,353,180 GPD (August 23, 1996
Maximum Day/Average Day: 2.54
Maximum Day Per Capita Usage: 319 GPCD

Average Daily Per Capita Water demands for 1995 and 1996 average 118 GPCD, a typical value for communities with primarily residential water demands.

Data for the three years 1997, 1998, and 1999 were tabulated and evaluated separately to reflect the most recent actual water consumption. Table 4-2 indicates monthly production and billing for Years 1997-1999. Monthly values of billed water may be higher than production values for the same month due to timing differences in summary of data.

Table 4-2
Monthly Water Production and Metered Sales (in Gallons)
1997-1999

Month/Year	Well #1	Well #4	Well #5	Total Production	Metered Sales	Unaccounted Water (Percent)
January, 1997	23,810,200	0	0	23,810,200	17,554,886	
February, 1997	21,549,300	0	0	21,549,300	19,243,123	
March, 1997	21,637,400	0	0	21,637,400	18,153,137	
April, 1997	22,632,300	0	0	22,632,300	20,665,976	
May, 1997	29,834,400	0	0	29,834,400	22,351,138	
June, 1997	30,048,800	15,000	0	30,063,800	25,851,305	
July, 1997	38,063,100	6,394,000	2,064,100	46,521,200	32,455,496	
August, 1997	38,174,700	5,944,000	3,102,600	47,221,300	47,248,894	
September, 1997	26,735,800	0	0	26,735,800	32,946,595	
October, 1997	24,104,600	0	0	24,104,600	20,683,928	
November, 1997	22,492,700	0	0	22,492,700	19,536,167	
December, 1997	21,298,700	0	0	21,298,700	19,864,456	
1997 TOTALS	**320,582,00**	**12,353,000**	**5,166,700**	**338,101,700**	**296,561,101**	**12.3%**
January, 1998	22,837,400	0	0	22,837,400	17,599,872	
February, 1998	22,788,500	0	0	22,788,500	20,547,934	
March, 1998	22,264,600	0	0	22,264,600	17,068,395	
April, 1998	23,192,300	0	0	23,192,300	21,649,147	
May, 1998	27,782,900	0	0	27,782,900	21,451,802	
June, 1998	29,903,400	0	0	29,903,400	23,538,086	
July, 1998	48,330,900	2,675,000	1,422,100	52,428,000	33,234,897	
August, 1998	49,765,900	1,287,000	683,000	51,735,900	46,833,918	
September, 1998	40,072,600	0	0	40,072,600	45,301,176	
October, 1998	27,030,600	0	0	27,030,600	25,653,056	
November, 1998	25,173,900	0	0	25,173,900	20,383,972	
December, 1998	23,134,600	0	0	23,134,600	20,780,861	
1998 TOTALS	**362,277,600**	**3,962,000**	**2,105,100**	**368,344,700**	**314,043,118**	**14.8%**
January, 1999	24,917,800	0	0	24,917,800	18,851,769	
February, 1999	24,182,200	0	0	24,182,200	21,424,889	
March, 1999	24,859,100	0	0	24,859,100	17,236,209	
April, 1999	26,250,200	0	0	26,250,200	18,561,351	
May, 1999	28,462,600	0	0	28,462,600	21,451,802	
June, 1999	32,280,000	0	0	32,280,000	23,538,086	
July, 1999	45,703,000	0	0	45,703,000	33,234,897	
August, 1999	43,162,800	0	0	43,162,800	41,374,393	
September, 1999	40,321,200	0	0	40,321,200	48,650,264	
October, 1999	28,218,000	621,000	0	28,839,000	30,536,509	
November, 1999	20,159,000	369,000	0	20,528,000	22,791,889	
December, 1999	19,983,700	0	0	19,983,700	20,920,954	
1999 TOTALS	**358,499,600**	**990,000**	**0**	**359,489,600**	**321,380,534**	**10.7%**

Since water demands within a city vary from year to year due to seasonal, climatic, and economic factors, it is not uncommon to see substantial yearly differences in water consumption. In order to provide more statistically accurate future projections, water use demand and consumption data have been evaluated for the 3 Years 1997-1999. The values from these three years have been averaged and adjusted for population variances. These average values are used for water system projections for Years 2000-2020:

Table 4-3
1997-1999 Water System Statistics

Parameter	1997	1998	1999	3 Year Average	Design Values
Population	7,590	7,980	8,310	7,960	
Average Daily Demand (Sources)	926,306 GPD	1,009,164 GPD	984,884 GPD	973,451 GPD (676 GPM)	
Average Daily Demand (Sales)	812,496 GPD	860,392 GPD	880,495 GPD	851,128 GPD	
Average Yearly Unaccounted Water (Percent)	12.3%	14.8%	10.6%	12.6%	10%
Maximum Month	August	August	July	July-August	
Average Day during Maximum Month	1,523,268 GPD (1058 GPM)	1,668,900 GPD (1159 GPM)	1,474,290 GPD (1024 GPM)	1,555,486 GPD (1080 GPM)	
Maximum Day	2,271,000 g (8-15-97)	2,528,561 g (8-11-98)	2,223,280 g (7-16-99)	2,340,947 Gal (1,626 GPM)	
Maximum Day/Average Day	2.45	2.51	2.26	2.41	2.5
Minimum Month	December	March	December	NA	
Well #1-Average Operation Hrs/Day	16 (66%)	18.9 (78.8%)	17.7 (73.4%)	17.5 (73%)	
Well #1-Maximum Operation Hrs/Month	717.5 (July)	719.25 (August)	676.5 (July)	704 hrs/month	
Well #1- Average Maximum Operation Hrs/Day	23.15 (96%)	23.18 (96.6%)	21.8 (90.9%)	22.7 (94.6%)	
Average Summer Day	1,345,721 GPD (935 GPM)	1,567,788 GPD (1089 GPM)	1,404,270 GPD (975 GPM)	1,439,239 GPD (1000 GPM)	
Maximum Day/Average Summer Day	1.69	1.61	1.58	1.63	1.65
Average Summer Day/Average Day	1.45	1.55	1.43	1.48	1.5
Average Winter Day	744,410 GPD	754,339 GPD	821,768 GPD	773,506 GPD (537 GPM)	
Average Winter Day/Average Day	.80	.75	.83	.795	.80
Average Per Capita Day	122 GPCD	126 GPCD	119 GPCD	122 GPCD	125 GPCD
Per Capita Usage: Average Day During Maximum Month	200 GPCD	290 GPCD	177 GPCD	195 GPCD	200 GPCD
Maximum Per Capita Day	299 GPCD	316 GPCD	269 GPCD	295 GPCD	313 GPCD

Table 4-4 illustrates the distribution of water users in the City of Monmouth.

Table 4-4
Water Service Distribution (As of April, 1999)

Type of Account	Number of Services	Percent of Total
Single Family Residential	1,601	81.8%
Multi-Family Residential	213	10.9%
Commercial	80	4%
Institutional	45 (Western Oregon University)	2.3%
Irrigation	2	.1%
City Services	5	.3%
Fire Protection	12	.6%
	Total: 1,958 Services	100%

Western Oregon University- Impact on Water Usage

Western Oregon University is the single largest consumer of water in the City of Monmouth. According to university officials, the current (2000) student enrollment of 4,515 is expected to rise significantly over the next ten years. Information received from the university projects Year 2010 student enrollment to be between 6,500-7,000. The following water usage data was obtained for Years 1998-1999 and reflect the most current data available:

Table 4-5
Western Oregon University
1998-1999 Water Consumption

Month/Year	Water Consumption (in Gallons)
January, 1999	1,753,536 g
February, 1999	3,393,751 g
March, 1999	2,879,351 g
April, 1999	2,618,898 g
May, 1999	3,593,242 g
June, 1998	3,535,272 g
July, 1998	5,403,702 g
August, 1998	9,430,186 g
September, 1998	8,513,512 g
October, 1998	4,814,427 g
November, 1998	3,653,905 g
December, 1998	3,127,014 g
TOTAL	**52,716,796 gallons**

Based on individual meter readings, the yearly irrigation demand by the university is approximately 14,400,000 gallons (27.3% of the total). This volume is typically consumed through the summer months of June, July, and August. The university has recently purchased 34 acres of additional land in anticipation of the projected 10 year growth. For planning purposes, the following criteria will be used:

Current Yearly Water Demand: 52,716,796 gallons
(-) Irrigation and landscape watering: <14,400,000 gallons>

Yearly Water Consumption: 38,316,796 gallons
38,316,796 gallons/4,500 students= 8,515 gallons/year/student
8515/365 days per year= 23.3 gallons per day/student-Use 25

In addition, irrigation demands are projected to double to accommodate the 15-20 acres planned to be added to the campus in the future. Based on current daily demands, future irrigation demands are projected to ultimately rise to 300,000 GPD (Year 2010).

Table 4-6
Western Oregon University
Maximum Projected Daily Water Use (in Gallons)

Year	Student Enrollment	Daily Water Use/Student	Total Domestic Use	Irrigation	Total
2000	4,500	25	112,500 GPD	160,000 GPD	272,500 GPD
2005	6,000	25	150,000 GPD	200,000 GPD	350,000 GPD
2010	6,500	25	162,500 GPD	300,000 GPD	462,500 GPD
2015	6,800	25	170,000 GPD	300,000 GPD	470,000 GPD
2020	7,000	25	175,000 GPD	300,000 GPD	475,000 GPD

Commercial/Industrial Water Use

As previously indicated, Western Oregon University is the largest single user of water in Monmouth. Review of meter reads and customer billings indicate a total of 80 commercial/industrial accounts currently exist in Monmouth. This amounts to 4% of the total connections. The actual water consumption from the commercial accounts averages 6%-7% of the total monthly consumption. This amount is fairly consistent and does not significantly vary through the year. This amount is negligible to the total and will therefore by included within the per capita usage. The average commercial account water consumption is also very close to a typical dwelling unit. Even though there is dedicated industrial zoned land available for future growth, at this time no industrial facility that consumes appreciable amounts of water is proposed or contemplated in Monmouth. In the absence of specific criteria, future commercial and industrial water usage will be included within the projected per capita demands. The city is advised that any future industrial concern that may use over 1000 gallons per day per developed acre will need to be addressed individually. For the proposed 142 acres of Industrially zoned land in the northeast area of the city, this value equates to a population equivalent of 454 (based on Maximum Day Demand). Each acre, therefore, of industrial water usage (@ 1000 GPD/Acre) will equal 3.2 residents of equivalent maximum water use.

Based on previously stated population and Western Oregon University projections, the following values will be used for planning purposes:

Table 4-7
Projected Water Demands: 2000-2020

	2000	2005 (1)	2010 (1)	2015 (1)	2020 (1)
Design Population	8,376	9,710	11,256	13,049	15,128
Average Daily Demand (3)	1,047,000 GPD	1,253,750 GPD	1,457,000 GPD	1,691,125 GPD	1,954,000 GPD
Average Summer Demand	1,570,500 GPD	1,900,625 GPD	2,300,500 GPD	2,644,688 GPD	3,039,500 GPD
Maximum Daily Demand (2)	2,621,688 GPD	3,116,730 GPD	3,713,128 GPD	4,282,337 GPD	4,938,064 GPD
Peak Hour (4)	4,550 GPM	5,413 GPM	6,450 GPM	7,440 GPM	8,600 GPM

(1) Years 2005-2020 reflect increased daily demand to accommodate projected Western Oregon University (WOU) and city growth
(2) Maximum Daily Demand is based on 313 gallons per capita/day plus the WOU growth factor
(3) Average Daily Demand is based on 125 gallons per capita/day
(4) Peak Hour Demand is assumed to be 2.5 x Maximum Day Demands

Required Source Capacity

Future required capacity is dependent on several factors. Among these are: duration of consecutive maximum days, source reliability, type of water use, and available storage. In the case of Monmouth, historical records indicate few incidents of consecutive or long term maximum day demands. Typically, maximum yearly water demands are incurred for a maximum of 3-4 consecutive days followed by a period of more typical summer demands. Source reliability has generally been excellent with few power or equipment failures. The city's current active storage of 5,000,000 gallons is adequate to accommodate up to two days of current maximum day demands. Future planning, however, must consider the existing common transmission pipeline (and possible failure) used by all wells and the fact that only three wells are available for all needed demands. For example, a prolonged failure or severe contamination of the Marion County well would result in a catastrophic event. To lessen this potential, new sources should be adequately spaced so that contamination of one source will have little or no impact on the others. The new Buena Vista well is located in the American Bottom region of Polk County, approximately three miles from the Marion County and Independence wells. This spacing provides a good measure of source reliability. Another area of concern is related to the use of only 2-3 high capacity wells to provide all of the needed capacity. To alleviate this concern, minimum well capacities will be based on any three of the future total of five wells (excluding the Fourth Street wells) providing an average summer day demand. The distribution of flow between the wells is also sufficient to provide maximum day demands with 24 hour a day pumping even with the loss of any single 700-800 GPM well. This design criteria fits well with available well capacities from new wells in the Buena Vista well field. If a coincidental failure of the Marion County Well occurs on a maximum day, the differential will be drawn from current and proposed future water storage.

Given the above conditions, for the purposes of this report, the following values will govern:

Table 4-8
Required Total Source Capacity: 2000-2020

	2000	2005	2010	2015	2020
24 Hrs/Day Pumping	1,820 GPM	2,165 GPM	2,580 GPM	2,775 GPM	3,430 GPM
20 Hrs/Day Pumping (recommended)	2,200 GPM	2,600 GPM	3,100 GPM	3,570 GPM	4,115 GPM

From Table 4-8, the value shown at 20 hours per day of source pumping provides reserve flow necessary for possible pump failure or coincidental fire demand and will be used for forecasting purposes.

Fire Flow

The City of Monmouth is located within the Polk County Fire District No. 1 for fire protection and is served from the main station located between Independence and Monmouth. Table 4-9 indicates needed and available fire flows for various locations within the city. These flows are based on normal fire flow requirements for specific structure or development classifications and are based on testing performed by ISO in March, 1998.

Table 4-9
Required Fire Flows

Location	Required Fire Flow (GPM)	Available Fire Flow (GPM)	Classification
Bentley and Martin Way	1250	2300	Residential
West Orchard Drive	750	7000	Residential
South Pacific and Madrona	750	1350	Commercial
Sacre Lane and Church St (WOU)	3500	2100	Institutional
Monmouth and Church St	3000	2400	Commercial/Institutional
West Church Street	3500	2000	Commercial/Instructional
East Church Street	3500	2600	Institutional

As seen in Table 4-9, past fire hydrant flow testing performed by ISO(March, 1998) indicated a maximum deliverable flow rate of 2,600 GPM @ 20 psi residual pressure in the Church Street Area. The minimum required flow in this area is 3,500-4,000 GPM. Due to the high exposure of a potentially large fire at the WOU campus, this area of the city is regarded as the most serious current fire flow deficient area in the city. After careful analysis and computer modeling, however, it is believed that this deficiency in flow is a function of the distribution system and undersized pipe to this area.

Discussions with Mark Stevens of Polk County Fire District indicated that Monmouth has been included with Independence, Rickreall, and the rural Luckiamute Water Cooperative to create an aggregate classification. Much of the criteria used to classify the Polk County Fire District is based on response time, dispatch methods, and available fire fighting equipment as well as water supply. During this discussion, the Fire District expressed the desire for up to 3,500-4,000 GPM supply in Monmouth, particularly in the downtown core area and Western Oregon University. Since ISO does not improve the rating of a city for fire flow above 3,500 GPM, this flow was felt to be the highest practical flow currently required in Monmouth.

For hydraulic modeling analysis, this value will be used during Year 2000 analyses. Year 2020 fire demand is assumed to be 4,000 GPM, reflecting the actual population requirement. Actual flow based on ISO population equivalents and storage requirements are calculated below and will be used for storage requirements.

The City currently has a Class 3 Fire Protection Rating as established by the Insurance Services Office (ISO). This rating is regarded as an excellent rating for a community such as Monmouth. This level of rating provides the same insurance premium to homeowners of residential property for all Class 3, 4, and 5 ratings (the lower the number relates to a better class rating). Class 1 and 2 ratings are difficult to obtain and unrealistic for this location. Drastic improvements to the water system to further lower the City's Fire Protection Rating, therefore, will not result in an appreciable reduction in fire insurance premiums and is most likely not feasible due to the current limitations associated with non-water supply issues, i.e. fire department response time, available equipment, etc. During evaluation of the system, the highest projected instantaneous fire flow demand would most likely occur within the downtown core area or at Western Oregon University. Since many of the existing structures in these areas are older wood or brick frame buildings with close spacing between structures, a very high fire flow (> 3000 GPM) could feasibly be required to fight a large conflagration in this area. Fortunately, most of the campus buildings within Western Oregon University are reportedly sprinkled and the likelihood of a very large and sustained fire at this institution is considerably less than with unsprinkled buildings.

Assumed fire flow demands, in the absence of specific criteria, is based upon population numbers. For planning and hydraulic modeling purposes, the following equation will be used to approximate the present and future fire flows (values will be used for both present and future population equivalents).

$$_{(1)}\ Q(GPM) = 1020\sqrt{P}\,(1 - .01\sqrt{P})$$

Where P = Population in Thousands

For 2020 Projected Population of 15,000

$$Q(GPM) = 1020\sqrt{15}\,(1 - .01\sqrt{15}) = 3800\ GPM$$

Monmouth Fire Flow duration: 4 hrs - Total Volume: 4000 GPM X 60 mins/hr X4 hrs = 912,000 gallons.

For planning purposes, a Year 2020 fire flow of 4000 GPM will be assumed over a 4 hour duration ≅ 1,000,000 gallons.

(1) American Insurance Association

Chapter Five
Future Water Sources

Future Water Sources

Groundwater

The current total permitted capacity under valid permits (5,328 GPM) is adequate to supply all projected water demands through the Year 2020, however, the existing source capacity (1,600 GPM) does not fulfill this requirement. Currently, the wells are operated continuously or as needed to maintain water in the reservoirs. A new control system, proposed in the first phase of improvements will allow automatic operation of all wells, optimizing source capacity and reliability.

The Marion County Well produces the highest quality of water of all existing sources, with low levels of iron, manganese, and hardness. The risk at this site associated with the river crossing, nitrates, and proximity to agricultural activity, however, necessitates the implementation of redundant source capacity.

For planning purposes, each existing well in the Independence Field will be limited to an average flow of 150 GPM (300 GPM total). Wells #4 and #5 each have levels of iron as well as past detections of regulated and unregulated organic contaminants (1) The only other current ground water source available to the city is the Marion County well. This shallow well has good yield (over 1,000 GPM), but contains elevated levels of carbon dioxide requiring treatment and periodic elevated Nitrate levels.

The recently drilled Buena Vista Well #1, located in the American Bottom region, has good yield (1000 GPM) and acceptable water quality. The major concern associated with the use of this site is the presence of iron and manganese. As outlined in other sections of this report, the iron and manganese levels from this well is considerably higher than the suggested limit. Nearby wells utilized by the Luckiamute Water Cooperative, however, do not contain the same high level of these elements. It is anticipated that continuous or long term pumping will allow water with higher aesthetic quality to be induced to the new well field. The author of this report has observed this phenomenon occur at other wells and believes this may also occur at this site. To avoid the initial expense of complicated iron removal equipment, the Buena Vista well should be equipped with sequestering injection equipment for the first 2-3 years of operation. The city's reliance on this well will be minimal for the first 3-5 years of operation which will afford the opportunity to pump the well as necessary to hopefully lower iron levels. If iron and manganese levels do not fall to acceptable levels within this time span, the city may opt to install filtration equipment for permanent removal of these elements.

Based on the criteria established in Table 4-8, the current recommendation is to immediately pursue development of the Buena Vista well field. This is felt to be the highest priority as additional source capacity is presently needed as well as a back-up source to the Marion County Well. Later phases of the study periods include development of additional wells in the Buena Vista well field to accommodate projected growth. For planning purposes, the following schedule is recommended:

(1) In 1994, traceable levels of Petachlorophenol (PCP) were detected in Well #4.

Table 5-1
Recommended Groundwater Source Development Schedule

	2000	2001	2005	2010	2015	2020
Marion County Well #1	1400 GPM	1200 GPM	1200 GPM	1300 GPM	1200 GPM	1200 GPM
Well #4	250 GPM	150 GPM	----	----	----	----
Well #5	150 GPM	150 GPM	150 GPM	150 GPM	----	----
Buena Vista #1	----	900 GPM	900 GPM	900 GPM	800 GPM	700 GPM
Buena Vista #2	----	----	700 GPM	700 GPM	700 GPM	700 GPM
Buena Vista #3	----	----	----	----	700 GPM	700 GPM
Marion County #2	----	----	----	----	----	800 GPM
Total Available Capacity (1)	1600 GPM	2400 GPM	2950 GPM	3050 GPM	3550 GPM	4100 GPM
Total Required Capacity (2)	2200 GPM	2300 GPM	2600 GPM	3100 GPM	3570 GPM	4115 GPM
Net Reserve (+) Deficit (<>)	<400 GPM>	+100 GPM	+350 GPM	<50 GPM>	<20 GPM>	<15 GPM>

(1) Based on 20 Hour per day of pumping
(2) Based on Maximum Day Demand

The above schedule reflects a progressive implementation of new wells from the Buena Vista well field and little or no changes in flow from the Marion County Well. Due to the known water quality concerns from this well, as well as constraints on space and well limitations, an increase in flow from this site is not feasible. A program to optimize the capacity of the Buena Vista well field and transmission pipeline, resulting in progressive expansion of this source is recommended. The later years of the study period also include development of a second Marion County Well. This well, to be located adjacent to the existing well, will provide an additional measure of source and well field redundancy. As previously outlined, Wells #4 and 5 are not planned in future projections due to the relatively low capacities and uncertain water quality from these wells. To avoid well interference between wells in the Buena Vista well field, a reduction in flow from each well is anticipated as additional wells are developed. This results in a total well field capacity of 2100 GPM, 588 GPM less than permitted.

Given the hydrogeology of this area, however, it is believed that lowering the yield from each well and combining more wells to produce the total water required, will provide long-term advantages to the wells and well pumps. A discussion of local hydrogeologic characteristics and recommended well construction standards can be found in later sections of this chapter.

Water Right Implications

To satisfy the proposed groundwater development schedule, the City will not need to obtain and secure additional water rights, only application to modify existing rights will be required. The city currently holds valid permits for 5 CFS (2240 GPM) for the Marion County well and 6 CFS (2688 GPM) for the Buena Vista wells. Both of these permits are for year round use. These permitted flows are far in excess of the required capacity and only the points of diversion will need to be modified. The existing Marion County permit allows withdrawl from two wells, which is the planned maximum number from this well field. The Buena Vista permit, however, projects total withdrawl from 2 wells also. The total permitted flow cannot realistically be obtained from two wells and the permit will need to be modified for the ultimate use of three wells. The city may also wish to pursue the transfer of existing Teal Creek surface water rights to the Buena Vista well field.

Since the Teal Creek source is not anticipated to be utilized anymore, transfer to groundwater rights may be the most logical use of these unused water rights. In all cases, the City should endeavor to retain any and all previous priority dates on pre-existing permits.

Surface Water Development

According to information obtained from the Water Resources Department and the Willamette Basin Plan (Nov. 1994), surface water for municipal use is available from the Willamette River at Independence and from the Teal Creek source. The amount of water available via water rights allocation from the Willamette River is far in excess of the projected water demands for Monmouth through the study period. The feasibility of re-developing the Teal Creek water source, however, is very limited. Historical data from the city and the Water Resources Department indicates a seasonal depletion of available water from this source, particularly during the summer. The Teal Creek springs are known to substantially dry up or endure severe depletion during late summer months. In addition, this source has severe turbidity events that often occur during periods of sustained precipitation and runoff. Further reliance on the Teal Creek source will require some method of storage to protect against periods of low water availability. The cost associated with treatment, storage, and transmission of this source to the city is felt to be economically excessive. Given the high cost of development and treatment of surface water, public resistance, the possible risk of contaminants due to local agricultural practices and upstream wastewater discharges, and the availability of adequate groundwater; development or use of any surface water source is not recommended at this time. During the past 10 years, several discussions have occurred in which the feasibility of a regional water authority supplying the Willamette River water to the cities of Dallas, Monmouth, and Independence has been explored. At this time, the political and economic limitations of this possibility are great and future planning utilizing this potential is not felt to be justifiable.

Local Hydrogeology

The City of Monmouth is located in a broad synclinal trough (valley) known as the Willamette Valley. The Willamette Valley was formed 30-60 million years ago through a downward folding of the subsurface layered rock formation. The material at the surface over much of the valley is a sandy to clayey silt that settled from ponded water. This silt, known as Willamette Silt, is comprised of a permeable fine-grained deposit that transmits water readily to the underlying alluvium (sand and gravel) formation. The alluvial deposits and silts underlying the Monmouth area were largely derived due to erosion and runoff from surrounding mountains. These deposits consist of layers of clay, silt, and sand and gravel. This alluvium material, chiefly consisting of sand and gravel, is also referred to as an unconsolidated material and provides the available groundwater for Monmouth, Independence, and nearby agricultural wells. Water percolates through the pores of sand and gravel by head created from the recharge point. Sand and gravel, due to its available pore spacing, is a much better conveyor of water to a well than clay or sandstone which does not permit water to transmit as easily.

Marion County and Independence Wells

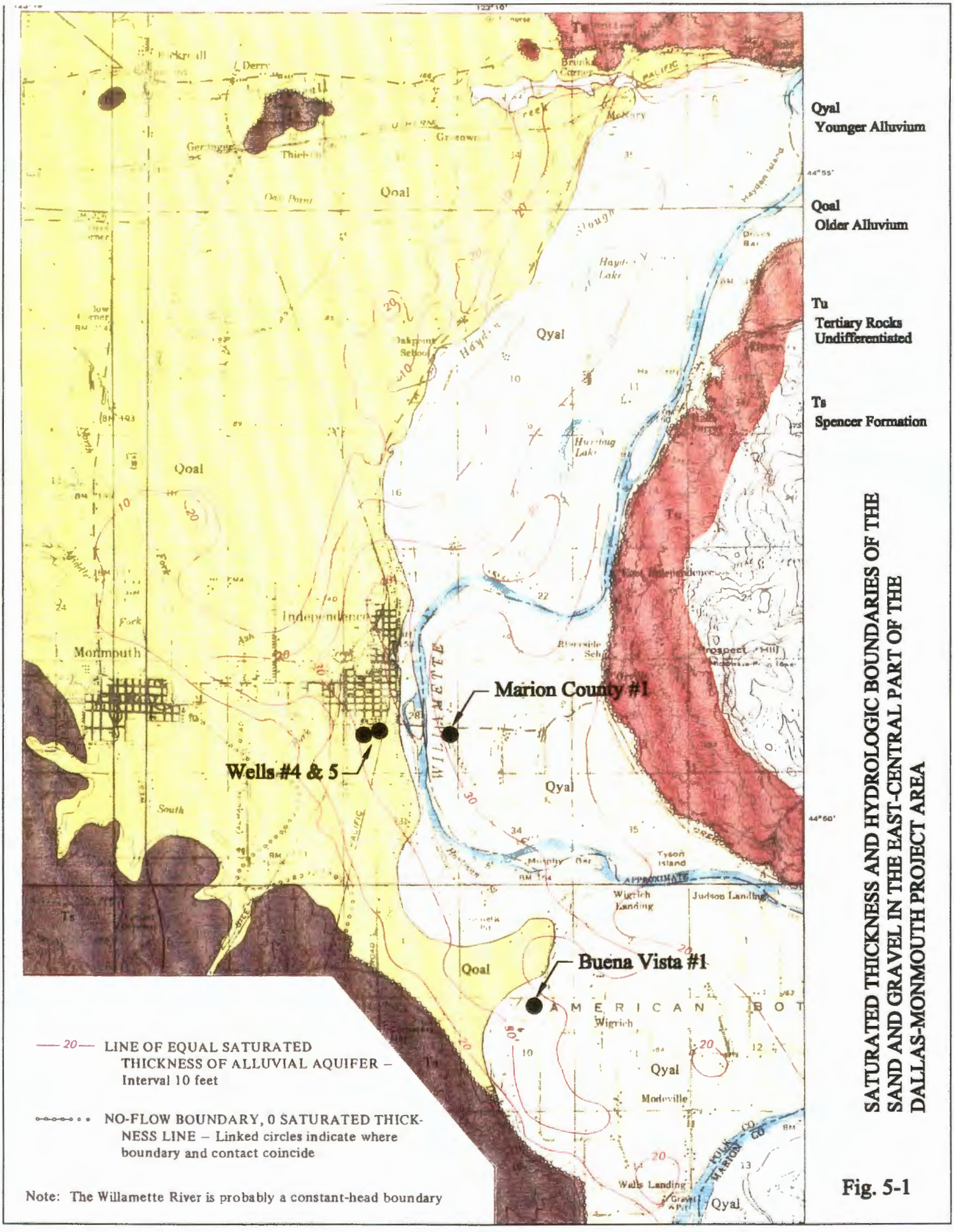
Near Corvallis Road, the sand and gravel beds are hydraulically continuous and can exceed a saturated thickness of 10 - 45 feet covering tens of square miles, generally within the Willamette River floodplain. Properly constructed wells in these deposits can typically obtain yields of 100 to over 500 gallons per minute. The yield of an individual well, however, can vary significantly depending on the distance from the Willamette River, thickness of aquifer, and amount of cementation (binding together) that occurs within the formation. The alluvium in the Monmouth/Independence area is often referred to as "younger or older alluvium". The terms "younger" or "older" alluvium refer to the relative geologic age of deposition of each of these types of alluvium. Younger alluvium has been more recently deposited and is constantly subject to washing and regrading of material due to the action of the Willamette River during floods. The older alluvium is established alluvium that underlies the younger alluvium and/or Willamette silt.

The younger alluvium bounds the Willamette River to the east and extends roughly to Corvallis and Buena Vista Roads to the west. This type of alluvium is characterized by high production wells due to good hydraulic connection with the Willamette River and lack of cementation. Water from the younger alluvium, however, also generally has higher levels of iron, manganese, and hardness and is more susceptible to Nitrates and contamination due to the shallow depth and lack of overlying sealing material. Annual recharge to the younger alluvium is established to be between 8"-15". The Marion County Well is an example of a well constructed in the younger alluvium. Information obtained from the draft report, "Monmouth-Independence Drinking Water Protection Area Delineation Report," OAWU, 1998; indicates recharge to the Marion County well occurs from the south-southeast. This area is heavily agricultural in practice and elevated nitrate levels periodically observed at the Marion County well may be the result of the application of nitrogen fertilizers often used in agricultural practices. Completion of this report is strongly recommended and the city should begin a recharge area inventory and delineation as soon as possible to assist in long-term protection of this specific well. The older alluvium is located generally west of Corvallis and Buena Vista Roads and underlies virtually all of the city including Wells #4 and 5. This type of alluvium does not yield the high flows common to the younger and shallower alluvium but it does generally have a higher degree of aquifer protection. The older alluvium is dependent on direct precipitation and inter-zonal leakage from the younger alluvium for recharge. The older alluvium is known to be at its thickest and most extensive point in the vicinity of the Independence South Well Field which accounts for the higher proportional yield from these wells as opposed to other wells in the older alluvium. In the area around Independence, sand-and-gravel beds in younger alluvium are continuous and hydraulically connected with sand-and-gravel beds in the adjacent older alluvium. When pumping is applied, the two units respond as a continuous aquifer. Discontinuity, cementation, and hydraulic losses, however, account for the difference in yield between these two formations. The older alluvium is typically overlain by 15 to 45 feet of clay and silt that provides good wellhead protection when proper well construction practices are employed.

Underlying the younger and older alluvium is semi-consolidated and consolidated shale (claystone), sandstone, and basalt materials. Wells in these formations are not productive (≤ 50 GPM) in this area for municipal purposes and encountering salt water is a definite potential, particularly in wells below 120' in depth. For these reasons, exploration of groundwater below 100' in depth is not recommended.

Buena Vista Well Field

Due to the anticipated high reliance on the Buena Vista well field, a separate discussion of the available capacity and limitations of this field is warranted. As evidenced on Figure 5-1, the Buena Vista well, constructed in 1997, is on the fringe of the younger alluvium. The younger alluvium (Qyal), indicated by the lighter shade of yellow, is the most productive and permeable of the two alluvial aquifers in the area. Since the well is located in such close proximity to the older alluvium, it is possible that the elevated iron and manganese levels are due to the influence of water from the older alluvium as well as the underlying consolidated formations. Due to the relatively low levels of sodium and chloride, the actual amount of influence from the underlying shale and sandstone formations is not considered to be significant at this time. Additional development of wells at the Buena Vista site must be planned and executed carefully to avoid well interference, excessive iron, manganese, and nitrate/nitrite levels, and overpumping. After activation of the Buena Vista well #1, the city should embark on a 1-2 year monitoring program (Table 5-3) to provide needed background data for proper selection and design of the additional well sites. A competent hydrogeologist should be consulted to optimize the site selection and design capacity of future wells. Upon receipt of the hydrogeologist's report the city should proceed towards the acquisition of additional land (preferably to the east of the existing well) as soon as possible. This acquisition is vital to insure adequate well spacing to prevent well to well interference or interference between the Buena Vista well and nearby irrigation or Luckiamute wells.



SATURATED THICKNESS AND HYDROLOGIC BOUNDARIES OF THE SAND AND GRAVEL IN THE EAST-CENTRAL PART OF THE DALLAS-MONMOUTH PROJECT AREA

Fig. 5-1

The following schedule is suggested to optimize development of the Buena Vista well field:

Table 5-2
Buena Vista Well Field Development Schedule

Year	Task or Milestone	Purpose	Total Well Field Capacity
2000-2001	Install pumping and chlorination equipment and iron/ manganese sequestering equipment at Buena Vista #1	Satisfy immediate need for additional source capacity	900 GPM
2001-2003	Perform static and pumping level tests on production and test wells and nearby wells as outlined in monitoring program	Provide data necessary for optimum selection of new well sites	900 GPM
2001-2003	Perform water quality tests for iron, manganese, and nitrates	Provide data necessary to determine need for water treatment	900 GPM
2002-2003	Select Buena Vista Well Sites #2 and 3 based on data collection and recommendations from hydrogeologist	Secure new well sites	900 GPM
2001-2002	Purchase additional land and/or water rights from nearby landowners or farmers	Secure needed land for additional wells in future years	900 GPM
2004-2005	Install iron/manganese removal equipment, if required	Implement if water quality does not improve with pumping	900-1600 GPM
2004	Drill and develop Buena Vista #2 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	1600 GPM
2005-2013	Continue monitoring program-Modify flows from wells, if necessary, to avoid interference between wells	Optimize available well capacity and Buena Vista #3 site selection	1600 GPM
2012-2013	Drill and develop Buena Vista #3 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	2100 GPM
2015-2020	Continue monitoring water quality and well pumping conditions- Modify frequency as required	Optimize available well capacities	2100 GPM

Table 5-3
Recommended Buena Vista Well Field Monitoring Program

Parameter	Type of Unit	Frequency
1. Well Static Water Level (after full recovery)	Feet from surface	Weekly
2. Pumping Rate	GPM	Monthly
3. Pumping water level (obtained with pumping rate)	Feet from surface	Monthly
4. Iron	mg/L	Monthly
5. Manganese	mg/L	Monthly
6. Nitrate/Nitrite-First Year of Use	mg/L	Monthly
7. Nitrate/Nitrite-After First Year of Use	mg/L	Quarterly
8. Daily Production	Gallons	Daily
9. Static Water levels from Nearby Wells	Feet from surface	Quarterly
10. Pumping water levels from Nearby Wells	Feet from surface	Quarterly
11. Sodium	mg/L	Yearly
12. Chloride	mg/L	Yearly
13. Static Water Level (1) (Observation wells)	Feet from surface	Monthly
14. Inorganics, VOL, SOC, Gross Alpha, etc.	Frequency as Determined by OHD	

(1) These observations should be made during Tests #2 and 3, after the production well has stabilized during normal conditions.

Well Interference Potential

Given the close proximity of the City of Independence's South Well Field and the City of Monmouth's Fourth Street Well Field, the possibility of well interference between these wells certainly exists. Fortunately, the Fourth Street wells are not frequently used, but if an emergency at Monmouth's Marion County well occurred, the potential exists for prolonged pumping from the Fourth Street Wells. If this occurred for an extended period of time, Wells #4 and 5 would most likely incur a drop in production of up to 10% - 50%. The high variable in drop of production would be related to the time of year of use (summer greater than winter), available water stored in the aquifer from recent recharge, and the rate and duration of pumping from both well fields.

The potential for drawing the known pentachlorophenol plume at a faster rate toward both well fields would also present a concern. Both cities would be well advised to discuss these scenarios and prepare an operational plan in the event both well fields would need to be used for an extended period of time. Well interference between Wells #4 and 5 and Monmouth's Marion County Well is not believed to be of concern given the different aquifers and distance between these sites. Even though the potential exists for interference between the Buena Vista Well and nearby agricultural and Luckiamute wells, the possibility of direct interference to nearby irrigation wells is low when considering the actual capacity of the Buena Vista Well versus the available yield and distance to actively used irrigation wells. Since most of the future water sources are projected to originate from the Buena Vista well field, the city must insure that adequate land is available for future well development and spacing. Each well site should be dedicated to 1-2 acres minimum of city owned land for adequate sanitary control as well as necessary well spacing. To prevent interference between existing Luckiamute Water Cooperative wells and the Buena Vista wells, the city should embark on a well level monitoring program (Table 5-3). This program should include both static and pumping water levels obtained throughout the year. A competent hydrogeologist should be consulted before siting and drilling Buena Vista wells #2 and 3 to optimize site selection. The City of Monmouth and Luckiamute Water Cooperative are advised to develop a monitoring and interuse agreement as soon as possible. Excessive aquifer draft or well interference may require purchase of available irrigation water rights or possibly re-consideration of extensive development of Buena Vista well field.

The greatest potential for well interference actually occurs within the Buena Vista Well Field itself. It is believed that with proper balancing of flows from each of the three proposed wells and normal pumping hours of less than 18 - 20 hours per day, the wells can operate together with minimal interference.

Alternate Water Sources

Recent discussions and investigation have been performed regarding the feasibility of securing (purchasing) municipal water rights from existing irrigation water rights. The primary irrigation rights under consideration are located approximately 4-5 miles northeast of the city. This source, although high in capacity, is vulnerable to iron, manganese, corrosion, and nitrate concerns. Use of these wells may also conflict with

other quasi-municipal and irrigation water rights now present in the same general area. In addition, the cost to develop and transmit this source would be prohibitive for one single entity to incur at this time. In the case of Monmouth, the high incremental cost associated with the development and transmission of water from the Buena Vista field necessitates complete utilization of this site. For the purposes of this study, procurement of this alternate water source is not presently recommended, although reconsideration in the future may occur if sufficient cooperative interest is expressed by Dallas or Independence. The city should continue to pursue this potential with Dallas and Independence for water demands beyond 2020.

Recommended Well Construction Standards

In order to optimize future well production, the following recommendations should be considered when constructing new wells:

1. New wells should be a minimum of 12" diameter, with a 12" diameter well recommended at the Buena Vista well sites to allow well screen installation, if feasible.

2. New wells shall be cement grout sealed to a minimum depth of 25', 5' into an impervious layer such as clay, if possible.

3. Formation sampling shall occur at no more than 5' intervals and at every change in formation to facilitate well screen selection.

4. New wells shall be drilled through the water-bearing formation to a minimum of five feet below the bottom of the aquifer. This five foot extension below the aquifer shall remain and be used for accumulation of sand.

5. New wells shall be test pumped for a minimum of twelve hours. During this period, any existing wells within ¼ mile should also be operated and monitored to determine the interference potential.

6. Generally, the well construction shall comply with Water Well Construction standards as issued by the State of Oregon Water Resources Department

7. To optimize the full extent of the aquifer, a stainless steel well screen, properly sized to retain approximately 40% of the formation, should be specified.

Well Pump Selection Criteria

Based on hydraulic modeling results, specific criteria for the selection of well pumps at the Buena Vista and Marion County well fields can be established. Based on projections and data within this report, the following guidelines can be used for selection of well pumps for both well fields.

Buena Vista Well Field

Well #1: Primary Design Condition: 900 GPM @ 323' TDH
Secondary Design Condition: 700 GPM @ 335' TDH
Wells #2 and 3: Design Condition: 700 GPM @ 335' TDH

This application will require 75-100 HP of electrical motor horsepower.

Marion County Well Field

Marion County #2 (Future): 800 GPM @ 345' TDH (1)

This application will require 100 HP electrical motor. The preceding calculations are based on calculated head requirements based on maximum day demand events. Total head includes 30' of well lift plus 20' of piping and valving frictional head.

(1) Contingent upon final determination after completion of well

Chapter Six
Water Quality

Water Quality

Introduction

Water quality issues will significantly impact both surface and groundwater sources over the next 5-10 years. Strict new regulations and monitoring requirements are either presently in effect or due to be enacted during the next 2-7 years. Many of these new regulations apply to both surface and groundwater sources while some only apply to one type of source. As the City of Monmouth currently utilizes only ground water sources, the impact of proposed groundwater regulations will primarily be discussed.

Background

In 1974, the U.S. Congress passed the Safe Drinking Water Act (SDWA) with the purpose of establishing a uniform set of regulations and water quality standards. These regulations and standards applied to all "Public Water Systems" throughout the United States with the Environmental Protection Agency (EPA) providing the primary role in setting the standards. The first national drinking water standards, called the National Interim Primary Drinking Water Regulations (NIPDWR) were adopted on December 24,1975 by the EPA. The intent of the SDWA was for individual states to assume "primacy" and provide implementation and enforcement of these standards. Oregon was one of the last states to accept primacy for the SDWA, assuming this role in 1986. Up to 1986, drinking water quality standards were in place for 23 contaminants. The 1986 SDWA amendments were passed by Congress at the same time Oregon assumed primacy. These amendments at that time provided the most stringent regulations and standards in the history of the United States with all public water systems impacted in some form. Under those amendments, the number of individual contaminants regulated totaled 83 within 3 years with 25 new contaminants regulated every three years into the future. Currently, there are national standards for 79 and state standards for 84 contaminants. In addition, new regulations were enacted which provided for mandatory filtration of surface water, disinfection requirements, and lead and copper testing. In Oregon, public drinking water systems are subject to the Oregon Drinking Water Quality Act (ORS448-Water Systems). This act, passed in 1981, was developed to empower the Health Division with broad authority to set water quality standards necessary to protect public health. The current monitoring requirements are outlined in Table 6-2. The City of Monmouth by virtue of its population and number of services is classified as a "Community Water System" serving less than 10,000 people.

The SDWA, in 1996, underwent considerable changes that will eventually effect virtually every public water system in the country. The 1996 amendments as opposed to previous SDWA laws, were prepared with assistance and input from the regulated community. This law was passed by Congress and was signed into law by President Clinton on August 6, 1996 as Public Law 104-182. As expected, the SDWA revision included some relaxation in some areas and increased enforcement in other areas. A summary of the 1996 SDWA is as follows:

1. Existing and current standards and rules (prior to 1996) remain in effect and unchanged. EPA is required to review and possibly revise all rules on a

schedule that extends to 2000. Monitoring frequencies for some current regulated contaminants are likely to be reduced. Current regulations are not subject to the new standard-setting criteria outlined below.

2. Under the 1986 SDWA amendments, EPA would set 25 new standards every three years. The current law, however, requires the EPA to only regulate contaminants that may have adverse health effects, are known or likely to occur at levels of public health concern and that provide a "meaningful opportunity for health risk reduction". EPA, under the new law, will now consider five new contaminants for regulation every five years. EPA can, however, bypass the standard selection process for contaminants that represent an urgent public health threat.

3. The new law authorizes new funding for water system construction projects through a new Drinking Water State Revolving Fund (DWSRF). This fund is administered by the State of Oregon Health Division for Oregon and the first funding program runs from 1997 through 2003.

4. The schedule for developing and implementing new standards will be more defined and the effort will focus on a smaller number of high priority contaminants, particularly microbial contaminants.

The current schedule for implementation of presently planned new standards is as follows:

November, 1998	Disinfection & Disinfection by-products rule (D-DBP)
November, 2000	Enhanced Surface Water Treatment Rule
August, 2000	Radon Rule
January, 2001	Arsenic Rule
January, 2001	Groundwater Disinfection Rule
May, 2002	Stage 2, D-DBP Rule
August, 2003	Sulfate (if regulated)

5. The revised law now requires water systems to provide water customers with annual "consumer confidence reports" that will describe the source and quality of the water they provide to consumers. The law does allow state governors the flexibility to allow systems serving fewer than 10,000 people to not require direct mailing of these reports but allow publishing them in a local newspaper. At this time, this is not allowed in Oregon.

6. Any variance to the new standards for systems serving less than 3300 people must be approved by the State Health Division.

7. Operator certification for all systems is now required.

8. Primary drinking water regulations will now be based on risk assessments including cost-benefit analysis.

Table 6-1
City of Monmouth
Water Quality Data

Item	Maximum Contaminant Level for Drinking Water	Testing Results: Buena Vista #1	Well #1 Results	Well #4 Results	Well #5 Results
INORGANIC CHEMICALS					
1. Antimony	0.006 mg/l	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001
2. Asbestos	7 million fibers per liter longer than 10 microns		Less than 0.18 MFL	Less than 0.18 MFL	Less than 0.18 MFL
3. Arsenic	0.05 mg/l	ND @ 0.005	ND @ 0.002	ND @ 0.002	ND @ 0.002
4. Barium	2 mg/l	ND @ 0.1	ND @ 0.1	ND @ 0.1	ND @ 0.1
5. Beyllium	0.004 mg/l	ND @ 0.0002	ND @ 0.0002	ND @ 0.0002	ND @ 0.0002
6. Cadmium	0.005 mg/l	ND @ 0.002	ND @ 0.002	ND @ 0.002	ND @ 0.002
7. Chromium	0.1 mg/l	ND @ .0.1	ND @ .0.1	ND @ .0.1	ND @ .0.1
8. Cyanide	0.2 mg/l	ND @ 0.02	ND @ 0.02	ND @ 0.02	ND @ 0.02
9. Fluoride	4 mg/l	0.14 mg/l	ND @ 0.1	ND @ 0.1	ND @ 0.1
10. Mercury	0.002 mg/l	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001
11. Nickel	0.1 mg/l	ND @ 0.02	ND @ 0.02	ND @ 0.02	ND @ 0.02
12. Nitrate (as N)	10 mg/l	ND @ 0.1	11.4 mg/l (1)	ND @ 0.01	ND @ 0.01
13. Nitrite (as N)	1 mg/l	ND @ 0.01	ND @ 0.002	ND @ 0.002	ND @ 0.002
14. Selenium	0.05 mg/l	ND @ 0.001	ND@ 0.001	ND @ 0.001	ND @ 0.001
15. Thallium	0.002 mg/l	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001
16. Lead	0.015 mg/l		ND @ 0.002	ND @ 0.002	ND @ 0.002
17. Copper	1.3 mg/l	<0.01 mg/l	ND @ 0.01		
ORGANIC CHEMICALS PESTICIDES					
18. Alachlor	0.002 mg/l	ND @ 0.004	ND @ 0.004	ND @ 0.004	ND @ 0.004
19. Atrazine	0.003 mg/l	ND @ 0.0002	ND @ 0.0003	ND @ 0.0003	ND @ 0.0003
20. Carbofuran	0.04 mg/l	ND @ 0.001	ND @ 0.004	ND @ 0.004	ND @ 0.004
21. Chlordane	0.002 mg/l	ND @ 0.0004	ND @ 0.0004	ND @ 0.0004	ND @ 0.0004
22. Dalapon	0.2 mg/l	ND @ 0.002	ND @ 0.02	ND @ 0.02	ND @ 0.02
23. Dibrommochloroproprane (DBCP)	0.0002 mg/l	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002
24. Dinoseb	0.007 mg/l	ND @ 0.0004	ND @ 0.0007	ND @ 0.0007	ND @ 0.0007
25. Diquat	0.02 mg	ND @ 0.0004	ND @ 0.01	ND @ 0.01	ND @ 0.01
26. Enodthall	0.1 mg/l	ND @ 0.01	ND @ 0.02	ND @ 0.02	ND @ 0.02
27. Endrin	0.002 mg/l	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002
28. Ethylene dibromide (EDB)	0.00005 mg/l	ND @ 0.00001	ND @ 0.00001	ND @ 0.00001	ND @ 0.00001
29. Glyphosate	0.7 mg/l	ND @ 0.01	ND @ 0.07	ND @ 0.07	ND @ 0.07
30. Heptaclor	0.0004 mg/l	ND @ 0.00004	ND @ 0.00004	ND @ 0.00004	ND @ 0.00004
31. Heptaclor epoxide	0.0002 mg/l	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002
32. Lindane	0.0002 mg/l	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002	ND @ 0.00002
33. Methoxychlor	0.04 mg/l	ND @ 0.0002	ND @ 0.004	ND @ 0.004	ND @ 0.004
34. Oxamyl (Vydate)	0.2 mg/l	ND @ 0.002	ND @ 0.002	ND @ 0.002	ND @ 0.002
35. Pentachlorophenol (PCP)	0.001 mg/l	ND @ 0.00008	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001
36. Picloram	0.5 mg/l	ND @ 0.0002	ND @ 0.05	ND @ 0.05	ND @ 0.05
37. Simazine	0.004 mg/l	ND @ 0.001	ND @ 0.0004	ND @ 0.0004	ND @ 0.0004
38. Toxaphene	0.003 mg/l	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001
39. 2,4,5-TP (Silvex)	0.05 mg/l	ND @ 0.0004	ND @ 0.005	ND @ 0.005	ND @ 0.005
40. 2,4-D	0.07 mg/l	ND @ 0.0002	ND @ 0.007	ND @ 0.007	ND @ 0.007
41. Adipates	0.5 mg/l	ND @ 0.002	ND @ 0.05	ND @ 0.05	ND @ 0.05
VOLATILE ORGANIC CHEMICALS					
42. Benzene	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
43. Carbon tetrachloride	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005

(1) Test performed on 2-22-00

Testing Results

Item	Maximum Contaminant Level for Drinking Water	Buena Vista #1	Well #1 Results	Well #4 Results	Well #5 Results
44. Para-Dichlorobenzene	0.075 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
45. Ortho-Dichlorobenzene	0.6 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
46. 1,2-Dichloroethane	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
47. 1,1-Dichloroethylene	0.007 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
48. Cis-1,2-Dichlorethylene	0.07 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
49. Trans-1,2,-Dichloroethylene	0.1 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
50. Dichloromethane	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
51. 1,2-Dichloropropane	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
52. Ethyibenzene	0.7 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
53. Monochlorbenzene	0.1 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
54. Styrene	0.1 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
55. Techrachloroethylene (PCE)	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
56. Toluene	1 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
57. 1,2,4-Trichlorobenzene	0.07 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
58. 1,1,1-Trichloroethane	0.2 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
59. 1,1,2-Trichloroethane	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
60. Trichlorethylene (TCE)	0.005 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
61. Vinyl Chloride	0.002 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
62. Xylenes	10 mg/l	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
SYNTHETIC ORGANIC CHEMICALS					
63. Benza (a) pyrene	0.0002 mg/l	ND @ 0.00004	ND @ 0.00004	ND @ 0.00004	ND @ 0.00004
64. Dif (2-ethylhexyl) adipate	0.4 mg/l	ND @ 0.002	ND @ 0.05	ND @ 0.05	ND @ 0.05
65. Di (2-ethylhexyle) phthalate	0.006 mg/l	ND @ 0.001	ND @ 0.003	ND @ 0.003	ND @ 0.003
66. Hexachlorobenzene	0.001 mg/l	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001
67. Hexachlorocyclopentadiene (HEX)	0.05 mg/l	ND @ 0.0002	ND @ 0.005	ND @ 0.005	ND @ 0.005
68. PCBs	0.0005 mg/l	ND @ 0.0002	ND @ 0.00025	ND @ 0.00025	ND @ 0.00025
OTHER PHYSICAL PROPERTIES					
69. Specific conductance	None		316 uhos/cm	414 uhos/cm	430 uhos/cm
70. pH	6.0 to 9.0	6.87	6.41	6.94	7.12
71. Alkalinity, total	None		81 mg/l as $CaCO_3$	222 mg/l as $CaCO_3$	116 mg/l as $CaCO_3$
72. Aluminum	None	<0.005 mg/l			
73. Calcium	None		59.2 mg/l	43.2 mg/l	39.2 mg/l
73A. Chloride		14 mg/l	4.5 mg/l		
74. Hardness, as CaCO3	None	48 mg/l	161 mg/l	176 mg/l	208 mg/l
75. Iron	None	4.51 mg/l	0.206 mg/l	0.116 mg/l	ND @ 0.1
76. Manganese	None	1.009 mg/l	ND @ 0.002	ND @ 0.002	0.53 mg/l
77. Phosphorus, Total	None		0.017 mg/l		
78. Sodium	None	13.6 mg/l	10.2 mg/l	36.6 mg/l	42.8 mg/l
79. Sulfate	None	8.6 mg/l	18.2 mg/l	4.3 mg/l	6.4 mg/l
80. Silica	None		38mg/l	19 mg/l	27 mg/l
81. Silver	None	<0.005 mg/l			
82. Tannin/Lignin	None		ND @ 0.1		
83. Total Solids (Dissolved)	None	187.5 mg/l	219 mg/l	234.3 mg/l	250.7 mg/l
84. Zinc	None	<0.01 mg/l	ND @ 0.01		
85. Langliers Index	None	-2.05	-2.12	-1.5	-1.12
OTHER NON-RELATED CONTAINANTS					
86. 3-Hydroxycarbofuran	None	ND @ 0.004	ND @ 0.004	ND @ 0.004	ND @ 0.004
87. Aldicarb	None	ND @ 0.002	ND @ 0.004	ND @ 0.004	ND @ 0.004
88. Aldicarb Sulfoxide	None	ND @ 0.003	ND @ 0.004	ND @ 0.004	ND @ 0.004

		Testing Results			
Item	Maximum Contaminant Level for Drinking Water	Buena Vista #1	Well #1 Results	Well #4 Results	Well #5 Results
89. Aldicarb Sulfone	None	ND @ 0.001	ND @ 0.004	ND @ 0.004	ND @ 0.004
90. Aldrin	None	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001
91. Butachlor	None	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001
92. Carbaryl	None	ND @ 0.004	ND @ 0.004	ND @ 0.004	ND @ 0.004
93. Dicamba	None	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
94. Dieldrin	None	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001	ND @ 0.0001
95. Methomyl	None	ND @ 0.004	ND @ 0.004	ND @ 0.004	ND @ 0.004
96. Metolachlor	None	ND @ 0.002	ND @ 0.001	ND @ 0.001	ND @ 0.001
97. Metribuzin	None	ND @ 0.001	ND @ 0.0005	ND @ 0.0005	ND @ 0.0005
98. Propachlor	None	ND @ 0.001	ND @ 0.001	ND @ 0.001	ND @ 0.001

Note: ND signifies constituent was not detected at level of detection indicated.

9. States must implement source water protection programs.

10. The EPA must identify Best Available Treatment (BAT) technologies for meeting new regulations.

11. The 1996 SDWA law provides interim monitoring relief for small systems (<10,000 people) and allows states to adopt permanent alternative monitoring requirements upon completion of source water risk assessments.

The above list is simply a summary of the 1996 SDWA and several details remain to be implemented by the EPA and Health Division. Specific water quality concerns for the City of Monmouth are listed below.

Table 6-2
Community Water Systems
Routine Chemical Monitoring (1)

Chemicals	Ground Water
Inorganics	Every 3 Years
Arsenic	Every 3 Years
Nitrate	Quarterly (Well #1) Annually (Wells #4 and 5) (2)
Asbestos AC Pipe	Every 9 Years (3)
Source Asbestos	One
Organics	Every 3 Years
Total Trihalomethanes	Quarterly (4)
Radiological	Every 4 Years

(1) This table describes the routine monitoring currently required for the City of Monmouth. Waivers, reductions, wellhead protection programs, or detections will affect the sampling requirements. You will find details on number, location, and timing of samples in the OHD rule book.
(2) Nitrate: testing for systems can be reduced to annually after 4 consecutive quarters of sampling below 5 mg/L and a reduction is requested in writing.
(3) Asbestos: routine monitoring is one sample every nine years. Monitoring will go to one sample every 3 years if the system exceeds Lead or Copper action levels.
(4) For systems ≥ 10,000 population

Inorganic Contaminants

Inorganic contaminants commonly referred to as "Primary" contaminants include 15 regulated metals and minerals such as Arsenic, Barium, Cadmium, etc. Inorganics can be either naturally-occurring or present due to agricultural or industrial uses. Inorganic contaminants most often originate from the source of water supply, but can also be present due to water contact with pipeline and storage tank materials. For most inorganic contaminants, health concerns are related to long-term or lifetime exposures with the exception of Nitrates and Nitrites. These two contaminants can seriously affect infants in short-term exposures by interfering with the transfer of oxygen from the lungs to the bloodstream. The City of Monmouth is currently in compliance for inorganics from Well #1 with the most recent tests performed in July, 1999. The last series of Inorgainic tests from Wells 4 and 5 were performed in 1996.

Arsenic

Arsenic is a regulated inorganic contaminant that has recently been under increased scrutiny by the EPA. The current maximum contaminant level of .05 mg/l is easily met by Monmouth's source water. The Arsenic Rule, due for final implementation in January, 2001 proposes lowering the MCL or MCLG to as low as .002 mg/l. This is expected to create a severe hardship on many utilities. Currently, all of the city's tests for Arsenic show levels less than .002 mg/l. Increased or more precise monitoring may be required in the future, however, as of the date of this plan, this potential is not known. The final maximum contaminant level for Arsenic is expected to be somewhere between .01-.003 mg/l.

Nitrates

A separate discussion regarding Nitrates is warranted due to the past history of elevated levels of this contaminant, particularly from the Marion County Well. As previously indicated, Nitrates in drinking water can cause elevated Nitrogen levels in blood, especially in infants and young children. The Nitrate level present from the Marion County Well has averaged a level of 5.3 since the well's activation in 1978. On several occasions, the test results were barely under the maximum contaminant level of 10 mg/L. As evidenced by Figure 6-1, Nitrate levels have traditionally alternated with seasonal changes. The most recent test, performed on February 22, 2000, indicated a Nitrate level of 11.4 mg/L, just above the maximum level of 10 mg/L. During episodes of high Nitrate levels, the city blends water from the Fourth Street wells to lower Nitrate levels to customers. This is an acceptable method of Nitrate control when properly executed. The increase in Nitrate levels observed during spring and summer months raises concerns in regard to sustained higher capacity pumping from this well. Alternating levels of Nitrates in water from the Marion County well have been observed for several years. This occurrence may be due to the transportation of recently applied nitrogen fertilizer (reverted to Nitrates) from nearby agricultural operations. Since groundwater in this area generally moves from the south-southeast towards the river, nitrates can easily be transported to the Marion County well due to induced pumping effect as well as ordinary groundwater movement. As the well is pumped and the Nitrates are flushed through the aquifer due to groundwater movement, Nitrate levels often lower to acceptable levels until the next cycle begins. Currently, the data is not adequate to verify or dispute this theory. The city should complete the well field delineation as soon as possible, classify the recharge zone, and develop a Groundwater Management Plan using all available data. Due to the levels of Nitrates now observed, increased capacity from the Marion County Well is currently not recommended until the source of Nitrates is verified and a management plan is implemented. Tests performed on water obtained from the Buena Vista well during construction (1997) indicated no detection of Nitrates. Tests performed in 1998 on water from nearby Luckiamute Water Cooperative Wells #1 and 2 indicated Nitrate levels below 1 mg/L. These tests indicated a current low probability of Nitrate from this well field. Activation of the Buena Vista Well #1 will provide a source of water will low or non-detectable levels of Nitrates for blending. The dedicated transmission pipeline from Corvallis Road to the city provides sufficient distance and mixing volume to effect blending of these two sources before water delivery to consumers. Assuming Nitrate levels at or below .1 mg/L from either the Fourth Street wells or Buena Vista well, blending of source waters from wells should be performed according to the following Table 6-3.

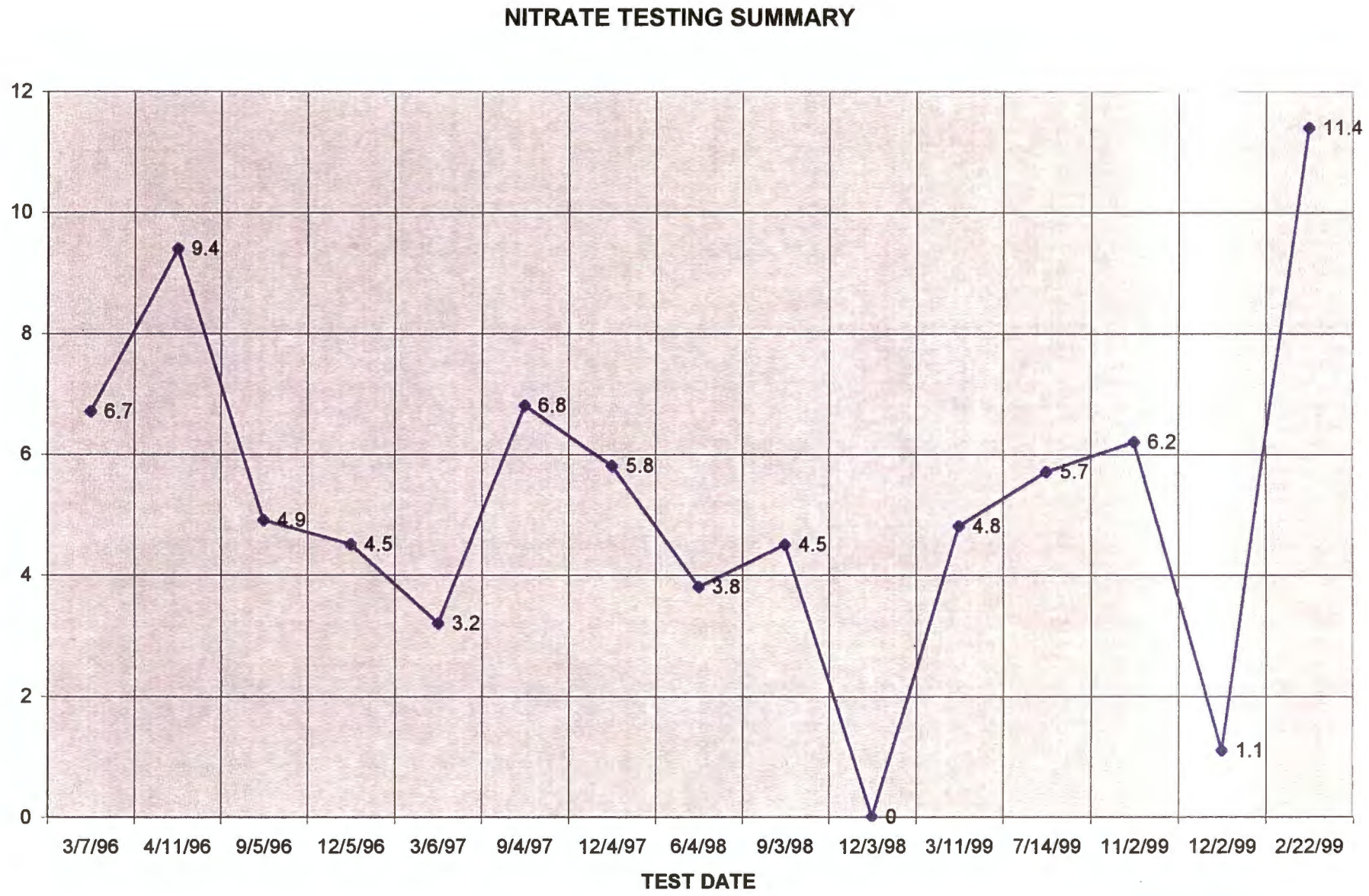

NITRATE TESTING SUMMARY
12
10
8
6
4
2
0
6.7
9.4
4.9
4.5
3.2
6.8
5.8
3.8
4.5
0
4.8
5.7
6.2
1.1
11.4
3/7/96
4/11/96
9/5/96
12/5/96
3/6/97
9/4/97
12/4/97
6/4/98
9/3/98
12/3/98
3/11/99
7/14/99
11/2/99
12/2/99
2/22/99
TEST DATE

Fig. 6–1

Table 6-3
Required Flow Rate for Source Blending to Lower Nitrate Levels

Marion County Well Flow Rate (GPM)	Desired Finished Nitrate Levels (mg/L)	Marion County Well #1 Raw Water Nitrate Level (mg/L) 10 mg/L	11 mg/L	12 mg/L	13 mg/L	14 mg/L	15 mg/L
600 GPM	5 mg/L	600 GPM	720 GPM	840 GPM	960 GPM	1080 GPM	1200 GPM
	8 mg/L	150 GPM	225 GPM	300 GPM	375 GPM	450 GPM	525 GPM
	10 mg/L	—	60 GPM	120 GPM	180 GPM	240 GPM	300 GPM
700 GPM	5 mg/L	700 GPM	840 GPM	980 GPM	1120 GPM	1260 GPM	1400 GPM
	8 mg/L	175 GPM	263 GPM	350 GPM	438 GPM	526 GPM	613 GPM
	10 mg/L	—	70 GPM	140 GPM	210 GPM	280 GPM	350 GPM
800 GPM	5 mg/L	800 GPM	960 GPM	1120 GPM	1280 GPM	1440 GPM	1600 GPM
	8 mg/L	200 GPM	300 GPM	400 GPM	500 GPM	600 GPM	700 GPM
	10 mg/L	—	80 GPM	160 GPM	240 GPM	320 GPM	400 GPM
900 GPM	5 mg/L	900 GPM	1080 GPM	1260 GPM	1440 GPM	1620 GPM	1800 GPM
	8 mg/L	225 GPM	338 GPM	450 GPM	563 GPM	676 GPM	790 GPM
	10 mg/L	—	90 GPM	180 GPM	270 GPM	360 GPM	450 GPM
1000 GPM	5 mg/L	1000 GPM	1200 GPM	1400 GPM	1600 GPM	1800 GPM	2000 GPM
	8 mg/L	250 GPM	376 GPM	500 GPM	625 GPM	750 GPM	875 GPM
	10 mg/L	—	100 GPM	200 GPM	300 GPM	400 GPM	500 GPM
1100 GPM	5 mg/L	1100 GPM	1320 GPM	1540 GPM	1760 GPM	1980 GPM	2200 GPM
	8 mg/L	275 GPM	414 GPM	550 GPM	688 GPM	825 GPM	963 GPM
	10 mg/L	—	110 GPM	220 GPM	330 GPM	440 GPM	550 GPM
1200 GPM	5 mg/L	1200 GPM	1440 GPM	1680 GPM	1920 GPM	2160 GPM	2400 GPM
	8 mg/L	300 GPM	452 GPM	600 GPM	750 GPM	900 GPM	1050 GPM
	10 mg/L	—	120 GPM	240 GPM	360 GPM	480 GPM	600 GPM
1300 GPM	5 mg/L	1300 GPM	1560 GPM	1820 GPM	2080 GPM	2340 GPM	2600 GPM
	8 mg/L	325 GPM	490 GPM	650 GPM	813 GPM	975 GPM	1140 GPM
	10 mg/L	—	130 GPM	260 GPM	390 GPM	520 GPM	650 GPM

Any Nitrate present in the dilution source of water (Fourth Street Wells or Buena Vista wells) will require additional dilution volume based on the actual level of Nitrate. Ordinary operation of the wells can effectively provide blended water automatically. Operation of the Buena Vista well as the "Lead" well (First well on) should be considered when programming the new control system.

Blending of source waters to lower nitrates may require Health Division notification and approval before commencing. The city is advised to consult with the Health Division during high nitrate events before blending of sources.

Wells number four and five have historically shown low or non-existent levels of Nitrate, therefore this constituent does not represent an immediate hazard from these wells. However, the new Buena Vista well field, due to its proximity to agricultural operations, lack of background data, and shallow depth, should be monitored for Nitrates at least every quarter during the first 4-5 years of operation. Quarterly sampling will provide needed background data for future operation and seasonal variations, known to affect Nitrate levels.

Trihalomethanes (Disinfection-By Products)

Common disinfection treatment used to kill mirco-organisms in drinking water, such as chlorine, can react with naturally occurring organic and inorganic material in water to form disinfection by-products. These disinfection by-products are suspected carcinogens over a lifetime of exposure. Total trihalomethane (TTHM) testing is required for cities with population greater than 10,000. Based on current population projections, Monmouth will need to monitor for TTHM by 2007.

Synthetic Organics (SOC's) and Volatile Organics (VOC's) (Phase II/V)

Synthetic organic contaminants (SOC) are also referred to as Phase II Regulated SOC's. The Phase II rule established MCL's for 38 contaminants including 10 VOC's (Volatile Organic Contaminants), 17 pesticides, PCB's, inorganic contaminants, and where applicable, 2 water treatment chemicals. The primary impetus of the Phase II/V rule is to determine the presence of organic (carbon) based and inorganic contaminants such as pesticides, solvents, and metals commonly used in present-day and past industrial and agricultural practices. The relative close proximity of both well fields to agricultural areas and past wood treatment facilities, (wells 4 and 5) as well as the relatively shallow nature of the wells, makes each well field somewhat vulnerable to these contaminants.

Previous rules covered only 11 of these contaminants. The Phase II rule was adopted by the Oregon Health Division in July, 1992 and monitoring began in January, 1993. The rule also required monitoring of 23 additional unregulated contaminants under Phase V. The City of Monmouth is currently required to submit Phase II/V tests every three years with the last round of tests performed in July, 1999. The tests, performed in 1999, did not indicate the presence of any Phase II/V contaminants in the Marion County Well with the exception of Sodium which is an unregulated inorganic. The typical level of sodium from each source ranges from 9.6 mg/l to 43 mg/l which is slightly higher than the recommended limit (World Health Organization) of 20 mg/l.

Due to the past presence of Pentachlorophenol (PCP), an SOC, from the Independence South Wells and well number 4, sustained use of either well field may cause additional migration of the contaminant plume to the recharge area. The city should limit use of Wells #4 and 5 as much as possible to prevent this occurrence. In addition, periodic monitoring of PCP should be performed on the wells. Recent composite tests from the South Well Field have not detected measurable levels of PCP. Future avoidance of contamination from Phase II/V elements and compounds will require monitoring and control of nearby agricultural and industrial practices. Generally, application of pesticides should be discouraged or forbidden within 500' - 1,000' of all well heads. The City is advised to contact all farms and industrial facilities in close proximity to the well fields and implement a Memorandum of Understanding with potential contaminant producers or users as to the application and control of any possible sources of contamination.

Radiological (Gross Alpha)

The current federal rule for radiological sampling (Radionuclides) requires 1 sample every 4 years. All past tests that have been performed have not indicated the presence of any Radionuclides. Radioactivity is uncommon from shallow ground water sources and is generally found in deep groundwater sources that are subject to a much longer and greater natural radioactivity exposure such as basalt or granite. The next round of Radionuclide testing for the City is currently required for the Independence wells and May, 2003 for the Marion County Well.

Secondary Contaminants

Secondary contaminants are not regulated contaminants but do include water quality parameters that can affect aesthetic conditions and taste and odor concerns. Because aesthetic water quality conditions are often the most apparent to customers, a discussion of their impact is included.

Table 6-4
Secondary Contaminants

Parameter	Suggested Limit	Well #1	Well #4	Well #5	Buena Vista Well
pH	6.5-8.5	7.2 (1)	6.94	7.12	6.87
Alkalinity	None	81 mg/L as $CaCl_3$	222 mg/L as $CaCO_3$	118 mg/L as $CaCO_3$	95-100 mg/L as $CaCO_3$
Aluminum	None	Unknown	Unknown	Unknown	<.005 mg/L
Calcium	None	59.2 mg/L	43.2 mg/L	39.2 mg/L	20-30 mg/L
Chloride	<250 mg/L	4.5 mg/L	8 mg/L	10 mg/L	14 mg/L
Hardness	<250 mg/L	161 mg/L	176 mg/L	208 mg/L	48 mg/L
Iron	.3 mg/L	.206 mg/L	.116 mg/L	ND @ .1 mg/L	4.51 mg/L
Manganese	.05 mg/L	ND @ .002 mg/L	ND @ .002 mg/L	.53 mg/L	1.009 mg/L
Sodium	10 mg/L	10.2 mg/L	36.6 mg/L	42.8 mg/L	13.6 mg/L
Sulfate	250 mg/L	18.2 mg/L	4.3 mg/L	6.4 mg/L	8.6 mg/L
Total Solids	500	219 mg/L	234.3 mg/L	250.7 mg/L	187.5 mg/L
Zinc	5	ND@ .01	ND @ .01	ND @ .01	<.01 mg/L

(1) After treatment-Raw Water pH: 6.1-6.8

The only secondary water quality constituents that cause concern at this time are the iron and manganese levels present in the Buena Vista well. As outlined in other chapters of this report, these levels are not typical for most wells in this vicinity and sustained pumping of the aquifer is planned to hopefully lower these levels to acceptable values. If the iron and manganese levels do not fall after 2-3 years of use, permanent filtration will most likely be required.

Fluoride

The City of Monmouth adds Sodium Fluoride at Marion County Well. The equipment used for fluoride injection is a Wallace and Tiernan fluoride saturator. Finished water fluoride levels average .6-.9 mg/L. The city resumed fluoride injection in 1995 after a 3 year hiatus. Original fluoride injection was started in 1973.

Coliform Bacteria

The Total Coliform Rule affected all public water systems in Oregon beginning in 1991. Coliform Bacteria is the primary measure of the microbial quality of drinking water. Coliform are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. All Oregon water suppliers, within the projected population ranges of Monmouth, are required to test for coliform bacteria according to the following monitoring guidelines:

Population	Samples per Month
7,601-8,500	9
8,501-12,900	10
12,901-17,200	15
17,201-21,500	20

Currently, the City of Monmouth by virtue of a population of 8,300 must test for coliform bacteria nine times per month. As the City grows in population, increased monitoring will be required. Information obtained from the Oregon Health Division indicates consistently negative coliform bacteria tests since 1990. The City, however, did experience a positive Total Coliform sample in 1998, which was believed to be due to biofilm growth in the pipeline or sampling errors. Subsequent repeat testing indicated negative coliform results.

Consumer Confidence Reports

The City of Monmouth was required to initially issue consumer confidence reports (CCR) to all water consumers by October 19,1999 and by July 1st each year thereafter for subsequent calendar years. The CCR is basically an annual report card which informs water customers whether or not their water system meets federal guidelines.

In the case of Monmouth, specific information regarding source quality, susceptibility, and additional water quality data must be evaluated and incorporated into the CCR. The water supplier must mail or otherwise deliver a water bill and must make a good faith effort to deliver to non-bill paying consumers. Water systems that serve fewer than 10,000 but not less than 500 persons must publish the CCR in at least one local newspaper. The following information must be included in the CCR:

1. The source(s) of drinking water(springs, wells, rivers, etc.)

2. A brief summary of the susceptibility to contamination of the source water based upon the source water assessments as they are completed by the states over the next 3 years.

3. Instructions on obtaining a copy of the water system's source water assessments.

4. A table showing the highest level of any contaminant detected in their drinking water plus EPA's health based standard (maximum contaminant level) for that contaminant for comparison and the probable source of the contaminant.

5. The water system's compliance with other drinking-water-related rules including monitoring.

6. An educational statement for vulnerable populations. Individuals who have suppressed immune systems caused by chemotherapy, organ transplants, AIDS, etc. fall into this category.

7. Educational information on nitrate, arsenic, or lead where the contaminants are detected above 50 percent of EPA's maximum contaminant levels.

8. The phone numbers for additional sources of information available from the water system's staff or EPA's Safe Drinking Water Hotline (800) 426-4791.

9. The rule specifies how the data is to be presented, with specific instructions for reporting and explaining results for turbidity, lead and copper, total and fecal coliform, cryptosporidium, radon, arsenic, nitrate, and any other contaminants.

Complete information regarding preparation and distribution of the CCR is available from the Oregon Health Division.

Asbestos

As outlined in previous chapters of this report, the City of Monmouth experienced asbestos cement pipe corrosion in 1993. Levels rose to as high as 125 million fibers per liter (MCL= 7 million fibers per liter) before interim corrective action was begun. Initially, the city injected caustic soda (Sodium Hydroxide) to elevate pH levels to 7.0-7.2 combined with Zinc Orthophosphate intended to reseal the pipe walls. These efforts were successful and within six months, asbestos levels were lowered to acceptable levels. The permanent solution, completed in 1995, involved installation of a packed tower air stripper, replacing Caustic Soda injection, for pH adjustment. This method has been very successful and asbestos levels have consistently been at or below detectable levels since late 1995-early 1996. Currently, finished water pH levels average 7.1-7.3 and zinc orthophosphate remains in use.

Lead and Copper Rule

The primary purpose of this rule is to address possible lead and copper contamination from materials commonly found in customer services. The rule was promulgated by the EPA on June 7, 1991 and the City has performed several rounds of testing to date. The rule established "Action" levels of .015 mg/l for lead and 1.3 mg/l for copper. None of the sources has naturally occurring lead or copper. Since the City's distribution system does not contain any known lead, copper would be the most expected element to occur.

The first round of Lead and Copper testing was performed in 1993. The 90th percentile Copper level observed in this first round was 2.58 mg/L, well above the action level of 1.3 mg/L. The subsequent improvements performed at the Marion County well site, i.e. air stripping and corrosion inhibitor, to correct the asbestos leaching condition has had the additional

benefit of lowering copper corrosion to acceptable levels within the water system. The City completed the sixth round of lead and copper testing during September, 1999. Since the lead and copper levels have been consistently below the action levels since 1995, the City is now deemed to be in compliance for lead and copper levels. Lead and copper levels during the most recent five testing rounds after implementing treatment averaged 0.00 mg/l and .73 mg/l respectively, well below appropriate action levels.

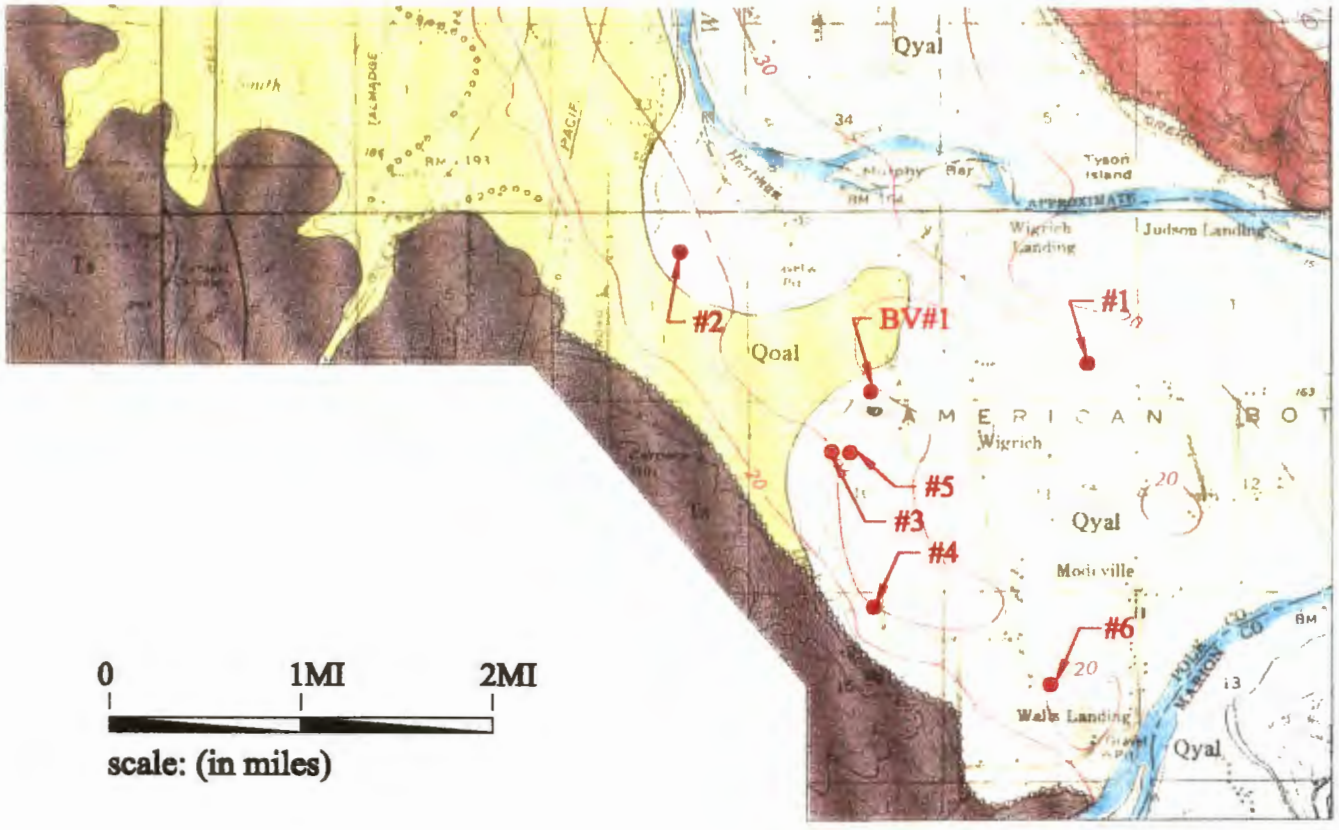
The raw water quality observed from the Buena Vista well field indicates a source water with marginally corrosive water. Because the source water exhibits a pH level less than 7.0 (6.87), and is low in calcium hardness, the potential for lead and copper corrosion problems exist. The sequesterant, planned for iron/manganese control, should also be selected as a corrosion inhibitor. The chemical selected for use should be effective within the pH range of the source water for iron control as well as protection against lead, copper, and asbestos corrosion. Injection of Sodium Hydroxide or air stripping may be required to elevate pH if the chemical adjustment is not adequate.

Aesthetic Concerns

Given the characteristics of Monmouth's source water, aesthetic (taste, odor, and staining) problems are not currently believed to be of great concern. The city's finished water from the Marion County Well does not contain appreciable levels of iron, manganese, or hardness which are the primary causes of staining. Long detention periods in pipelines or reservoirs, however, can cause isolated incidences of taste and odor complaints that can usually be remedied by line flushing or tank drain/refill cycles. Operation of wells #4 and 5, however, do result in higher iron and manganese levels due to the background water quality. The proposed Buena Vista well currently has higher levels of iron (4.13 mg/L) and manganese (1.0 mg/L) than the Marion County Well and treatment to remove or stabilize these elements will be required. Data obtained from nearby Luckiamute Water Cooperative wells number 1 and 2 do not show significant levels of iron and manganese. Due to the close proximity of the two well fields and similar depths, it is believed that iron and manganese levels in the Buena Vista well may lower to acceptable levels after sustained use. To avoid a potentially expensive and operationally complex filter plant, the city should initially install sequestering injection equipment at the new well. Sequesterents are used to bind or "tie up" iron and manganese in water supplies, preventing or lessening staining impacts to customers. The use of this chemical is very common and successful under proper application. This chemical should be applied as a corrosion inhibitor. After 2-3 years of usage, the iron and manganese levels should be re-evaluated and filtration implemented, if required.

Groundwater Specific Issues

In addition to the previously outlined observations and recommendations regarding VOC, SOC, bacteria ,and other water quality concerns, future regulations may affect the use of groundwater. The Groundwater Disinfection Rule, due in April, 2000, is not expected to have a significant impact to Monmouth since all of the sources are routinely chlorinated and have been classified by the Health Division as "groundwater not under the influence of surface water". In December, 1993, the city began a one year sampling program for the purposes of classifying the Marion County Well. This well is located within one-quarter mile of the Willamette River and was subject to mandatory filtration if



Chemical analyses of ground water from selected wells in the Dallas-Monmouth area.

Sample / Well number	Data sampled	Well depth (feet)	Water-bearing unit 1/	Milligrams per liter: Silica (SiO_2)	Iron (Fe)	Manganese (Mn)	Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Bicarbonate (HCO_3)	Carbonate (CO_3)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Nitrite plus nitrate, as N	Phosphate ortho, as P	Boron (B)	Arsenic (As)	Dissolved solids calculated from determined constituents	Hardness, as $CaCO_3$	Noncarbonate hardness	Sodium-adsorption-ratio (SAR)	Specific conductance (micromhos per centimeter at 25°C)	pH (units)	Temperature (°C)
1	9-23-76	60	--	48	.07	0	25	16	8.2	.7	98	0	21	7.0	.1	11	.09	.005	.001	223	130	48	.3	292	7.7	13.0
2	9-24-76	39	--	54	6.00	.48	22	14	32	1.8	192	0	9.3	11	.4	1.8	.46	.02	.007	255	110	0	1.3	341	7.9	13.0
3	4-28-69	75	--	--	1.30	--	--	--	--	--	181	--	30	102	--	--	--	--	--	3/474	--	--	--	--	7.2	--
4	9-30-76	75	--	52	.02	.01	14	8.0	9.0	1.3	82	0	5.9	4.3	.1	.66	.23	.002	.001	139	68	1	.5	191	8.3	13.5
5	10-23-74	55	--	43	.09	--	14	1.5	13	1.0	75	0	5.0	3	.4	--	--	--	--	3/144	41	--	--	--	6.6	--
6	9-22-76	36	--	44	.01	.02	23	14	10	.9	90	0	24	8.7	.1	9.5	.21	.01	.000	211	120	41	.4	287	7.2	13.0

1/ Water-bearing unit: Tsv, Siletz River Volcanics; Tt, Tyee Formation; Ty, Yamhill Formation; Ts, Spencer Formation; To, Tertiary rocks, undifferentiated.
2/ Analysis by MEI-Charlton, Inc.
3/ Well location approximate; well data not in table 8.
4/ Total iron (Fe) or manganese (Mn).
5/ Determined by residue on evaporation.
6/ Composite sample from three interconnected public-supply wells.

Sample Well Locations

Fig. 6-2

surface water influence was determined to be present. One year of testing, completed in late 1994, verified that the Marion County well is not under the influence of any surface water and in early 1995, the Health Division formally classified the well as a groundwater supply source. The Independence Fourth Street wells, due to their distance from surface water and other water quality parameters, have never been examined or suspected of being under surface water influence. The new Buena Vista well field, while considerably removed from the Willamette River, is located within an agricultural region. Continued monitoring and control of nearby fertilizer and pesticide application within the recharge area should be performed by the city for this well field. Additionally, the city should implement a quarterly nitrate sampling program for these wells during the first 3-5 years of operation. This information will provide needed background data and seasonal variations will be observed. Assuming Nitrate levels consistently remain below 5 mg/L through the first 3-5 years of operation, the city could consider lowering the sampling frequency to yearly.

Wellhead Protection Program

The City of Monmouth, in conjunction with the City of Independence, has retained the Oregon Association of Water Utilities (OAWU) to prepare a joint Wellhead Protection Program. This is believed to be a very important venture and the City is encouraged to proceed to completion of this project. Many of the proposed monitoring and regulatory components of the 1996 SDWA will be tied to implementation of a Wellhead Protection Program.

A properly prepared Wellhead Protection Program includes many elements such as: delineation of the aquifer recharge zone, control and protection agreements with local sources of possible contaminants, and specific wellhead protection criteria.

Chapter Seven
Water Storage Requirements

Water Storage Requirements

Background

Water storage is provided for several reasons:

1. To equalize supply and demand for daily flow variations, maximum day, and peak hour requirements, See Figure 7-1.
2. To provide emergency reserve supply during pipeline breaks, mechanical failures, and power outages.
3. To provide water for fire protection.

As previously outlined, in Chapter Four; the estimated future average day, maximum day, and peak hour demands are as follows:

Year	Population	Average Day (GPD) (1)	Maximum Day (GPD) (1)	Peak Hour (GPM) (1)
2000	8,376	1,047,000	2,621,688	4550 GPM
2005	9,710	1,253,750	3,116,730	5413 GPM
2010	11,256	1,457,000	3,713,128	6450 GPM
2020	15,128	1,954,000	4,938,064	8600 GPM

In the determination of required storage volume, several factors must be evaluated. Among these are: Operational storage (daily fluctuations), fire protection storage, reserve emergency storage, and source reliability.

Operational Storage

Operational or equalizing storage provides reserve water during variations in system demands that occur within one day of normal operation. This reserve storage is used to allow the sources to pump at a continuous rate. Given the fact that Monmouth's water system consists of mostly residential, institutional, and light commercial demands, a factor of 25% of maximum day demand will be used for operational storage. This value is commonly used for systems of this type and size.

Fire Protection Storage

As previously stated in this report under "Fire Flow," the quantity of water required for effective fire fighting varies according to population and type of development. Since the Monmouth system consists of one single pressure zone, fire reserve will be calculated for the total population. Fire flow used for this study will be 3,500 GPM for current conditions and 4,000 GPM for Year 2020 (2). This flow is typical for the Year 2020 projected population of 15,000 and is also felt to be adequate to accommodate a large fire within the downtown area and Western Oregon University. For both scenarios, storage requirements will be based on four (4) hours fire flow duration. The current required fire storage, therefore, is 3,500 GPM X 240 minutes = 840,000 gallons.

(1) For water storage planning purposes, values reflect current non-revenue and unaccounted for water loss of 10%.
(2) Guide to Determination of Required Fire Flow-American Insurance Association and Insurance Services Office.

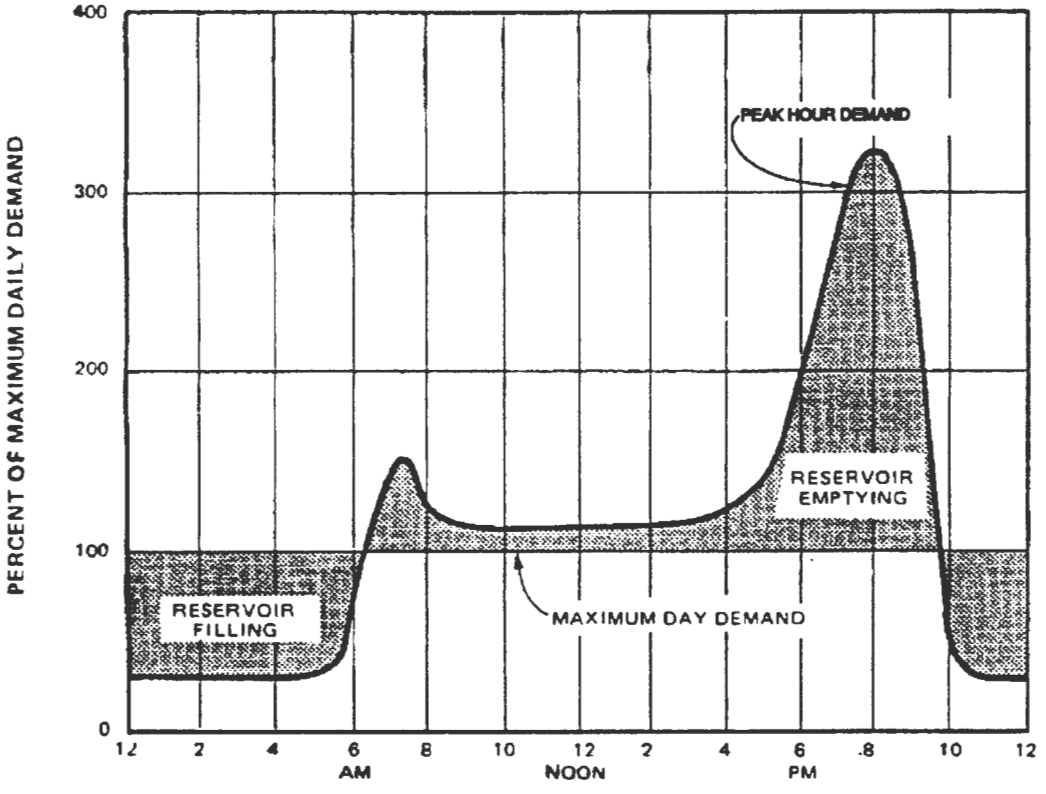


FIGURE 7-1
TYPICAL DEMAND PATTERN
DURING DAY OF MAXIMUM USE

Reserve Emergency Storage

This requirement is dependent on several factors. Among these are: source reliability (including pumping facilities), power reliability, pipeline integrity, and available standby facilities. See Table 7-1 for the most common expected emergencies and the corresponding duration of outage:

Table 7-1
Typical Water System Emergencies (in order of likelihood)

Emergency Type	Maximum Expected Duration (Days)	Affected Wells
1. Power Outage (localized)	½-1	Any
2. Regional Power Outage (Major)	1-3	All
3. Pumping Equipment Failure	2-3	Typically only one
4. Water main break	1-2	Varies as to location of break
5. System contamination (back flow, cross-connection, etc.)	2-3	None
6. Aquifer Contamination	Indefinite	One Well field

The most common emergencies expected to disrupt the normal water system operation are numbers 1,2,3 and 4. The maximum expected duration of these emergencies is approximately 2-3 days. Each type of emergency applies to Monmouth uniquely and will be discussed separately.

In the case of Monmouth, all existing sources are located within one mile of each other and all source flow is transmitted through one transmission pipeline to the reservoirs. Proposed improvements include the installation of a new parallel transmission main from the wells to the city. This will lessen the exposure due to the loss of the transmission main. The three wells each contribute varying flows to the system and the greatest impact to the system would involve the loss of the Marion County Well. The loss of this well (1200 GPM) would require Wells #4 and 5 to operate continuously to compensate for this loss of flow. The two wells alone cannot accommodate even current average day demands, therefore, a sustained loss (more than 3-4 days) of the Marion County Well will result in either extreme water rationing or emergency use of water from Independence. For this reason, implementation of the new Buena Vista well is considered to be the highest priority. The addition of this well, planned by 2001, will effectively substitute for the Marion County Well should a prolonged shutdown occur. With this new well in service, the city will have total redundancy in source, pumping equipment, and standby facilities. The loss of either large well will still provide the other large well (900 GPM) plus the Independence Wells (400 GPM). This total available capacity of up to 1600 GPM is not adequate to meet current maximum day demands, however, the maximum difference amounts to 200,000 gallons per day which can be met from storage for up to 2 weeks, without compromising fire protection. A two week duration of consecutive maximum day demands is very unlikely in Oregon and planning for this extreme event is not considered to be economically or realistically feasible. Almost any conceivable failure, with the exception of a massive well field contamination or a catastrophic well failure, can generally be repaired within one week. By 2005, continued growth will necessitate the addition of a second Buena Vista well. A third Buena Vista well #3 and an additional Marion County well is planned to be developed

within the study period. These additional wells will provide needed redundancy and increased capacity of facilities through the end of the study period.

Power reliability is a current concern due to the fact that all wells are served by the same primary power source provider (PP&L). A sustained outage, in the absence of standby facilities, could result in a severe depletion of storage before power restoration. Even though the proposed Buena Vista wells will also be served by PP&L, the locations are served by different feeders from different directions. Power failure to one well, therefore, will not necessarily result in power failure to any other wells. In addition, the availability of standby engines will allow emergency operation of either (or both) the Marion County and Buena Vista wells. The proposed addition of telemetry control at the City shops can notify system operators immediately upon power failure at any site which will significantly lessen response time to activate standby engines. A long power outage, therefore, will not prevent operation of the wells as there are currently standby facilities at the Marion County well and are planned at the proposed Buena Vista well. This will allow operation of at least one well field should a sustained outage occur.

For planning purposes, an ultimate reserve emergency storage equivalent to two days of average day demand ending with Year 2020 average daily demand will be used. This reserve combined with the operational storage also provides one full day of maximum day demand (without compromising fire protection) through each year of the study period. This value is often used as the minimum storage requirement for municipalities. This is due to the proposed redundancy of well field and pumping facilities as well as implementation of an emergency plan with the City of Independence and proposed improvements to the existing one million gallon buried reservoir. The Cities of Independence and Monmouth currently have in place an emergency water connection between their respective water systems. Understandably, this type of arrangement can also impact Monmouth's water storage, however, if properly negotiated and operated, this emergency connection can give either city the time it needs to implement backup power or repair facilities. Alternately, this existing facility could also be used to provide water to Independence during the same extreme emergency. Conceivably, proper implementation of this inter-use facility can have economic and reliability benefits for both cities.

TABLE 7-2
STORAGE REQUIREMENTS
YEARS 2000, 2005, 2010, 2015, 2020

	2000	2005	2010	2015	2020
Operational Storage (25% of Max Day)	655,500 Gal	780,000 Gal	930,000 Gal	1,070,600 Gal	1,235,000 Gal
Fire Reserve Storage (1)	840,000 Gal	840,000 Gal	1,000,000 Gal	1,000,000 Gal	1,000,000 Gal
Reserve Emergency Storage (2 days X average day)	2,094,000 Gal	2,507,500 Gal	2,914,000 Gal	3,382,250 Gal	3,908,000 Gal
Total Required Storage	3,589,500 Gal	4,127,500 Gal	4,844,000 Gal	5,452,850 Gal	6,143,000 Gal
Less Available Storage (2)	5,000,000 Gal	5,000,000 Gal	5,000,000 Gal	6,000,000 Gal	6,000,000 Gal
Total (Deficit), Surplus (+):	+1,410,500 Gal	+872,500 Gal	+156,000 Gal	+547,000 Gal	<143,000 Gal>

(1)Fire Storage Requirement: 2000: 3,500 GPM x 60 mins/hr x 4 hrs duration = 840,000 gals.
2020 Fire Flow: 4,000 GPM x 240 minutes = 1,000,000 gallons

(2)After addition of proposed additional storage at incremental year of study period.

The proposed schedule for addition of water storage is shown below:

Table 7-3
Proposed Water Storage Addition Schedule

Site	2000 (existing)	2005	2010	2015	2020
Cupids Knoll 3MG (1980)- Res. #1	3,000,000 Gal	3,000,000 Gal	3,000,000 Gal	3,000,000 Gal	3,000,000 Gal
Cupids Knoll 1MG (1949)- Res. #2	1,000,000 Gal	1,000,000 Gal	1,000,000 Gal	Abandoned	Abandoned
New Cupids Knoll 2MG (Replace Res. #2)	—	—	—	2,000,000 Gal	2,000,000 Gal
Cupids Knoll 1MG (1969)- Res. #3	1,000,000 Gal	1,000,000 Gal	1,000,000 Gal	1,000,000 Gal	1,000,000 Gal
TOTAL	5,000,000 Gal	5,000,000 Gal	5,000,000 Gal	6,000,000 Gal	6,000,000 Gal

As seen in Table 7-3, the proposed schedule for water storage addition calls for a new 2,000,000 reservoir to be placed at the existing Cupids Knoll Reservoir site. This reservoir will replace the existing partially buried reservoir during 2010-2015. The existing buried reservoir is approaching the end of its service life (66 years) around 2010 and is slated for abandonment during this period. The new reservoir will be placed in the corner of the existing reservoir site. Refer to Figure 7-2 for the current and proposed reservoir site plans.

Emergency Plan

The City of Independence and City of Monmouth are advised to develop an Emergency Plan that will address the water usage curtailment and mutual notification procedures during a sustained power outage, fire, or equipment failure. This is especially important given the high reliance on the Marion County Well. This plan should include, at a minimum, the following items:

1. Classification and severity of emergency. The most common and expected conditions would include:
    1. Power outages
    2. Well or pump failure
    3. Pipeline break
    4. Cross-connection contamination
    5. Source contamination
    6. Extreme system demand due to fire and/or unusually high demands
2. Expected duration of failure and impact to both systems.
3. Public notification procedures and phone numbers for each customer, if necessary.
4. Corrective procedures for each separate incident.

5. Emergency Plan coordinator and emergency contact phone numbers and names for both cities.

6. Regulatory agency notification procedures and contact persons

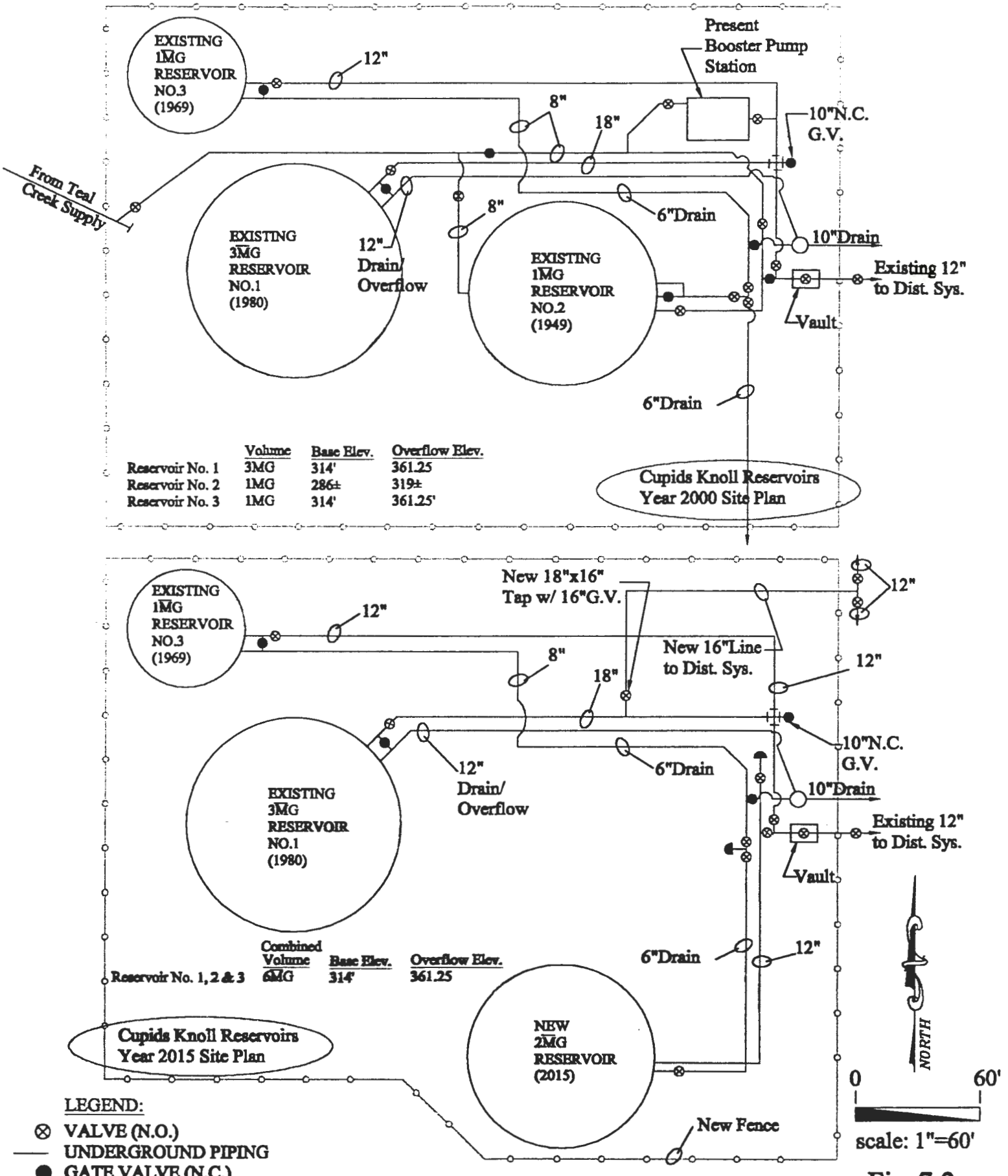

EXISTING 1MG RESERVOIR NO.3 (1969)
12"
Present Booster Pump Station
8"
18"
10"N.C. G.V.
From Teal Creek Supply
EXISTING 3MG RESERVOIR NO.1 (1980)
12" Drain/ Overflow
8"
6"Drain
EXISTING 1MG RESERVOIR NO.2 (1949)
10"Drain
Existing 12" to Dist. Sys.
Vault
6"Drain
Volume Base Elev. Overflow Elev.
Reservoir No. 1 3MG 314' 361.25
Reservoir No. 2 1MG 286± 319±
Reservoir No. 3 1MG 314' 361.25'
Cupids Knoll Reservoirs Year 2000 Site Plan
EXISTING 1MG RESERVOIR NO.3 (1969)
12"
New 18"x16" Tap w/ 16"G.V.
12"
New 16"Line to Dist. Sys.
8"
18"
12"
10"N.C. G.V.
12" Drain/ Overflow
6"Drain
10"Drain
EXISTING 3MG RESERVOIR NO.1 (1980)
Existing 12" to Dist. Sys.
Vault
Combined Volume Base Elev. Overflow Elev.
Reservoir No. 1, 2 & 3 6MG 314' 361.25
6"Drain
12"
Cupids Knoll Reservoirs Year 2015 Site Plan
NEW 2MG RESERVOIR (2015)
NORTH
0
60'
scale: 1"=60'
New Fence
LEGEND:
⊗ VALVE (N.O.)
UNDERGROUND PIPING
● GATE VALVE (N.C.)
NOTE: VALVE & PIPING LOCATIONS ARE APPROXIMATE

Fig. 7-2

Chapter Eight
Hydraulic Analysis
And
Distribution System Evaluation

Hydraulic Analysis of the Water System

General

Extensive hydraulic analysis has been performed on the City of Monmouth's water distribution system. These analyses included evaluation of the existing system at average day, maximum day, and peak hour demands and future 2020 peak hour demands. Recommendations for specific distribution system improvements are based on data obtained from the computer modeling.

Analysis of the water system was performed using computer modeling simulation via the Cybernet Version 2.5 manufactured by Haestad Methods Inc. The actual modeling procedure was performed by Jeff Deckard, Stettler Co., in Salem, Oregon. The Program has a maximum limitation of 1,000 pipes, 1,000 junctions (nodes), 250 pumps, and 250 tanks. The Hazen-Williams formula was used to calculate friction losses. Coefficients of friction (C values) used in the model ranged from 100 for all steel pipe to 130 for Asbestos-Cement pipe and 140 for PVC pipe. These values are typical and appropriate for the respective pipe material and age. All pipe sizes were entered as nominal sizes, i.e. 6 inch inside diameter for all 6" sizes, regardless of type. Minor losses such as tees, ells, and valves have been disregarded.

To verify the accuracy of the model, computer calculated residual pressures were compared to actual field flow tests performed by City and Engineering personnel.

System Models

To be effective, system models must evaluate four system components: the supply system (sources and reservoirs); water demands; the distribution system; and the variations within the system; such as elevation and friction factors. Variations in each of these four components were used in computing existing the future scenarios and represented expansions or additions to the system.

Assumptions of the Computer Modeling Analysis

1. Elevations of all nodes were based on topographical information obtained from USGS maps. Elevations were ascertained at City pipeline locations, *not* from individual residences. Residual pressures are determined at pipelines, therefore, losses due to elevation and friction head to each individual residence must be determined individually. All node elevations were set at based on elevations from USGS maps.

2. The following beginning hydraulic grade line elevations, reflecting expected draft, were used for the system modeling:

   A. Cupids Knoll Reservoir — 350' MSL (Average and Maximum Day)
   350' MSL (Peak Hour and Fire Flow)

3. Internal conditions of individual pipelines cannot be realistically determined, therefore, average friction factors based on pipe material type and verification employing field testing were used. Several field flow tests using existing 6" and

12" AC pipe were performed in November, 1999. Calculated friction factors (C Valves) ranged from a low of 110 to a maximum of 160. The median "C" value for all tests was 127.5 for AC Pipe. The "C" values used were 140 for PVC, 120 for ductile iron, 130 for AC pipe, and 100 for steel and cast iron for Year 2000 models. The "C" value for AC was lowered in 2020 models to 120 to reflect typical values for older AC pipe.

4. Because of the uncertainty of a water-use agreement with the City of Independence, this physical intertie was not included during any simulations. Use of this intertie, during an emergency or high-use period, however, would have a great impact on these simulations and both cities are encouraged to pursue implementation of an exchange agreement.

5. Contributions and losses from smaller pipes (2" and smaller) were disregarded from this model. Residual pressures were calculated at major pipeline points. Additional losses due to service meters, service lines, elevational increases, and smaller distribution lines must be calculated and subtracted from original residual pressures to obtain residual pressures at individual residences.

6. Minimum required residual pressure during maximum day and peak hour demands at all locations was 30 psi at all flow conditions. Minimum desired residual pressure was 50 psi at all flow conditions. Minimum required residual pressure during fire flow conditions was 25 psi. Maximum desired pipeline velocity was placed at 5 FPS during all scenarios.

7. Node demands were based on estimates for specific areas. Individual residences were grouped together at nodes based on number of residences in close proximity to the node. There are a total of 330 nodes in all models.

8. Each node (existing and future) was assigned a flow value to approximate estimated flow to a group of residential under varying conditions. The following flow values were used for each individual simulation:

A. Average Day: (2000)	2.27 GPM per node (6 services/node)
	.38 GPM per service connection
B. Maximum Day: (2000)	5.69 GPM per node (6 services/node)
	.95 GPM per service connection
C. Year 2000 Peak Hour:	14.22 GPM per node (6 services/node)
	2.37 GPM per service connection
D. Year 2020 Maximum Day:	5.53 GPM per node (6 services/node)
	.92 GPM per service connection
E. Year 2020 Peak Hour:	13.83 GPM per node (6 services/node)
	2.31 GPM per service connection

Simulations D and E also included increased flows at selected nodes to approximate projected residential growth near the node. These flows are variable and are based on actual undeveloped acreage outside the city limits but within the Urban Growth Boundary.

Future year simulations incorporated all currently known proposed developments at their respective locations as well as estimated future demands at critical nodes. These demands varied from 15 GPM to 500 GPM and were placed to simulate expected demands during average, maximum day, and extreme peak hour conditions. Future demands were placed based on areas of projected future growth. As previously stated, most of these demands were placed in the southern and northern area. Fire flows were simulated during all maximum day computer runs.

Year 2000 Distribution System Modeling Data

Current year hydraulic analysis was performed on the distribution system to determine the adequacy of the system in delivering required flow with adequate residual pressures. For Year 2000, computer modeling was performed for 5 specific scenarios:

1. Average Day Demand

2. Maximum Day Demand without fire flow

3. Maximum Day Demand with coincidental 3500 GPM @ Western Oregon University

4. Peak Hour Demand

5. All demands off-Wells Operating through Distribution system to Reservoirs

The initial set of hydraulic analysis indicated significant flow delivery limitations within the distribution system. After modifications to the distribution system were performed, a second full set of models plus an additional model for maximum day demand (+) 3500 GPM fire flow in the downtown business district was performed. This was done to verify the effectiveness of the proposed improvements. Wells operating during Year 2000 simulations were Marion County well #1 (1200 GPM) and Buena Vista well #1 (900 GPM).

Year 2000 Average Day Demand-Existing System

The current average day demand (1,046,000 GPD) was simulated with all wells off. This type of simulation provides the most reliable data concerning distribution system flow variations and is the worst case scenario for this particular simulation since the wells are not available. This simulation indicates that the existing distribution system is capable of efficiently conveying average day demands throughout the system. All pressures within the grid were above the minimum level of 50 psi with the exception of Butler/Walnut Drives which are pressure limited due to relative elevation. Typical pipeline velocities were between .1-1.0 FPS, well below the maximum limit of 5 FPS.

Year 2000 Maximum Day Demands-Existing System

Maximum day demands (2,620,800 GPD) were simulated under an assumed condition of maximum day demands with the Marion County Well operational. This combination is the most likely scenario for present maximum day events. The computer model results indicate that the distribution system is adequate under these conditions. All node

pressures were above the minimum desired pressure of 50 psi with the exception of Butler/Walnut Drives which are pressure limited due to relative elevation. Pipeline velocities were well below acceptable limits with typical velocities of .5-1.5 FPS throughout the grid. There is a noticeable increase in pressure within the system, however, due to the additional frictional head the distribution system places against the well pump. This value ranges between 3' (1.5 psi) to 20' (8.6 psi) of additional pressure in the grid.

Peak Hour Demand-Existing System (Well #1 Operational)

Peak hour demands (6,552,000 GPD, 4550 GPM) were simulated for the current distribution system configuration and population. This simulation demonstrated typical pressures within the grid ranged between 33-50 psi. Most of the residual pressures were generally within acceptable ranges, however, high velocities (8-10 FPS) and excessive friction loss was observed in 8" distribution pipes in the Butler Road area. The model verifies the substantial contribution to pressure provided by the well pumps. Residual pressures without the Marion County Well contribution (1487 GPM) would lower to an average value of 15-30 psi, significantly lower than acceptable minimum pressures.

Distribution System Efficiency of Source Delivery to Reservoirs

A simulation was performed to determine the feasibility of utilizing the existing distribution system as a transmission means for the combined flow of the Marion County Well #1 and the proposed Buena Vista Well #1. During this simulation, all node demands are de-activated and all water is delivered to the reservoirs via the existing distribution system. The results of this model indicate excessive pressure increases in the system occur during this scenario. The increase in pressure is most significant in the Talmadge Road/Olympic Road/Bentley Road/Park Place neighborhoods with an increase in pressures as high as 17 psi (40') above static pressures. These increases in pressure can elevate pressure levels in residences to well over 90 psi.

Year 2000 Maximum Day Demands with 3500 GPM Coincidental Fire Flow at Church Street-Existing System with Wells "Off"

This model was performed to determine the water distribution system's capability (without source assistance) to deliver maximum day demands combined with a high fire flow. This 3500 GPM demand was placed at two nodes in the Church Street vicinity. All wells were inactive during this simulation to create the worst case event. This location is representative of a fire that might be expected at Western Oregon University. This location also coincides with previous ISO tests that indicated severe deficiencies in available fire flow in this area. Residual pressures throughout the distribution system were well below the minimum allowable of 25 psi with numerous nodes displaying negative values as low as –20 psi. Pipeline velocities and head loss were excessive in all distribution system pipelines near the reservoirs. The relatively small pipelines on the west end of the system create severe pressure losses during this simulation. Velocities as high as 18 FPS (Butler Road) in several pipelines were observed. This simulation confirmed that a severe and hazardous situation currently exists within the City of Monmouth, necessitating an immediate response.

Year 2000 Distribution System Summary- Existing System

The various models performed on the current distribution system presents the following conclusions:

1. The existing distribution system is adequate for current average and maximum day demands, with or without source contribution.

2. Due to inefficient and undersized piping, the existing distribution system cannot accept total flows from the sources greater than 1600 GPM without significant pressure increases in the grid.

3. Maximum day demands combined with fire flow or Peak Hour demands create severe and unacceptable pressure declines throughout the city with several locations displaying negative pressures.

4. Contributions from the wells are required during maximum day demands with coincidental fire flow or peak hour demands to avoid dangerously low pressures, this is not a reliable and safe condition.

5. Immediate corrections to the distribution system are required to provide a needed factor of safety.

Year 2000 Distribution System Improvements

The severe pressure drop observed during a coincidental maximum day/3500 GPM fire flow event is too significant to avoid or delay immediate corrective action. As previously outlined, most of the pressure drop is due to extreme losses in pipelines distributing water from the Cupids Knoll reservoirs to the grid. Most of this pressure loss occurs in 8" pipelines on Butler Drive, Clay Street, and Main Street. The single 12" pipeline from the reservoirs to Butler Drive also contributes to the overall loss in pressure. The improvements, shown on Figure 10-2 (Phase I, Priority I), are the minimum level of work considered to be required to improve system hydraulics. Additional simulations were performed following incorporation of these improvements, the results follow:

Year 2000 Maximum Day Demand with 3500 GPM Fire Flow at Church Street After Improvements (Both Wells "Off")

This simulation verified a substantial increase in residual pressures after completion of the proposed pipeline improvements. Pressure levels throughout the grid averaged 45-50 psi with the lowest observed pressure of 39 psi occurring in the Butler Drive/Walnut Drive area. Pipeline velocities were considerably lower and more evenly distributed within the grid. Typical velocities in major pipelines ranged between 4-6 FPS. The increase in pressure observed at Church Street was 37-40 psi, this value is considerably higher than the calculated pressure level of –17 psi observed before the improvements. This simulation was performed with all available wells inoperable. This situation creates the worst-case potential.

Year 2000 Maximum Day Demand with 3500 GPM Fire Flow at Main Street- After Improvements (Both Wells "On")

A second fire flow simulation was performed during maximum day demands to verify available fire flow capacity to the downtown business district. A 3500 GPM demand was placed on Main Street (from two individual hydrants) during Year 2000 maximum day demands but after the addition of the distribution system improvements. The results of this model were also very favorable as residual pressure levels were between 55-70 with typical pressures of 60 psi or higher throughout the grid. Pipeline velocities were well distributed with a maximum velocity of 6 FPS. Most of the velocities within the grid were between 1-3 FPS, well below the maximum desired velocity of 5 FPS. These were no residual pressures below the minimum acceptable level of 25 psi.

Distribution System Efficiency of Source Delivery to Reservoirs

This simulation was performed to verify the capability of the distribution system in delivering water from the Marion County and Buena Vista wells to the reservoirs after the pipeline improvements. Pressures throughout the grid were 7-8 psi on average lower than observed during this previous simulation. The maximum observed pressure within the system was 91 psi, with most of the pressures between 75-85 psi, an acceptable range of delivery pressure to residences.

Year 2000 Peak Hour Demands-After Improvements

Two individual peak hour simulations were performed:

1. Peak hour demands with all wells operational and;

2. Peak hour demands with all wells deactivated. The effects on residual pressures during operation of the wells is significant with an average increase in pressure of 12-15 psi observed with both wells operational. Pressure distribution throughout the grid was between 53-70 psi during contribution from the wells and 42-55 psi with all wells deactivated. In both cases, all pressures were well above the minimum required pressure of 30 psi. Pipeline velocities were generally between .5-3 FPS with no velocities above 6 FPS. The distribution of flow and uniformity of pressure is significantly improved during simultaneous well operation and reservoir contribution.

Year 2000 Hydraulic Analysis Summary

1. The existing distribution system can accommodate current average and maximum day demands with minimal pressure loss within the city. All node residual pressures were above the minimum desired pressure level of 50 psi.

2. A maximum day demand combined with a high intensity (3500 GPM) fire flow results in significant and severe pressure drops throughout the city. Residual pressures at several locations drop into negative values, a potentially dangerous and hazardous condition.

3. The distribution system is not currently capable of accepting more than 1600 GPM of total source capacity due to pressure increases seen in the grid.

4. Distribution system improvements (Phase I-Priority I) greatly improve water delivery throughout the city under all flow conditions.

5. After Phase I, Priority I improvements are complete, the distribution system is capable of accommodating all Year 2000 average day, maximum day, maximum day with coincidental fire flow (3500 GPM) and peak hour demands.

Year 2020 Hydraulic Modeling Data

For Year 2020, 4 distinct computer simulations were performed to determine any further needed improvements and the effectiveness of the proposed improvements.

These were: Peak Hour
Maximum Day w/ 3500 GPM Fire Flow at Monmouth/Main Street
Maximum Day w/ 3500 GPM Fire Flow at Church Street (WOU)
Maximum Day w/ 2000 GPM Fire Flow in Northeast area of the city

Year 2020 Distribution System Modeling Data

Several computer simulations were performed for anticipated water system demands for the Year 2020. These models included elements of new residential development and assumed industrial water demands. These simulations were performed assuming the implementation of additional distribution system improvements as detailed in Figure 9-1. For Year 2020 computer models, the following values were assumed:

Population: 15,128
"C" value for AC Pipe lowered to 120
Average Day per Capita Use: 125 GPCD
Maximum Day per Capita Use: 313 GPCD
Peak Hour Factor: 2.5x Maximum Day Demand
Fire Flow: 4000 GPM (2000 GPM in Industrial Area)
Marion County Well Field Capacity: 2000 GPM

Buena Vista Well Field Capacity: 2100 GPM

Year 2020 Maximum Day (4,909,000 GPD)

This model was the first model (and lowest projected daily flow model) performed for Year 2020. This model was performed to answer two questions:

1. Can the water system accommodate projected maximum day demands without significant pressure losses?

   And,

2. Can the water system accept the ultimate combined well field capacity (4100 GPM) without severe pressure increases within the distribution grid?

The results of this model were mixed for both questions. Pressure distribution throughout the city was between 40-81 psi with average values between 65-75 psi. Pipeline velocities were between .25-9.3 FPS with virtually all pipes within the gird contributing to flow distribution. This model, however, underscores the need for additional pipeline reinforcement, particularly in the southern area of the city. During maximum day events, the pressure within the city will rise between 5-10 psi higher than normal with all sources operable. This situation will be worse at flow conditions less than maximum day demands. To prevent excessive velocities and commensurately higher pressures than desired, combined operation of all sources should be limited to a reservoir water level elevation of 350' or less. This control level can easily be accommodated through the new control system. This recommendation will not be necessary, if the 12" transmission pipeline is continued from the planned initial termination at Ecols Street to the 12" pipeline above Butler Street. This extension is planned for Phase IV.

Year 2020 Peak Hour (8546 GPM)

The computer simulation performed on Year 2020 Peak Hour demands indicates favorable pressure distribution throughout the city. Pressure values average between 50-64 psi with the lowest pressure of 38 psi occurring in the Butler Road vicinity. Pipeline velocities were well distributed, with typical velocities between 1-4 FPS. The highest observed velocity was 6.48 FPS (Main-Jackson Street). Adequate flow was observed in all pipeline improvements, indicating some measure of contribution to the system. The new northern Hwy 99W crossing, in particular, displayed a flow of over 200 GPM during Peak Hour conditions and 383 GPM during combined maximum day demands and 2000 GPM fire flow in the Northeast section of the city. These results, combined with the inherent advantages of system looping, verifies the need for this road crossing.

Year 2020 Maximum Day Demands with 4000 GPM Fire Flow at Church Street (Western Oregon University)

This simulation was performed using the same basic criteria as the Year 2000 model except fire flow was raised to 4000 GPM and various local water demands were adjusted upwards to simulate projected growth in that specific area. The results from this computer simulation indicated good pressure and velocity distribution thorough the grid. Virtually all of the pipelines within the system contributed to the system demands.

Typical velocities were in the range of 1-5 FPS with the highest observed velocity of 8.6 FPS occurring on Monmouth Street. Residual pressures throughout the city were above acceptable minimum levels and averaged between 56-73 psi. Although there is still some pressure rise at various locations within the system apparent, the increase in pressure does not exceed 5 psi above the normal maximum pressure to any residence. Residual pressures at the point of fire flow withdrawal (Church Street) were 46 and 44 psi, well above the minimum level of 25 psi.

Year 2020 Maximum Day Demand with 4000 GPM Fire Flow on Main Street

This model was performed identically to the previous model with the exception of relocating the fire flow demand to two hydrants on Main Street (Knox and Main and Broad and Main). As with the previous simulation, pipeline velocities were within acceptable limits with typical values of 1-4 FPS. Residual pressures averaged between 50-70 psi with a pressure level at the points of withdrawal of 50 psi.

Year 2020 Maximum Day Demand with 2000 GPM Fire Flow at Bowman and High Streets

This particular simulation was performed to verify the ability to successfully deliver a fire flow in this area during maximum day demands without incurring significant pressures losses within the city. A value of 2000 GPM was selected for this simulation to insure that commercial or light industrial fire demands can be met. This vicinity also includes 142 acres of industrially zoned land and higher flow rate models for this area were deemed important to verify the availability of water for any reasonable type of industrial development. During this simulation, the proposed Highway 99W crossing was alternately closed and opened to determine the actual need for this crossing. The contribution from this crossing during this simulation is significant. The flow through this pipe (383 GPM) is forced to be delivered from a different direction if it is not available. This change of direction results in considerably higher local pipeline velocities and lower residual pressures throughout the city. The highway crossing also provides needed grid reinforcement and looping to the entire northern section of the city. This crossing, therefore, is an important element to this study and will be planned to be installed during Phase III improvements. Residual system pressures were within acceptable limits, typically pressures between 60-75 psi were noted. Once again, pipeline velocities were well distributed with typically values between 1-4 FPS. Pressures at the specific nodes used for 1000 GPM withdrawals were 48 psi (Bowman Street) and 55 psi (High Street).

Additional Hydraulic Models

Although not included within this report, additional simulations were performed to assist with model calibration, alternate well operation scenarios, and alternate pipeline improvements. A set of models was evaluated simulating the effect of a dedicated North-South transmission main. This 12" PVC main was inserted from the 16" well field transmission main, North on Heffley Street to Main Street, west on Main to Pacific Avenue where it was then connected to the existing 12" main to the North. The purpose of this set of simulations was to determine the viability and cost effectiveness of a new North-South transmission main. The results from these models indicate that a North-South transmission main is not necessary within this study period. In fact, differences in pressures between the two sets of models did not vary more than 2 psi under the same flow conditions. The model did indicate, however, the need to extend the existing 12" main on Main Street westward to the existing 12" main on Pacific Avenue. This extension, combined with the installation of 600' of 12" on Pacific Avenue, will effectively provide a North-South 12' transmission main. When combined with the proposed highway crossing at Olive Street, the distribution system will be very efficient in all locations. Additional models, used to determine the best well operational combinations, were also performed. The results from these models are included elsewhere in this report.

Year 2020 Hydraulic Analysis Summary

1) The distribution system, after completion of all proposed improvements, can accommodate all projected average day, maximum day and peak hour demands for the Year 2020. System-wide residual pressures are acceptable and pipeline velocities are within normal limits.

2) Fire flow availability throughout the city is greatly enhanced following the incorporation of the phased improvements. Fire flows as high as 4000 GPM are available in most locations within the city. Fire flows up to 2000 GPM are available in the extreme Northeastern area of the city

3) A substantial increase in system-wide pressure may be developed during simultaneous operation of all wells at flows less than maximum day demands. Eventual extension of the transmission main to the 12" reservoir connection at Falls City Highway, before activation of all Year 2020 sources, is recommended to prevent this occurrence.

4) Investment in a dedicated North-South transmission main is not warranted or recommended. Extension and inter-connection of existing 12" mains on Main Street and Pacific Avenue are recommended, however, to optimize water delivery to all major quadrants within the city.

5) An additional Highway 99W crossing is recommended at the northern end of the distribution system. This crossing will provide needed redundancy, looping, and reinforcement for the northern end of the city on both sides of the highway.

Service Levels

Computer modeling and topographical analysis indicates that the existing reservoir elevation is adequate to provide water throughout the city with the exception of elevations above 260' MSL. This limitation is due to the relative elevations within this area as opposed to specific inadequacies of the distribution system. All proposed development above 260' MSL should be planned with booster pumping for water service. Generally, this requirement will apply to homes built in the Cupids Knoll area and all land west of Butler Road. Refer to Figure 8-1 for this restriction area.

Distribution System Evaluation-AC Pipe

Introduction

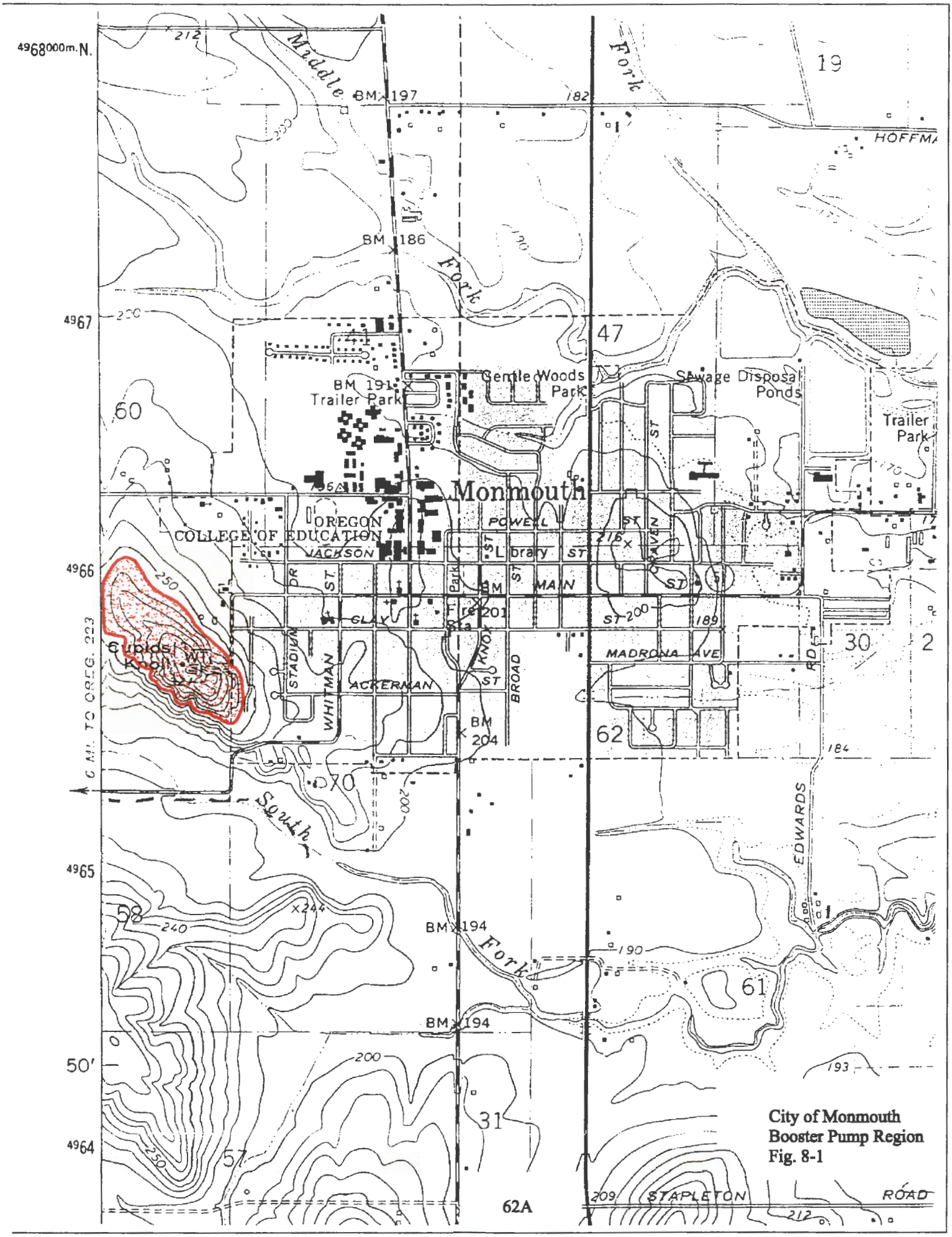
As discussed in previous chapters of this report, the distribution system serving the City of Monmouth uses a high percentage of asbestos cement pipe (AC). AC pipe comprises approximately 19.3 miles (65%) of the total pipe length of 29.75 miles. The 1993-1994 AC corrosion event which resulted in severe (albeit short term) loosening and loss of asbestos fibers has created a concern regarding long-term viability of continued use of the pipe. Although the corrective measures employed have been very successful in abating internal waterline corrosion, due to the high percentage of AC pipe in the Monmouth system, a discussion of the continued use of AC pipe is warranted.

Background

Asbestos-cement (AC) pipe has been in use in the United States since 1930. It is made by mixing Portland cement and asbestos fiber under pressure and heating it to produce a hard and strong product. Although AC pipe was first developed and used in Germany during the 1920's, its light weight, corrosion resistance, and smooth interior pipe wall properties soon met with favor from engineers and water systems in the US. By 1940, the pipe was used extensively throughout North America. It is estimated that there is currently over 200,000 miles of AC pipe in service in the United States. AC pipe is available in sizes from 4" up to 42" and pressure classes of 100, 150, and 200 psi. AC pipe was used as new and replacement pipe by many Oregon communities during the 1950's, 1960's, and early 1970's. Since the mid-1970's, PVC pipe has largely replaced AC pipe in water systems due to its properties of ease of installation, durability, cost, and corrosion resistance.

The first AWWA standard for the application, manufacturing specifications, and installation guidelines were issued in 1953. Since that time the standard has been revised several times. Most of the AC pipe now in service in Monmouth was originally installed during the decades of 1950's-1960's and 1960'-1970's. AC pipe generally has an expected service life of between 30-50 years, largely dependent on pressure cycles and internal and external corrosion factors.

In late 1992, the city began receiving complaints of plugging of aerators and small screens from customers. In February, 1993, investigation determined the cause to be numerous fibers which were identified as asbestos fibers determined to be from the



City of Monmouth
Booster Pump Region
Fig. 8-1

city's AC pipe. Testing conducted on water obtained from customer fixtures determined asbestos fiber counts as high as 120 million fibers per liter. This value is 17 times higher than the EPA suggested standard of 7 million fibers per liter. Immediate corrective action was undertaken, which included temporary pH correction, flushing, and injection of a corrosion inhibitor (Zinc Orthophosphate). The identified cause of AC pipe corrosion was leaching of calcium from the cement component of the AC pipe. Very soft water, such as Monmouth's, will attempt to chemically balance itself by the dissolution of calcium. Soft water is due to low calcium hardness and free Carbon Dioxide gas in water produced from the Marion County Well. Temporary adjustment of pH, using Sodium Hydroxide, was performed to elevate the pH and remove the carbon dioxide. Zinc Orthophosphate is also used for this application as a "sealant" chemical. This chemical (which is FDA approved for potable water use) applies a thin layer of zinc oxide to the pipe wall interior.

This oxide layer assists in re-cementing the pipe wall surfaces and also provides a protective barrier between the water and the pipe. This initial equipment was in place and operable on March 30, 1993 and by late July, 1993, the levels of asbestos fibers fell to well below the EPA suggested limit. Installation of an air stripper (used as a permanent method of carbon dioxide removal) and permanent zinc orthophosphate feed facilities were activated in March, 1995. Routine testing for asbestos fibers since 1994 has consistently shown asbestos fibers at or below detectable levels of .20 million fibers per liter. Since 1995, the city has continued operation of the air stripper/zinc injection at the Marion County Well. Asbestos tests, performed quarterly, continue to indicate non-detectable levels of asbestos fibers.

Structural Integrity of AC (Transite) Pipe

Numerous tests were performed in 1993 to determine the structural condition of the AC (commonly referred to as Transite) pipe. It was feared that if sufficient loss of asbestos fibers and/or softening of the pipe had occurred, the pipe would be subject to failure. Pipe softening can occur due to loss of calcium in the cement component of the pipe material. The following tests were performed in 1993

Table 8-1
1993 AC Pipe Test Results

Sample #	Pipe Size and Pressure Class	Test Type	Test Parameters	ASTM Standard (1)	Disposition
1	6" Cl. 150	Hydrostatic Pressure	525 psi	525 psi	Split pipe
2	6" Cl. 150	Hydrostatic Pressure	575 psi	525 psi	Split pipe
3	6" Cl. 150	Hydrostatic Pressure	550 psi	525 psi	Split pipe
4	6" Cl. 150	Hydrostatic Pressure	525 psi	525 psi	Split pipe
5	12" Cl. 200	Crush Test	11,700 psi	11,800 psi	Split pipe
6	12" Cl. 200	Crush Test	10,000 psi	11,800 psi	Split pipe
7	12" Cl. 200	Crush Test	11,200 psi	11,800 psi	Split pipe
8	12" Cl. 200	Crush Test	11,400 psi	11,800 psi	Split pipe

These tests indicated that random samples of the pipe showed no appreciable loss of structural integrity or pressure rating due to the short- term corrosion event. Additional samples, upon visual inspection were obtained in 1999 as an element of this study. All of the samples appeared to be structurally sound with little or no internal softening of the pipe or loose asbestos fibers. Hydrostatic testing was performed on one random 6" AC pipe section removed from the same area as the 1993 samples were obtained. This sample split at a hydrostatic pressure of 525 psi. This value matches exactly the hydrostatic standard of 525 psi for 6" class 150 AC pipe.[1] The pipe in service is not typically exposed to severe pressure cycling and the pipe is operating well within the rated pressure of 150 psi (distribution system) or 200 psi (transmission main). Average operating pressures within the distribution system range from 50-85 psi. The transmission pipeline generally operates between 100-120 psi. This operational parameter, combined with the current acceptable water quality conditions and low pipeline velocities, creates very favorable conditions for the continued use of the existing AC pipe.

The city also reports few past incidents of pipeline failure and the relatively low percentage (10%) of unaccounted for water indicates a small amount of current leakage. Based on the strength of these observations, immediate or widespread replacement of the AC pipe is not warranted at this time. Because most of the pipe will be nearing or exceeding its expected service life after Years 2015-2020, a systematic approach to replacement of the pipe is recommended to begin after or during this period. Preparation of an inventory of AC pipe, including the year of installation and service records, is recommended. As the pipe continues to age, the city can use this inventory to assist in replacement decisions. The city may elect, if desired, to continue random testing of AC pipe samples and, if results are favorable, delay initiation of replacement until Years 2020-2030.

Distribution System Evaluation-Remaining Pipe Types

The city utilizes AWWA C-900 Class 150 or 200 PVC (PolyVinyl Chloride) pipe as the standard for all new pipe. This pipe is very durable, lightweight, and has excellent corrosion resistance and smooth interior walls. The pipe is generally impervious to chemical attacks and normal corrosion and incrustation problems associated with potable water systems. C-900 PVC also has excellent surge capacity due to a 2.5 to 1 safety factor. Generally, it is recommended that all new PVC pipe used within the City of Monmouth comply with the following specifications:

Material Specifications for PVC Pipe

All pipe installed for and in the City of Monmouth shall be PVC (PolyVinyl Chloride) type pipe. The pipe shall be manufactured from PVC resin compound in compliance with ATSM D1784, cell class 12454B. The pressure ratings shall be class 150 psi (DR18) or class 200 psi (DR14). The actual pressure rating is to be determined by the city. Each pipe shall be 20' in length and equipped with an integral bell gasket complying with ASTM F477. Installation shall be in compliance with AWWA standard M23 and the City of Monmouth standards. A suitable tracer wire shall be installed with the pipe. Additional Technical Data regarding C-900 PVC pipe can be found in the Appendix.

(1) Refer to Figure 8-2.

SECTION 3 - DETAIL REQUIREMENTS:

3.1 Pipe:

3.12 Hydrostatic Strength: Each standard, random and short length of Tran-site water pipe shall be designed to have sufficient strength to withstand an internal hydrostatic pressure listed under Table II when applied as specified in Section 4.22.

TABLE II

A		B	
Routine Hydrostatic Pressure, psi		Sampling Hydrostatic Test pressure, psi	
Class	Test Pressure	Class	Test Pressure
100	350	100	400
150	525	150	600
200	700	200	800

3. 13 Flexural Strength: Each standard length of Transite water pipe in sizes 3, 4, 6, and 8 inches shall have sufficient flexural strength to withstand, without failure, the total loads listed in Table III when applied at the third points of a 9-foot span for 10-foot lengths and a 12-foot span for 13-foot lengths in the manner specified in section 4.23.

TABLE III - Applied Flexural Loads

		Total Applied Load., Pounds	
Pipe Size	Class	10 foot lengths	13 foot lengths
3	100	750	–
	150	830	–
	200	910	–
4	100	1200	1000
	150	1470	1200
	200	1870	1400
6	100	2800	2300
	150	3700	2800
	200	4900	3700
8	100	--	4800
	150	--	5700
	200	--	7600

3.14 Crushing Strength: Transite water pipe shall have the crushing strength indicated in Table IV when tested in accordance with the ASTM 3-Edge Bearing Method as specified in Section 4.24.

TABLE IV - Applied Crushing Loads

Nominal Pipe	Crushing Strength per Linear Ft. ,Lb		
Size, Inches	Class 100	Class 150	Class 200
3	4,600	6,700	8,800
4	4,100	5,400	8,700
6	4,000	5,400	9,000
8	4,000	5,500	9,300
10	4,400	7,000	11,000
12	5,200	7,600	11,800

Material Specifications DS-335-64
Transite Asbestos – Cement Water Pipe

Fig. 8-2

Cast Iron and Galvanized Pipe

The city also has approximately 4300' of cast/ductile iron and 3450' of galvanized steel in the distribution system. While the cast and ductile iron pipe appears to be in fair condition, the steel pipe (mostly 2") is undersized and prone to corrosion and leakage. Replacement of all steel pipe is anticipated to occur by contracting to construction contractors over the next 10-15 years. The city may wish to delete this work from the proposed capital improvement program and perform this work with city forces as maintenance funds permit. All hydraulic analysis performed for Year 2020 assumes replacement of all existing steel pipe (2" and 4") with 6" or larger PVC pipe by that time.

Chapter Nine
Related Issues

Related Issues

This section covers topics that are ancillary to the overall Master Plan.

Cross Connection Control Program

The City currently has an active cross connection program in effect. Given the variations of system pressure, OHD regulations, and potential for backflow, a cross connection program is definitely warranted. The Cross Connection program is operated and supervised by George White, who is certified in Backflow Prevention. The City operates their Cross Connection program through a proprietary software program from BMI, Inc (CrossTrack). At this time, the City has been operating its Cross Connection program since April, 1995 and has identified and implemented or recommended corrections for approximately 25% of the distribution system. Potential cross connection problems of greatest concern would include: industrial and commercial facilities, facilities with fire sprinkler systems, and areas with marginal or greater pressures due to friction loss.

Corrosion Control

Given the current water quality of the wells, the corrosive effect of water on most system components is not felt to be severe. This is due to the corrected pH, calcium hardness, and alkalinity of the well water. Recent tests have confirmed no current presence of Asbestos fibers in the system which verifies the present lack of aggressive chemistry in the water towards AC pipe. In addition, recent testing for compliance with the lead and copper rule indicate a lowered potential for copper leaching since implementation of treatment at the Marion County Well. Further testing may need to be performed to determine any changes in the corrosivity of the water.

Future Regional Water Authority and Exchange Potential With Nearby Water Purveyors

In 1991, a regional study was performed that identified present problems with water supply in Lincoln, Polk, and Yamhill counties. Recent discussions have explored the possibility of a regional water authority that would serve water supply to this Tri-County area. Several potential reservoir sites have been proposed and debated with no current resolution. As of the date of this report, no firm plans exist for a regional water authority or water system.

In July 1996, a Regional Water Supply Plan-Phase I (CH2MHill) was completed for the cities of Dallas, Monmouth, and Independence. This plan outlined the current water supply deficiencies for these communities and outlined several alternatives for short and long-term solutions. Among the proposals were: Willamette River water, Mercer Reservoir improvements, a dam on Rickreall Creek, and shallow wells. This plan was updated in 1999 as the Regional Water Supply Plan-Phase 2. The most recent report includes population projections, water use inventory, and updated recommendation. In the 1999 report, the Willamette River was excluded from consideration and new wells and upgrade of existing wells was selected as the primary source of new water supplies. As of the date of this report, no firm plan or proposed schedule exists for

implementation of the improvements outlined in either report. Given the current political, technical, geographic, and economic limitations, the likelihood of creation of a Regional Water Authority (RWA) is believed to be at least 10-15 years in the future. Given the current water supply deficiencies present in Monmouth's water system, the city should proceed with the improvements outlined in the Master Plan as soon as possible and re-visit the concept of an RWA should interest from additional water purveyors increase. The impact of a regional water authority on Monmouth is not known at this time, however, Monmouth appears to have sufficient available water resources regardless of this potential.

Since the new Buena Vista well field is in close proximity to Luckiamute Water Cooperatives wells the city should investigate the potential of an inter-use or exchange agreement with the Cooperative. This agreement could conceivably provide mutual benefit to both entities with a low exposure to political or technical hazards. Water quality, particularly nitrates, remains a concern, however, and the City should endeavor to prevent contamination of this critical resource. The City is also encouraged to pursue possible inter-exchange agreements with the City of Independence. Although a physical connection currently exists with the City of Independence, the mutual benefits of an automatic use agreement appear to outweigh the potential costs and disadvantages. Both cities operate at dissimilar pressures to each other but this is presently corrected through available booster pumping - pressure reduction. The water quality of Independence's well source is similar to Independence's and after current treatment processes will not represent a hazard to AC pipe.

Operator Certification and Training

The current level of operator certification required for the City of Monmouth is Water Distribution II. Water Treatment I certification is also required due to the treatment facilities at the Marion County Well. Current status of certified personnel is as follows:

George White: Water Distribution (WD) II, Certificate # 1577
Russ Cooper: Water Distribution (WD) II
Water Treatment (WT) I, Certification # 6277

This level of certification (WDII) is appropriate for the City and adequate up to a service population of 15,000. Additionally, faced with current regulations for monitoring and operation, continuing education and training should be pursued by all personnel. This should include; but not limited to: water microbiology and treatment, confined space (OSHA) laws, electrical theory, trench protection and shoring methods, and emergency planning.

Conservation Plan

To encourage conservation of water, the following steps are recommended:

1. Implement a zonal leak detection program.

2. Establish and implement water rates based on sliding fee. Charge at minimum flat rate for first 1,000 gallons or cubic feet then an increasing unit amount above base flow.

3. Test all service meters at 10 year maximum interval.

4. Test all Master and production meters at 5 year maximum interval.

5. Hold public forums and encourage conservation through direct mailings and billing stuffers.

6. Periodically tour and examine the distribution system network to visually discover leaks. Perform leak detection survey and correction.

7. Encourage the installation of low flow devices such as: low flow shower heads, low flow toilets, and efficient irrigation practices such as drip irrigation on all new and existing services. Consider possible rebate or purchase program for water conservation devices.

Emergency Plan

The City of Monmouth is susceptible to various types of emergencies. These include: power outages, flooding, and storm damage. A procedure for each scenario should be addressed and all personnel fully informed and trained. The following items are specific incidents that may affect the water system with specific recommended corrective action. Each plan must have a person in responsible charge that will assume leadership and direction. In the case of Monmouth, the Public Works supervisor should assume this role. Communication methods other than telephone should be available. This can be short wave, citizens band, or two-way radio.

Power Outages

This is expected to be the most common and frequent emergency. Since standby power facilities are available at the Marion County Well, the City should undertake the following steps during a power outage:

1. Verify if the outage is a located type affecting only one or two wells or widespread throughout the city.

2. If localized, activate all available sources, notify the serving utility of outage.

3. If widespread, notify the serving utility (Pacific Power & Light) and ask for estimated time for service restoration.

4. If outage is expected to last for several hours, activate the back up engine to operate at least the Marion County Well.

5. Notify the customers through door-to-door contact and/or public address to conserve water and limit use.

6. If necessary, activate water inter-connection with the City of Independence.

Flooding

1. All well heads should be at least 1'-2' above highest anticipated flood level.

2. All electrical facilities and equipment should be well above flood level.

3. All water lines in flood prone areas should be inspected regularly for adequate restraint and support.

Earthquakes

1. Verify structural integrity of all storage vessels - Repair any cracking or settlement.

2. All pumps and mechanical equipment should be firmly anchored to a support base.

3. Pipelines on exposed slopes are especially prone to failure and/or sliding. These pipes should be buttressed and adequately supported.

4. Reinforce support of all river crossings.

5. After an earthquake, immediately inspect all storage facilities to determine structural condition. If failure is imminent, emergency draining may be required. Only drain if absolutely necessary as fire protection and fresh water will be scarce.

6. Develop a standby plan with the Fire District to dedicate locations such as the Willamette River for alternate source of fire protection supply if water system is not functioning.

7. All new structures should be designed for UBC Seismic Zone 3. All reservoirs should be periodically examined and repaired where necessary.

Storm Damage Prevention

Maintain areas surrounding well sites, and storage facilities free of loose or broken tree limbs that could interrupt power and/or damage facilities. Remove dead trees or trees with bad root system that could fall on a facility during a storm.

1. Periodically examine all electrical services and poles at facilities. Notify utility if loose connections, guy cables, poles, or damage to other electrical equipment is apparent.

2. Verify security of all facilities; bolt down buildings to foundation, if necessary. Install weather stripping on doors and/or windows.

System Contamination

1. Maintain security at all sites. Prevent unauthorized entry to all well, reservoir, and pump sites. Fence all sites not currently secured. Install lockable gates across access roads. Bar all windows into building. Install dead bolt locks.

2. Post all sites with appropriate signage that states "No Trespassing" or similar language.

3. Maintain control of all keys; inventory and list holders.

4. Implement and maintain cross connection program.

5. If contamination occurs, determine severity, type and likely origin. Discontinue use of source if under suspicion. Verify presence with follow-up testing.

6. Notify required regulatory agencies and public, if appropriate.

Wells

1. Maintain all well heads in sanitary condition, screen all vents and access ports.

2. Limit animal and human activity in the vicinity of well areas.

Telemetry and Control System

Included within this report is funding necessary for a new control system to be placed at the City shops to operate the well pumps. This will provide a substantial improvement as pump failure or low reservoir alarm notification will be present through an alarm dialer. The City should plan to activate the alarm dialer, at a minimum, on weekends and after hours to provide earlier notification of pump failure or low reservoir level to system operators.

Operation and Maintenance

Effective management of a water system requires several considerations. These include advance planning and budgeting, good record keeping, adequate expansion and replacement funding, proper maintenance procedures, and efficient operation. The following recommended procedures for effective system management are:

1. Maintain complete and accurate water distribution mapping. Update map as required when new pipes to system are added. Verify and identify all valve locations. Correct errors on mapping when excavations uncover unknown or incorrect data.

2. Maintain water rights on all sources, perform testing as required by regulatory agencies. Secure and maintain easements where water mains cross private properties, etc.

3. Develop accurate records of water production from all sources. Develop historical records against water revenue to track system loss.

4. Establish and implement a systematic meter testing program.

5. Develop and maintain good communications with all regulatory agencies such as : Health Division, Water Resources Department, etc.

6. Prepare Operation and Maintenance manual for entire system. Include items such as: emergency procedures, pump data, service instruction, etc.

7. Secure and maintain list of emergency assistance with phone numbers including electricians, pump servicemen, utility contacts, etc.

8. Develop a set of basic standards as they relate to the water system. In general, these standards should include requirements for pipeline material and installation, fire hydrants, cross-connection control, service lines and meters, pipeline locating, and coordination of utilities.

9. Perform daily/weekly inspections of all facilities. Record operating hours and production. Check water pumping levels. Check water levels in reservoirs.

10. Update maps at least once yearly.

11. Exercise all motors at least weekly.

12. Seasonally check all electrical connections, condition, etc.

13. Develop a water main extension policy.
    A) Require that all main extensions be consistent with adopted Master Plan.
    B) Determine policy through SDC's regarding developer sharing or paying cost of water main, generally for 6" and smaller.
    C) Require that all new mains, regardless of source payment, be installed according to accepted standards.

Chapter Ten
Capital Improvement Program

Capital Improvement Program

The recommended capital improvement program for the City of Monmouth has been divided into several phases of work. These phases are the minimum level of construction and improvements necessary during the following periods of the study: Phase I: 2000-2002, Phase II: 2002-2005, Phase III: 2005-2010, Phase IV: 2010-2015, and Phase V: 2015-2020. Phase I improvements include the minimum improvements believed to be required to correct present source inadequacies and distribution system deficiencies. Improvements proposed during later years of the study period (2010-2020) may require reassessment depending on actual growth and status of the water system.

Phase I Improvements (2000-2002)

Phase I improvements are designed to provide additional source capacity and redundancy (Buena Vista Well #1) that are currently inadequate. In addition, improvements to the distribution system are immediately required to provide adequate fire protection within the city as well as lower system pressure during operation of the new wells. These improvements should be performed in the order listed to facilitate proper operation of the wells. Priority Number 1 is needed to increase available fire protection throughout the city and provide an efficient path to the reservoirs for the higher capacity the sources will be capable of during combined operation of the Marion County and Buena Vista wells. Priority Number 2 is the construction of the Buena Vista well field transmission pipeline. Priority Number 3 provides funds for the initial development of Buena Vista Well Number 1. Priority Number 4 proposes completion of the Monmouth-Independence Drinking Water Protection Area Delineation Report. This report, which is being prepared by the Oregon Association of Water Utilities, is a very important document for both cities. The background information obtained from this report will be used for future well siting purposes as well as well field contaminant identification and control. The final priority in Phase I includes the installation of a radio controlled telemetry system for control and monitoring of all wells and reservoirs. Modifications to the existing booster station at Cupids Knoll to optimize the use of Reservoir Number 2 will also be performed at this time.

Phase I: 2000-2002

Priority #	Projected Year	Description	Estimated Cost
1A	2000	360'-16" PVC Pipeline-Reservoir to Butler Road- See Table 10-1	$22,064.00
1B	2000	4240'-12" PVC Pipeline- Butler and Talmadge Road-See Table 10-1	$215,360.00
1C	2000	3200'-8" PVC Pipeline- Various locations-See Table 10-1	$134,075.00
		Total Priority I	$371,499.00
2	2000-2001	17,300'-16" AWWA Class C-905, 165 psi Transmission Pipeline-Buena Vista well field to existing 14" AC pipeline at Corvallis Road	$821,450.00
3	2000-2001	Construction of Buena Vista Well Pump Station #1-900 GPM Design Flow, Equipped with stand by engine, chlorination facility, and sequestering feed equipment	$190,500.00
4	2000-2001	Complete Monmouth-Independence Drinking Water Protection Area Delineation Report (Now in Draft Form)	$10,000.00
5	2001-2002	Install a radio based Scada system at City Shops (Master Unit) and 2 Remote well sites	$38,000.00
		Sub-Total Phase I	*$1,431,449.00*
		(+) 10% Engineering and Inspection	$143,150.00
		(+) 10% Contingency	$143,150.00
		TOTAL PHASE I	**$1,717,749.00**

Note: Add $10,000.00 (Estimated) per site to add sewer facilities to Scada system, if desired.

Phase II Improvements (2002-2005)

Phase II improvements are needed improvements to the water system that, while important, are not as critical as Phase I improvements. Priority Number 1 provides funds necessary to perform seismic reinforcement of the Willamette River Bridge crossing. This work should include a structural engineering evaluation followed by: (projected) installation of flexible ball-joint adapters at both ends and harness replacement/addition. The actual scope of work will depend on recommendations received from the engineering evaluation. This work should not be performed until the Buena Vista Well #1 is fully operational. Priority Number 2 allocates funds for a detailed hydrogeologic study of the groundwater resources for both well fields; Marion County and Buena Vista. This study should be performed after 1-2 years of operation of the Buena Vista Well #1 and data collection outlined in Table 5-3 is adequate in duration and data points. This study should be completed and reviewed before additional well sites are selected and before the completion of land purchases or additional wells in either well field. Priority Number 3 allocates funds to purchase additional land and/or right-of-way needed for Buena Vista wells #2 and 3. Priority Number 4 allocates sufficient funds to purchase additional land on Cupids Knoll for the proposed 2 million gallon reservoir planned for Phase IV. Priority number 5 allocates funds for needed reservoir cleaning and inspection for all reservoirs. Priority Number 6 includes the drilling and development of Buena Vista well #2. Priority Number 7 is not included within the total cost of Phase II, but is included for possible future consideration.

Phase II: 2002-2005

Priority #	Projected Year	Description	Estimated Cost
1	2002-2003	Perform Seismic reinforcement of Willamette River Bridge crossing	$48,000.00
2	2002	Perform a hydrogeologic study on the Marion County and Buena Vista well fields for proper selection of new well sites and Nitrate control recommendations.	$32,000.00
3	2002	Purchase land for Buena Vista well field	$100,000.00
4	2002	Purchase land for Cupids Knoll 2MG Reservoir	$30,000.00
5	2003-2005	Clean and inspect Reservoirs	$15,000.00
6	2003-2004	Drill and develop Buena Vista Well #2 Design Capacity: 700-800 GPM	$186,000.00
		Sub-Total Phase II	*$411,000.00*
		(+) 10% Engineering and Inspection	$41,000.00
		(+) 10% Contingency	$41,000.00
		TOTAL PHASE II	**$493,000.00**
7	2004-2005	Installation of Iron/Manganese removal system to be placed in Independence (See Figure 10-1) Includes estimated cost of purchase of necessary land for treatment facilities. Design Flow: 1600 GPM	$375,000.00

Phase III Improvements (2005-2010)

Phase III improvements include the installation of a new 16" transmission pipeline from Corvallis Road into the city (Priority Number 1). This pipeline is needed at this time for three reasons: To provide an alternate and redundant route for water transmission from the well fields, to provide a larger transmission main necessary for the ultimate Buena Vista and Marion County well field capacities (4,100 GPM), and to accommodate expected growth in the southern region of the city. This new pipeline will also greatly lower operating pressure on the existing 12" and 14" AC transmission pipelines, extending the remaining life of these pipelines. This pipeline is planned to be installed in the existing easement and much of the pipelines, particularly the 12" and 10" interties and 16" transmission pipeline should be partially funded from SDC's or developer funded. This improvement is planned to be implemented with a 3 year window (2005-2008) due to the uncertainty of actual growth in the future. This pipeline may be delayed towards the end of the 3 year window if growth declines or water demands stabilize. The city is cautioned, however, that the full potential of the wells cannot be realized until the pipeline is completed. This is due to the excessive friction loss that will be encountered from the existing 12" pipeline when pumping greater than 1600 GPM-1800 GPM. Priority Number 2 includes installation of various distribution system 12' and 8" reinforcement and looping. This priority will effectively provide a 12" pipeline, North to South, within the city. This improvement will also greatly improve water delivery throughout the eastern section of the city. This work is also needed to more efficiently convey water through the distribution grid to the reservoirs from the wells.

Phase III (2005-2010)

Priority #	Projected Year	Description	Estimated Cost
1	2005-2008	Install 14,700'± 16" AWWA C-905, class 165 psi Transmission pipeline from the Phase I, Priority 1 16" Corvallis Road to the city distribution system and intertie to water system	$885,700.00
2	2008-2010	Phase III, Priority 2-Waterline improvements-See Table 10-1	$272,860.00
		Sub-Total Phase III	*$1,158,560.00*
		(+) 10% Engineering and Inspection	$115,856.00
		(+) 10% Contingency	$115,856.00
		TOTAL PHASE III	**$1,390,272.00**

Phase IV Improvements (2010-2015)

Phase IV improvements include drilling and development of Buena Vista Well #3 (including a standby engine), construction of a new 2 million gallon reservoir on Cupids Knoll, acquiring land for Marion County Well #2, and completing connection of the transmission pipeline to the 12" reservoir pipeline.

Phase IV (2010-2015)

Priority #	Projected Year	Description	Estimated Cost
1	2012-2013	Drill and develop Buena Vista Well #3 Design Capacity 700-800 GPM (Equip with standby engine)	$235,000.00
2	2013-2015	Construct 2MG Reservoir at Cupids Knoll (To replace Reservoir #2)	$525,000.00
3	2013-2015	Purchase land for Marion County Well #2	$60,000.00
4	2013-2015	Phase IV, Priority 4-Waterline improvements-See Table 10-1	$347,000.00
		Sub-Total Phase IV	*$1,167,000.00*
		(+) 10% Engineering and Inspection	$116,000.00
		(+) 10% Contingency	$116,000.00
		TOTAL PHASE IV	**$1,399,000.00**

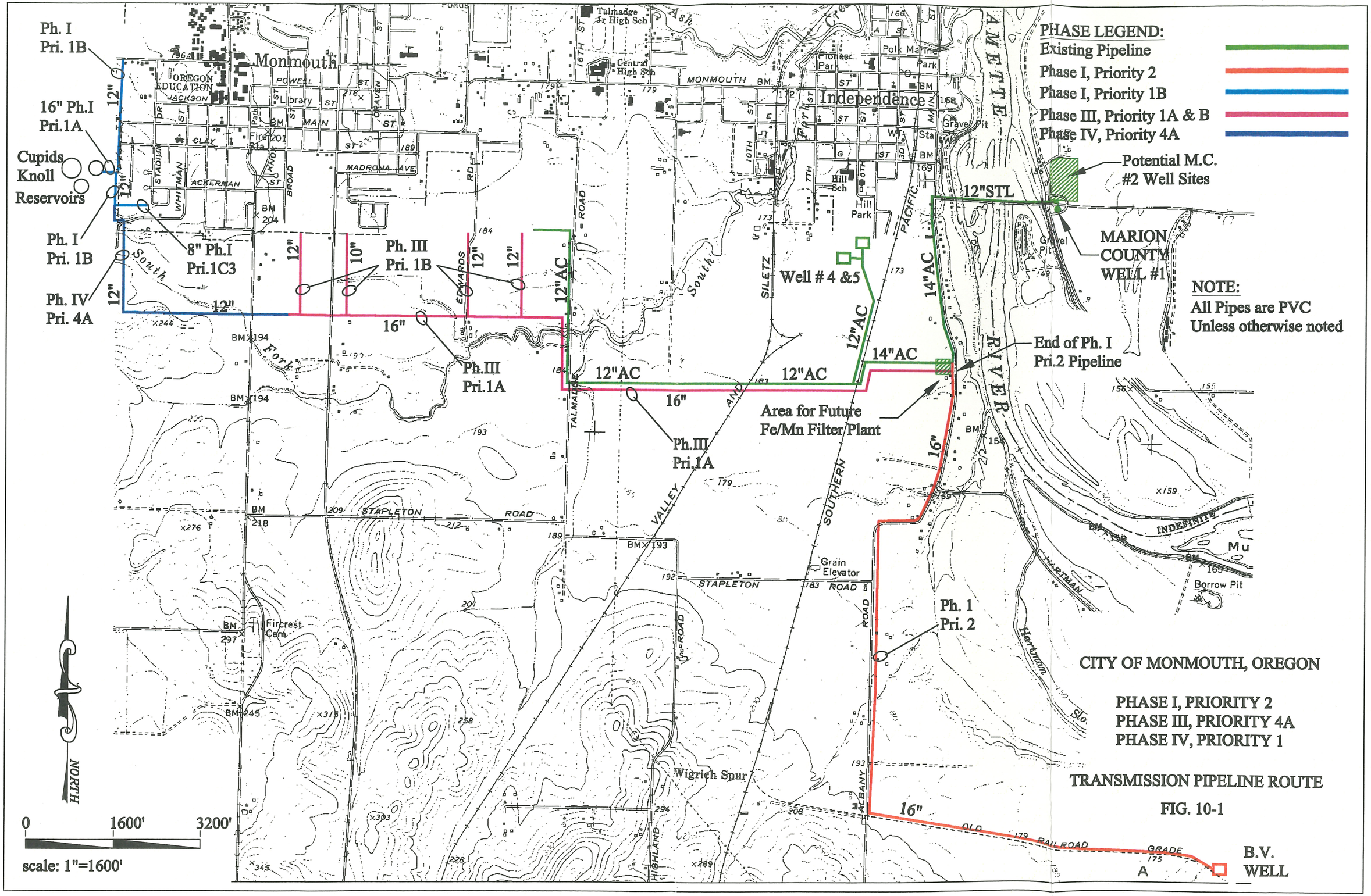
Phase V Improvement (2015-2020)

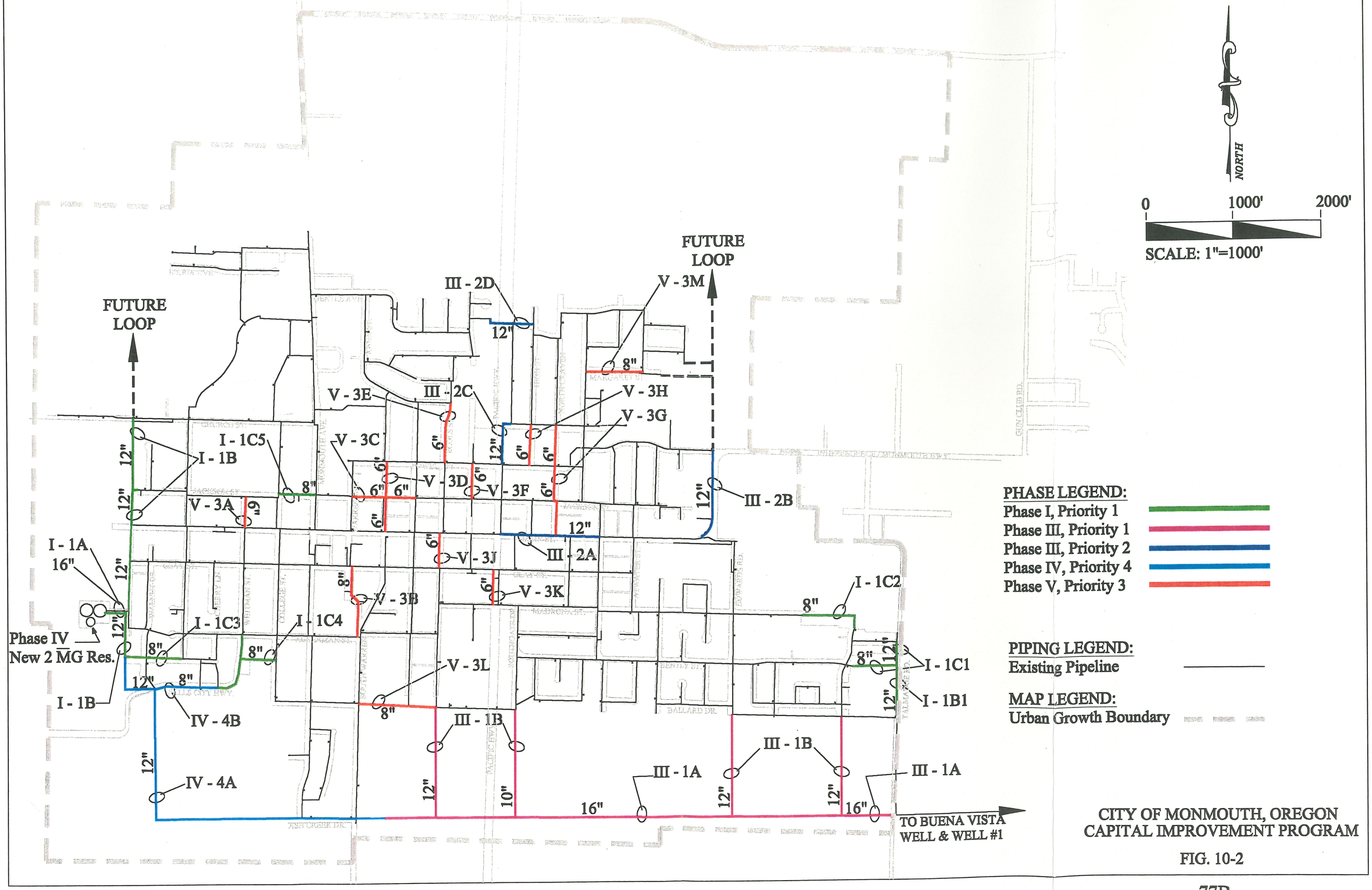
Phase V is the last phase of work scheduled within this report and includes the drilling and development of Marion County well #2. Also included is replacement of various 2" and 4" galvanized piping in the system. This work may be performed by the city as maintenance replacement, if desired.

Phase V (2015-2020)

Priority #	Projected Year	Description	Estimated Cost
1	2016-2017	Drill and develop Marion County well #2 (No standby facilities) Design Capacity: 800 GPM	$195,000.00
2	2017-2020	Install standby engine at Buena Vista well #2	$42,000.00
3	2017-2020	Phase V, Priority 3- Waterline replacement	$460,360.00
		Sub-Total Phase V	*$697,360.00*
		(+) 10% Engineering and Inspection	$70,000.00
		(+) 10% Contingency	$70,000.00
		TOTAL PHASE V	**$837,360.00**

Total all Phases I-V: $5,837,381.00


Ph. I
Pri. 1B
16" Ph.I
Pri.1A
Cupids
Knoll
Reservoirs
Ph. I
Pri. 1B
Ph. IV
Pri. 4A
8" Ph.I
Pri.1C3
Ph. III
Pri. 1B
Ph.III
Pri.1A
Ph.III
Pri.1A
Well # 4 &5
Potential M.C.
#2 Well Sites
12"STL
MARION
COUNTY
WELL #1
End of Ph. I
Pri.2 Pipeline
Area for Future
Fe/Mn Filter Plant
Ph. 1
Pri. 2
Monmouth
Independence
Talmadge Jr High Sch
Central High Sch
Pioneer Park
Polk Marine Park
Hill Park
Gravel Pit
Grain Elevator
Fircrest Cem.
Wigrich Spur
Borrow Pit
Library
Fire
Sta
Hill Sch
OREGON EDUCATION
MONMOUTH
POWELL
MAIN
ACKERMAN
MADRONA AVE
JACKSON
CLAY
WHITMAN
STADIUM
BROAD
CRAVEN
16TH ST
10TH
7TH
5TH
PACIFIC
SILETZ
EDWARDS
TALMADGE ROAD
STAPLETON ROAD
VALLEY
SOUTHERN
PACIFIC RAILROAD
ALBANY AND EASTERN
HARTMAN
INDEFINITE
OLD RAILROAD GRADE
South Fork Ash Creek
Ash Creek
WILLAMETTE RIVER
12"
16"
10"
12"AC
14"AC
BM 194
BM 218
BM 209
BM 204
BM 297
BM 245
BM 193
BM 165
NORTH
0
1600'
3200'
scale: 1"=1600'
PHASE LEGEND:
Existing Pipeline
Phase I, Priority 2
Phase I, Priority 1B
Phase III, Priority 1A & B
Phase IV, Priority 4A
NOTE:
All Pipes are PVC
Unless otherwise noted
CITY OF MONMOUTH, OREGON
PHASE I, PRIORITY 2
PHASE III, PRIORITY 4A
PHASE IV, PRIORITY 1
TRANSMISSION PIPELINE ROUTE
FIG. 10-1
B.V.
WELL
A



CITY OF MONMOUTH, OREGON
CAPITAL IMPROVEMENT PROGRAM

FIG. 10-2

Table 10-1
Phase I-V Waterline Improvements Breakdown

Phase	Priority #	Code	Length	Size	Route or Location	Destination or Cross Streets	Estimated Cost
I	1A	I-1A	360'	16"	Cupids Knoll	Reservoirs to Butler Dr.	$22,064.00
I	1B	I-1B	3360'	12"	Butler Drive	Church to Walnut/Orchard	$170,060.00
I	1B	1-1B1	880'	12"	Talmadge Rd	Exist. 12" north to Olympia	$45,300.00
I	1C	I-1C1	600'	8"	Bentley St	Talmadge	$22,800.00
I	1C	I-1C2	760'	8"	Madrona Ave	Park Place	$24,799.00
I	1C	I-1C3	420'	8"	Orchard St	Walnut and Stadium	$21,383.00
I	1C	I-1C4	1000'	8"	Whitman St	McDonald Lane	$35,730.00
I	1C	I-1C5	420'	8"	Jackson St	College and Monmouth Ave	$29,363.00
I	2	I-2	17,300'	16"	Corvallis Rd	Buena Vista well #1 to 14" AC pipeline	$821,450.00
III	1	III-1A	14,700'	16"	Exist Transmission Line	Corvallis Rd to Broad St	$613,500.00
III	1	III-1B	6100'	12"/10"	Various (4)	New Pipeline to Existing System	$272,200.00
III	2	III-2A	1300'	12"	Main St	Atwater and 99W	$91,000.00
III	2	III-2B	1060'	12"	Main St	12" North to Alberta	$92,460.00
III	2	III-2C	600'	12"	Pacific Ave	Powell to Church	$39,600.00 (1)
III	2	III-2D	400'	12"	Olive Way	High to Gentle Ave	$49,600.00
IV	4	IV-4A	5200'	12"	South Interconnect	12" From Res. To 16"	$312,000.00 (2)
IV	4	IV-4B	1000'	8"	Falls City Hwy	12" to Whitman	$35,000.00
V	3	V-3A	360'	6"	Whitman St	Jackson to Main	$22,320.00
V	3	V-3B	900'	8"	Warren St	Clay to Ackerman	$58,500.00
V	3	V-3C	780'	6"	Jackson St	Warren to Broad	$48,360.00
V	3	V-3D	780'	6"	Knox St	Powell to Main	$48,360.00
V	3	V-3E	720'	6"	North Ecols	Powell to Winegar	$44,640.00
V	3	V-3F	400'	6"	Cattron	Powell to Jackson	$24,800.00
V	3	V-3G	1260'	6"	North Craven	Main to Church	$78,120.00
V	3	V-3H	480'	6"	High St	Powell to Church	$29,760.00
V	3	V-3J	360'	6"	South Ecols	Main to Clay	$22,300.00
V	3	V-3K	400'	6"	Pacific Ave	Clay to Madrona	$26,000.00
V	3	V-3L	580'	8"	Gwinn St	Warren to Broad	$23,200.00
V	3	V-3M	660'	8"	Margaret St	Sacre Ln to Olive Way	$34,000.00

(1) Includes Hwy 99W bore and pipeline connection to Gentle Ave
(2) Estimate assumes installation through undeveloped land.

Conditions of Estimates

1. Construction costs are based on an average of similar local municipal projects completed between 1992-1999 and adjusted for 2000 cost using an ENR Construction Cost Index of 6160 (February, 2000). Unless otherwise indicated, estimates do not include the costs of land acquisitons, right-of-way or easement purchase, or costs associated with funding or financing. Service line replacement and new hydrants are included on applicable new mains and sub-mains. New pipeline costs are based on the use of AWWA C-900 Class 150 PVC pipe with minimal asphalt removal and restoration. For ductile iron pipe, add 15% to all applicable estimates. While substantial effort has been performed to prepare accurate estimates, the City is cautioned that additional factors

such as: rock excavation, specific design criteria; inflation, and local work and economic conditions can have a substantial impact on actual construction costs. Caution should be employed when using these estimates. Estimates are subject to +30% to –15% variation in accordance with criteria established by the American Association of Cost Estimating Engineers.

2. The cost estimate for Phase I, Priority 2 assumes that 7600' of the new 16" transmission pipeline will route through the existing railroad grade that traverses the well field. The remaining 9700' will be installed within the existing right-of-way along Corvallis Road.

3. Phase II, Priority 7 is not included within the anticipated improvement schedule due to the uncertainty of this item. The cost and projected year of implementation are included for reference only in the event iron filtration is required.

4. The cost estimate for Phase III, Priority #1 transmission pipeline assumes installation within the existing pipeline route easement.

Chapter 11
Financial Planning

Financial Planning

The proposed improvements outlined in the preceding sections of this study will require substantial sums of money to implement. This portion of the study will provide information on various funding sources and options the City can pursue to finance the improvements.

A complete revenue analysis is beyond the scope of this study. The City should employ the services of a rate analyst to evaluate current operating costs, depreciation, and improvement program to assist in establishing revised systems development charges or water rates before the City begins extensive improvements.

Financing Capital Improvements

Several options exist to adequately fund the proposed capital improvements outlined in this study. These include the sale of General Obligation, Bancroft, or Revenue Bonds; government loans or grants; use of system development charges and system revenue. Each type will be addressed separately.

General Obligation (G.O.) Bonds

This form of debt is backed by the "full faith and credit" of the taxing entity and as the name implies, is a general obligation of the entity. Generally, these types of bonds are obtained at a slightly better interest rate than Revenue Bonds. Issuance of these types of bonds must be approved by a simple majority of the registered voters within the City. Current Oregon statute places a ceiling limitation of G.O. debt which is based on the size of the City as well as the total valuation within the City.

Financing by General Obligation bonds is accomplished by the following procedure:

1. The City's engineer prepares a detailed cost estimate to determine the total funds required for construction.

2. An election is held within the City.

3. When voter approval is granted, bonds are offered for sale and the money for actual design and construction is obtained prior to preparation of final engineering plans and the start of construction.

General Obligation Bonds are usually retired through ad valorem taxation and/or water use revenues. Ad valorem taxation affects all property within the City that will ultimately benefit by the water system, whether the property is presently developed or not. Taxes levied from G.O. Bonds are outside the limits imposed by Measure Five. Construction costs are more equally distributed among all property owners and the program does not impose a penalty on existing residential or business development if they are not benefited. General Obligation Bonds are typically issued for repayment within 20 - 40 years.

Bancroft Act (Improvement Bonds)

Under an Oregon law known as the Bancroft Act, cities and districts may assess a portion of the cost of water lines against the property directly benefited. All property within the assessment area is assessed on an equal basis, regardless of whether it is developed or not. Many communities will assess and allow repayment on a deferred basis. Assessments are applied as a property lien against benefited properties and must be repaid through non-taxing revenues. Many times, cash payments are made by affected property owners and the City issues bonds and levies assessments only on the unpaid balance. If the Improvement Bond Option is taken, the City sells Bancroft Bonds to finance construction costs and the property owner may repay the assessment in 20 semi-annual installments with simple interest. This option is limited by the effect of Measure Five that limits assessments to $10/$1000 assessed value without voter approval. Given the limitations of Improvement Bonds, this type of financing is generally not advantageous for improvements of this type.

Revenue Bonds

This type of debt is backed by the revenues generated by proceeds from the system itself. These bonds constitute a lien against earnings of the utility which they are financing. Bonds may be issued for varying periods of time and at interest rates depending upon the bond market. Bonds are repaid by revenue (after operation and maintenance expenses) derived from the City. The City protects the bond purchasers by agreeing to establish and maintain water rates sufficient to pay the annual bond payment plus a 30 - 50% reserve.

Limited Tax Bond

Under current Oregon law, bonds may be issued and sold up to one-half of one percent of Real Market Value (RMV) of the affected entity without election or vote. Taxes which are levied to meet the debt service, however, are subject to the limits of Measure Five.

Measure 47 Impact

At this time, the potential impact of Measure 47 on the City is not clear due to the anticipated modification by the legislature or possible court review.

Government Loans or Grants

Several government agencies, both state and federal, are available for possible financing of water system improvements:

1. **Rural Economic & Community Development**: The RECD provides financial assistance for water supply and waste disposal facilities in rural areas and towns up to 10,000 people. Borrowers must be unable to obtain needed funds from other sources at reasonable rates and terms; have legal capability to borrow and repay loans, pledge security for loans, and operate the facilities; and be financially sound through taxing, assessments, revenues or other forms of income to pay O & M costs an retire the debt.

Maximum term on a loan is 40 years and loan rates reflect the current market. Current rates in February, 2000 were 4.5% for Poverty level, 5.125% for Intermediate, and 5.75% for market.

2. **Oregon Community Development Block Grant Program (CDBG):** Preference to these grants is given to projects which primarily benefit low and moderate income persons and projects needed to resolve violations of health standards. The maximum grant amount is $500,000 which can include costs relative to right-of-way, engineering, construction, and grant administration.

3. **Special Public Works Fund**: This program provides loan and grant assistance to eligible municipalities or districts for the construction of publicly owned infrastructure needed to create or retain permanent jobs or improve the community's ability to keep or attract business and industry. This type of funding would most likely not be as attractive as others due to the minimum interest rate of 6.5% and documented job creation requirement.

4. **Drinking Water State Revolving Fund (DWSRF)**: The new 1996 amendments to the Safe Drinking Water Act included provisions for funding of new water construction projects. The new law authorizes $8.6 billion dollars through Year 2003 for loans and grants for the United States. The primary purpose of this fund is to make loans to water systems for construction projects to improve health and to meet safe drinking water standards. After State legislative approval, the Oregon Economic Development Dept. (OEDD) will assume administrative responsibility for this program in Oregon. Oregon's allotment for Fiscal Year 1997 is $18.92 million, which is the first year of the funding program that runs through 2003.

Also available for financing consideration are: Water Resources Department Water Development Loan Fund and Economic Development Administration Public Works Grant.

Systems Development Charge(SDC)

Oregon law allows municipalities and service districts the ability to charge a reimbursement system development charge, an improvement system development charge, or a combination of the two. The methodology and implementation of SDC's in Oregon is regulated by Oregon Revised Statues 223.297-314 which became effective on July 1, 1991. The reimbursement SDC is developed to recover the costs of existing capital improvements or improvements under construction. An improvement SDC is designed to recover the costs associated with planned capital improvements. Under current Oregon law, local governments are allowed the ability to assess SDC's for the following types of improvements:

1. Water supply, treatment, and distribution

2. Wastewater collection, transmission, treatment, and disposal.

3. Drainage and flood control

4. Transportation

5. Parks and Recreation

Guidelines for the calculation and implementation of SDC's must follow specific criteria outlined in the Statue and administrative rules. The legislation requires the reimbursement SDC to be established by an ordinance or resolution setting forth the methodology used to calculate the charge. This procedure must consider the cost of existing facilities, prior contributions by existing users, the value of unused capacity, and other relevant factors. The primary objective of the methodology must be that future system users contribute no more than an equitable share of the capital costs of existing facilities.

Additional provisions of the law require the deposit of SDC revenues into dedicated accounts; annual accounting of revenues and expenditures, creation of an administrative appeals procedure to allow a citizen or other interested part the opportunity of challenging an expenditure of SDC revenues, and expenditure of reimbursement fees only on improvements associated with the specific system that the fees were assessed.

Water Rate Comparisons

Table 11-1 indicates water rate comparisons between cities and water districts in the Willamette Valley. This information is included for reference and to assist the city in comparing rates to other water purveyors.

Table 11-1
Water Rate Comparisons (As of 1-1-2000)

City or Water District	1998 Population	Source of Supply (1)	Base Rate (Per Month)	Base Volume	Increasing Unit Rate	Monthly Charge Compared to Monmouth Base Charge (Plus 100 Cubic Feet)	Unit Rate (100 Cubic Feet)
Albany	38,925	SW	$10.30 (Meter)	(+)	$2.11/748 gal.	$12.41	$2.11
Amity	1,315	SW/GW	$14.00	0-2000 gallons	$2.26/1000 gal.	$14.00	$1.69
Aumsville	2,875	GW	$20.00	0-9000 gallons	$1.76/1000 gal.	$20.00	$1.32
Brownsville	1,445	SW	$16.50	0-300 cubic feet	$1.40/100 cubic ft	$16.50	$1.40
Dallas	12,530	SW	$10.30	0-300 cubic feet	$1.10/100 cubic ft	$10.30	$1.10
Dayton	1,920	GW	$20.00	0-600 cubic feet	$.50/50 cubic ft	$20.00	$1.00
Falls City	1,020	SW	$28.00	0-7999gallons	NA	$28.00	----
Gervais	1,370	GW	$18.00	0-1000 cubic ft	$1.00/100 cubic ft	$18.00	$1.00
Indepedence	5,815	GW	$19.50 (Meter)	(+)	$1.33/100 cubic ft	$20.83	$1.33
Jefferson	2,335	SW	$19.00	0-2500 gallons	NA	$19.00	NA
Keizer	29,235	GW	$17.75 (Bi-monthly)	(+)	$.41/100 cubic ft	$18.16	$0.41
Lebanon	12,480	SW	$9.10	(+)	$2.00/100 cubic ft	$11.10	$2.00
Luckiamute Water Co-Op	3,000	GW	$21.56	0-4000 gallons	1.89/1000 gallons	$21.56	$1.41
Lyons-Mehama Water Dist	2,100	SW	$10.00	(+)	$1.30/1000 gallons	$11.30	$0.97
Mill City	1,650	SW	$2.57	748 gallons	$1.00/748 gallons	$2.57	$0.75
Monmouth	**8,310**	**GW**	**$9.95 (Meter)**	**(+)**	**$.81/100 cubic ft**	**$10.76**	**$0.81**
Orchard Heights Water Assoc.	1,000	SW/GW	$16.75 (Membership Fee)	(+)	$1.70/1000 gallons	$18.45	$1.27
Rickreall Water Assoc.	1,280	GW	$10.00	0-3000 gallons	$2.50/1000 gallons	$10.00	$1.87
Salem	126,635	SW	$17.48 (Bi-Monthly)	0-800 cubic ft	$.76/100 cubic ft	$8.74	$0.76
Silverton	6,740	SW	$12.88 (Meter)	(+)	$1.00/100 cubic ft	$13.88	$1.00
Stayton	6,655	SW	$9.50 (Meter)	(+)	$.475/1000 gallons	$9.98	$0.36
Sublimity	2,400	GW	$5.00 (Meter)	(+)	$.79/1000 gallons	$5.79	$0.59
Suburban East Salem W.D.	5,200	SW	$16.10 (Bi-monthly meter charge)	NA	$1.30/1000 gallons	$8.05	$0.97
Turner	1,330	SW	$12.00	0-400 cubic ft	$2.85/100 cubic ft	$12.00	$2.85
Willamina	1,810	SW	$24.50	0-750 cubic ft	$.80/100 cubic ft	$24.50	$0.80
					AVERAGE:	$14.64	$1.21

REFERENCES

City of Monmouth Comprehensive Land Use Plan, 1980

Water System Plan for City of Monmouth
CH2MHill, 1983

City of Monmouth Sewer Master Plan
HBH Consulting Engineers, July, 1999

Oregon Blue Book: 1999-2000
State of Oregon Secretary of State Office

City of Monmouth Sanitary Sewer System Facilities Plan Update
Westech Engineering, 1989

Contents of File: City of Monmouth
Oregon Health Division; 1975-1999

Construction Cost Index
Engineering News Records; March, 1999

Preliminary Design Report on Water Storage Facilities for the City of Monmouth, Oregon
James Montgomery Consulting Engineers, 1978

Operation Logs, Customer Water Billing Summaries, As-Built Records and Drawings
Provided by: City of Monmouth

Water Supply Survey
C&G Engineering, 1977

Water Rights Data and Well Logs
Water Resources Department

Community Water System Source Book-Fifth Edition
Joseph Ameen, 1990

Water Utility Accounting-Third Edition
American Water Works Association; 1995

Willamette Basin Report
Oregon Water Resources Department; 1992

Portland State University, Center for Population R

Long Term Water Supply Source for City of Monmouth
Robert E. Meyer Consulting Engineers, 1978

City of Independence Water System Master Plan
Stettler Company, 1997

Regional Water Supply Plan, Phase I
Cities of Dallas, Monmouth, Independence, and Polk County
CH2MHill Engineers

Regional Water Supply Plan, Phase II
Cities of Dallas, Monmouth, Independence, and Polk County
CH2MHill Consulting Engineers, 1999

City of Monmouth Local Review Order; May, 1998

Contents of Files for City of Monmouth
Stettler Supply Company, 1978-1999

Mailing List for Extension FO Copies

Note: Include a copy of the "Important Notice" document along with the original copy of the Final Order being sent to the permit holder.

FO Date: January 6, 2012

Copies Mailed
By: Connie Dame
(SUPPORT STAFF)
on: 1/6/2012
(DATE)

Application G-13521
Permit G-12976

Original mailed to permit holder:

City of Monmouth ✓
Attn: Russ Cooper
151 W Main St
Monmouth, OR 97361

Copies sent to:

1. WRD - App. File G-13521/ Permit G-12976 ✓
2. WRD – WR Regional Manager, Bill Ferber
   NOTE: Do not send FO's to South Central Region (Kyle Gorman)
   Do not send FO's to Northwest Region (Bill Ferber)
3. BROOKE SALTARELLO, 4B ENGINEERING & CONSULTING, 3700 RIVER RD N, SUITE 2, KEIZER, OR 97303 ✓

Fee paid as specified under ORS 536.050 to receive copy:

4. None

Receiving electronic copy via e-mail (10 AM day of signature date)
(DONE BY EXTENSION SPECIALIST)

5. WRD – Bill Fujii/Lisa Jaramillo – Notify of WMCP needed

   Done by ALR *Date* 1-6-2012

6. WRD – Water Master District 16 – Mike McCord, Salem

   Done by ALR *Date* 1-6-2012

CASEWORKER: ALR

Oregon Water Resources Department
Water Right Services Division

Water Rights Application
Number G-13521

Final Order
Extension of Time for Permit Number G-12976
Permit Holder: City of Monmouth

Permit Information

Application File G-13521/ Permit G-12976
Basin 2 – Willamette Basin / Watermaster District 16
Date of Priority: October 1, 1993

Authorized Use of Water

Source of Water:	Two Wells within the Duck Slough Basin
Purpose or Use:	Municipal
Maximum Rate:	6.0 Cubic Feet per Second (CFS)

Appeal Rights

This is a final order in other than a contested case. This order is subject to judicial review under ORS 183.484. A request for judicial review must be filed within the 60 day time period specified by ORS 183.484(2). Pursuant to ORS 536.075 and OAR 137-004-0080 you may either file for judicial review, or petition the Director for reconsideration of this order. A petition for reconsideration may be granted or denied by the Director, and if no action is taken within 60 days following the date the petition was filed, the petition shall be deemed denied.

Application History

Permit G-12976 was issued by the Department on October 31, 1996. The permit called for completion of construction by October 1, 1998, and complete application of water to beneficial use by October 1, 1999. On October 7, 1999, the City of Monmouth submitted an application to the Department for an extension of time for Permit G-12976. In accordance with OAR 690-315-0050(2), on October 25, 2011, the Department issued a Proposed Final Order proposing to extend the time to complete construction to October 1, 2055 and to extend the time to fully apply

water to beneficial use to October 1, 2055. The protest period closed December 9, 2011, in accordance with OAR 690-315-0060(1). No protest was filed.

The Department adopts and incorporates by reference the Proposed Final Order dated October 25, 2011.

At time of issuance of the Proposed Final Order the Department concluded that, based on the factors demonstrated by the applicant, the permit may be extended subject to the following conditions:

CONDITIONS

1. Development Limitations

Diversion of any water under Permit G-12976 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86. The required WMCP shall be submitted to the Department within 3 years of an approved extension application. Use of water under Permit G-12976 must be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 on file with the Department.

The deadline established in the Extension Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders

2. Conditions to Maintain the Persistence of Listed Fish

A. Minimum Fish Flows Needs

Minimum fish flow needs in the Willamette River as recommended by ODFW are in Table 1, below; flows are to be measured in the Willamette River at Salem, Oregon (USGS Gage Number 14191000, or its equivalent).

Table 1

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
Month	Cubic Feet per Second
July 1– August 31[1]	5,630
September 1 – October 31	5,630

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 –April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

[1] A condition on the permit allows the use of water during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

B. Determining Water Use Reductions - Generally

The undeveloped portion of water under G-12976 having PSI with the Willamette River is 2.53 cfs during the months of June through November, and 4.84 cfs during the months of December through May. The maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is determined in proportion to the amount by which the flows shown in Table 1 are missed based on a seven day rolling average of mean daily flows measured in the Willamette River at Salem (USGS Gage Number 14191000, or its equivalent). The percent of missed target flows is defined as:

$$(1 - (Q_A / Q_T)) \times 100\%,$$

where Q_A is the actual flow measured at the designated gage based on the seven day rolling average, and Q_T is the target flow (from Table 1).

The percent missed target flows applied to the undeveloped portion of this permit having PSI with the Willamette River provides the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition, and is defined as:

$$E_{PSI} - (E_{PSI} \times \% \text{ missed target flows}),$$

where E_{PSI} is undeveloped portion of the permit as of this extension having PSI with the Willamette River, being 2.53 cfs June through November, and 4.84 cfs December through May.

The maximum amount of water that can be appropriated as a result of this persistence condition may be adjusted by a Consumptive Use Percentage, when

applicable, as per Item 2.C., below. The overall reduction to the amount of the undeveloped portion having PSI with the Willamette River of the permit will not exceed 20%.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages
The City of Monmouth has not identified any Consumptive Use Percentages based on the return of flows to the Willamette River through effluent discharge. Thus, at this time the City may not utilize Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages
Utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 2.C.f., below.

Consumptive Use Percentages submitted to the Department for review must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates
Continuing the utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition beyond an approval period (as described in 2.C.f., below) is contingent upon the City submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 2.C.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and

(2) include a description and justification of the methods utilized to determine the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices

If there are changes to either wastewater technology or the practices at the City's waster water treatment facility resulting in 25% or more reductions in average monthly return flows to the Willamette River, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to the Willamette River as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 2.C.f., below.

If such changes to either wastewater technology or the practices at the City's waster water treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

e. Relocation of the Point(s) of Appropriation (s) and/or Return Flows

If the point(s) of appropriation(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

After relocation of the point(s) of appropriation(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages

The utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may continue for a 10 year approval period that begins 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 2.C.d., or

2.C.e. (above) are applicable.

Consumptive Use Percentages (first time utilization or updates) which are submitted and receive the Director's concurrence will begin a new 10 year approval period. The approval period begins on the date of the Water Resources Director's concurrence with Consumptive Use Percentages Updates, as evidenced by the record. The City at its discretion may submit updates prior to the end of an approval period.

D. Examples

Example 1: Target flow met

On June 20, the last seven mean daily flows were 9500, 9200, 9000, 8500, 8750, 7500 and 7250 cfs. The seven day rolling average (Q_A) is 8528 cfs. The amount of the undeveloped portion of the permit having PSI with the Willamette River that can be appropriated would not be reduced because the 7 day average of mean daily flows is greater than the 8500 cfs target flows (Q_T) for June 20.

Example 2: Target flow missed.

Step 1: If on June 20, the average of the last seven mean daily flows was 7200 cfs, and the target flow is 8500 cfs, then the target flow would be missed by 15.3%.

$$(1 - (7200 / 8500)) \times 100\% = 15.3\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%[1] during the month of June and the utilization of this percentage is authorized, and the target flow is missed by 15.3% (from Step 1), then the amount of the undeveloped portion of the permit having PSI with the Willamette River that could be appropriated would be reduced by 12.0%.

$$(78.7\% \times 15.3\%) / 100 = 12.0\%$$

(If adjustments are not to be made by a Consumptive Use Percentage, then the undeveloped portion of the permit having PSI with the Willamette River would only be reduced by the % by which the target flow is missed – 15.3% in this example).

Step 3: The overall reduction of 12% of the amount of the undeveloped portion of the permit having PSI with the Willamette River does not exceed

[1] Currently, the City of Monmouth may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7% is only for illustrative purposes in this example.

20%.

Step 4: The undeveloped portion of this permit having PSI with the Willamette River (E_{PSI}) during June is 2.53 cfs. Therefore, in this example, the maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is 2.23 cfs.

$$2.53 - ((2.53 \times 12.0\%) / 100) = 2.23$$

Step 5: Given that the entire permit, being 6.0 cfs, is undeveloped and the undeveloped portion having PSI with the Willamette River in June is 2.53 cfs, if the amount of water legally authorized for appropriation at a given point in time (for example, authorization provided through a WMCP) is 4.0 cfs, then 0.53 cfs of the undeveloped water having PSI with the Willamette River would be used to satisfy the 4.0 cfs.

$$4.0 - (6.0 - 2.53) = 0.53$$

Note: (6.0 – 2.53) equals the undeveloped portion of the permit not having PSI

In this example, the 0.53 cfs of undeveloped water having PSI with the Willamette River is less than the 2.23 cfs maximum undeveloped portion of the permit having PSI with the Willamette River (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, there would be no required reduction in water use of the undeveloped portion under the permit.

Step 6: If the amount of water legally authorized for appropriation at a given point in time is 6.0 cfs, then 2.53 cfs of undeveloped water having PSI with the Willamette River would be used to satisfy the 6.0 cfs.

$$6.0 - (6.0 - 2.53) = 2.53$$

In this example, the 2.53 cfs of undeveloped water is greater than the 2.23 cfs maximum undeveloped portion having PSI with the Willamette (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, the amount of undeveloped water (having PSI with the Willamette River) appropriated would need to be reduced by 0.30 cfs.

$$2.53 - 2.23 = 0.30$$

In this example, the maximum amount of water that could be appropriated is 5.70 cfs.

$$6.0 - 0.30 = 5.70$$

E. Relocation of the Point(s) of Appropriation (s) and New Quantification of PSI.

Any relocation of the point(s) of appropriation(s) through a permit amendment or transfer process will require a new OWRD ground water review pursuant to OAR Chapter 690 Division 9 to determine if use of water at the relocated point(s) of appropriation(s) has the potential for substantial interference (PSI) with surface water. This review will be used to quantity a new value for E_{PSI}, being the undeveloped portion of the permit as of this extension having PSI with the surface water based on the new locations of the point(s) of appropriation(s). The new value for E_{PSI} will be then utilized in the calculations for determining the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition.

The applicant has demonstrated good cause for the permit extension pursuant to ORS 537.630, 539.010(5) and OAR 690-315-0080(3).

Order

The extension of time for Application G-13521, Permit G-12976, therefore, is approved subject to conditions contained herein. The deadline for completing construction is extended from October 1, 1998 to October 1, 2055. The deadline for applying water to full beneficial use within the terms and conditions of the permit is extended from October 1, 1999 to October 1, 2055.

DATED: January 6, 2012

Dwight French, Water Right Services Division Administrator *for*
PHILLIP C. WARD, DIRECTOR

If you have any questions about statements contained in this document, please contact Ann Reece at (503) 986-0827.

If you have other questions about the Department or any of its programs, please contact our Water Resources Customer Service Group at (503) 986-0900.

IMPORTANT NOTICE

for holders of ground water permits

Oregon law requires that you hire a Certified Water Rights Examiner to survey the use that you make under your permit. This survey must be submitted to the Salem office of the Water Resources Department no later than one year after the completion dated allowed by your extension. *[See ORS 537.630(4)]*

ORS 537.630

1) Except for the holder of a permit for municipal use, the holder of a permit issued pursuant to ORS 537.625 shall prosecute the construction of a well or other means of developing and securing the ground water with reasonable diligence and complete the construction within a reasonable time fixed in the permit by the Water Resources Department, not to exceed five years after the date of approval of the application. However, the department, for good cause shown, shall order and allow an extension of time, including an extension beyond the five-year period, for the completion of the well or other means of developing and securing the ground water or for complete application of water to beneficial use. In determining the extension, the department shall give due weight to the considerations described under ORS 539.010 (5) and to whether other governmental requirements relating to the project have significantly delayed completion of construction or perfection of the right.

(2) The holder of a permit for municipal use shall commence and complete the construction of any proposed works within 20 years from the date on which the permit for municipal use is issued under ORS 537.625. The construction must proceed with reasonable diligence and be completed within the time specified in the permit, not to exceed 20 years. However, the department may order and allow an extension of time to complete construction or to perfect a water right beyond the time specified in the permit under the following conditions:

(a) The holder shows good cause. In determining the extension, the department shall give due weight to the considerations described under ORS 539.010 (5) and to whether other governmental requirements relating to the project have significantly delayed completion of construction or perfection of the right;

(b) The extension of time is conditioned to provide that the holder may divert water beyond the maximum rate diverted for beneficial use before the extension only upon approval by the department of a water management and conservation plan; and

(c) For the first extension issued after the effective date of this 2005 Act for a permit for municipal use issued before November 2, 1998, the department finds that the undeveloped portion of the permit is conditioned to maintain, in the portions of waterways affected by water use under the permit, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law. The department shall base its finding on existing data and upon the advice of the State Department of Fish and Wildlife. An existing fish protection agreement between the permit holder and a state or federal agency that includes conditions to maintain the persistence of any listed fish species in the affected portion of the waterway is conclusive for purposes of the finding.

(3) If the construction of any well or other means of developing and securing the ground water is completed after the date of approval of the application for a permit under ORS 537.625, within 30 days after the completion, or if the construction is completed before the date of approval, within 30 days after the date of approval, the permit holder shall file a certificate of completion with the Water Resources Department, disclosing:

(a) The depth to the water table;

(b) The depth, diameter and type of each well, and the kind and amount of the casing;

(c) The capacity of the well pump in gallons per minute and the drawdown thereof;

(d) The identity of the record owner of any property that was described in the application for a permit under ORS 537.625 but is not included in the certificate of completion; and

(e) Any other information the department considers necessary.

(4) Upon completion of beneficial use necessary to secure the ground water as required under this section, the permit holder shall hire a water right examiner certified under ORS 537.798 to survey the appropriation. Within one year after applying the water to beneficial use or the beneficial use date allowed in the permit, the permit holder shall submit the survey as required by the Water Resources Department to the department along with the certificate of completion required under subsection (3) of this section. If any property described in the permit is not included in the request for a water right certificate, the permittee shall state the identity of the record owner of that property.

(5) After the department has received a certificate of completion and a copy of the survey as required by subsections (3) and (4) of this section that show, to the satisfaction of the department, that an appropriation has been perfected in accordance with the provisions of ORS 537.505 to 537.795 and 537.992, the department shall issue a ground water right certificate of the same character as that described in ORS 537.700. The certificate shall be recorded and transmitted to the applicant as provided in ORS 537.700.

(6) The procedure for cancellation of a permit shall be as provided in ORS 537.260.

(7) Notwithstanding ORS 537.410, for purposes of obtaining a water right certificate under subsection (5) of this section for a supplemental water right, the permittee shall have a facility capable of handling the full rate and duty of water requested from the supplemental source and be otherwise ready, willing and able to use the amount of water requested, up to the amount of water approved in the water right permit. To obtain a certificate for a supplemental water right, the permittee is not required to have actually used water from the supplemental source if:

(a) Water was available from the source of the primary water right and the primary water right was used pursuant to the terms of the primary water right; or

(b) The nonuse of water from the supplemental source occurred during a period of time within which the exercise of the supplemental water right permit was not necessary due to climatic conditions.

Oregon Water Resources Department
Water Right Services Division

Application for Extension of Time

In the Matter of the Application for an Extension of Time for Permit G-12976, Water Right Application G-13521, in the name of the City of Monmouth	)))	PROPOSED FINAL ORDER

Permit Information

Application File G-13521/ Permit G-12976
Basin 2 – Willamette Basin / Watermaster District 16
Date of Priority: October 1, 1993

Authorized Use of Water

Source of Water:	Two Wells within the Duck Slough Basin
Purpose or Use:	Municipal
Maximum Rate:	6.0 Cubic Feet per Second (CFS)

This Extension of Time request is being processed in accordance with Oregon Administrative Rule Chapter 690, Division 315.

Please read this Proposed Final Order in its entirety as it contains additional conditions not included in the original permit.

This Proposed Final Order applies only to Permit G-12976, water right Application G-13521. A copy of Permit G-12976 is enclosed as Attachment 1.

Summary of Proposed Final Order for Extension of Time

The Department proposes to:

- Grant an extension of time to complete construction of the water system from October 1, 1998 to October 1, 2055.
- Grant an extension of time to apply water to full beneficial use from October 1, 1999 to October 1, 2055.
- Make the extension of time subject to certain conditions as set forth below.

ACRONYM QUICK REFERENCE

Department – Oregon Department of Water Resources
City – City of Monmouth
ODFW – Oregon Department of Fish and Wildlife
PFO – Proposed Final Order
WMCP – Water Management and Conservation Plan

Units of Measure
cfs – cubic feet per second
gpm – gallons per minute

AUTHORITY

Generally, see ORS 537.630 and OAR Chapter 690 Division 315.

ORS 537.630(2) provides in pertinent part that the Oregon Water Resources Department (Department) may, for good cause shown, shall order and allow an extension of time, for the completion of the well or other means of developing and securing the ground water or for complete application of water to beneficial use. In determining the extension, the department shall give due weight to the considerations described under ORS 539.010 (5) and to whether other governmental requirements relating to the project have significantly delayed completion of construction or perfection of the right.

ORS 539.010(5) provides in pertinent part that the Water Resources Director, for good cause shown, may extend the time within which the full amount of the water appropriated shall be applied to a beneficial use. This statute instructs the Director to consider: the cost of the appropriation and application of the water to a beneficial purpose; the good faith of the appropriator; the market for water or power to be supplied; the present demands therefore; and the income or use that may be required to provide fair and reasonable returns upon the investment.

OAR 690-315-0080 provides in pertinent part that the Department shall make findings to determine if an extension of time for municipal and/or quasi-municipal water use permit holders may be approved to complete construction and/or apply water to full beneficial use. Under specific circumstances, the Department may condition extensions of time for municipal water use permit holders to provide that use of the undeveloped portion of the permit maintains the persistence of listed fish species in the portions of the waterways affected by water use under the

permit.

OAR 690-315-0090(3) authorizes the Department, under specific circumstances, to condition an extension of time for municipal and/or quasi-municipal water use permit holders to provide that diversion of water beyond the maximum rate diverted under the permit or previous extension(s) shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan under OAR Chapter 690, Division 86.

FINDINGS OF FACT

Background

1. Permit G-12976 was granted by the Department on October 31, 1996. The permit authorizes the use of up to 6.0 cfs of water from two Wells within the Duck Slough Basin, for municipal use. It specified that construction of the water development project was to be completed by October 1, 1998, and that complete application of water was to be made on or before October 1, 1999.

2. The permit holder, the City of Monmouth (City), submitted an "Application for Extension of Time" to the Department on October 7, 1999, requesting the time to complete construction of the water system be extended from October 1, 1998 to October 1, 2002 and the time to apply water to full beneficial use under the terms and conditions of Permit G-12976 be extended from October 1, 1999 to October 1, 2002. This is the first extension of time request for Permit G-12976.

3. Due to an ongoing permit extension rulemaking, the Department placed all pending Applications for Extension of Time for municipal and quasi-municipal permits on hold and did not require municipal and quasi-municipal water use permit holders to submit Applications for Extension of Time until the new rules were adopted.

4. Municipal and quasi-municipal water use permit extension rules OAR 690-315-0070 through 690-315-0100 were adopted on November 1, 2002, amended, filed with the Secretary of State, and became effective on November 22, 2005.

5. On March 26, 2003, the City submitted an amended "Application for Extension of Time," consistent with the revised OAR Chapter 690 Division 315 rules governing extensions of time for municipal and quasi-municipal water use permits. The amendment requested the extended time to complete construction and apply water to full beneficial use be changed from October 1, 2002 to October 1, 2014. Clarifications to this amended application were submitted on May 3, 2005.

6. Notification of the City's Application for Extension of Time for Permit G-12976 was published in the Department's Public Notice dated April 1, 2003. No public comments were received regarding the extension application.

7. On August 24, 2011, August 31, 2011, and October 11, 2011, the permit holder amended and updated their Application for Extension of Time. The amendments ultimately

requested the extended time to complete construction and apply water to full beneficial use be changed from October 1, 2014 to October 1, 2055.

Review Criteria for Municipal Quasi-Municipal Water Use Permits *[OAR 690-315-0080(1)]*
The time limits to complete construction and/or apply water to full beneficial use may be extended if the Department finds that the permit holder has met the requirements set forth under OAR 690-315-0080. This determination shall consider the applicable requirements of ORS 537.230[1], 537.630[2] and/or 539.010(5)[3]

Complete Extension of Time Application *[OAR 690-315-0080(1)(a)]*

8. On October 7, 1999, the Department received a completed Application for Extension of Time and the fee specified in ORS 536.050 from the permit holder.

Start of Construction *[OAR 690-315-0080(1)(b)]*

9. Permit G-12976 was issued prior to June 29, 2005; therefore, the applicant is not required to provide evidence of actions taken to begin actual construction of the project.[4]

Duration of Extension *[OAR 690-315-0080(1)(c) and (1)(d)]*
Under OAR 690-315-0080(1)(c),(d), in order to approve an extension of time for municipal and quasi-municipal water use permits the Department must find that the time requested is reasonable and the applicant can complete the project within the time requested.

10. The remaining work to be accomplished under Permit G-12976 consists of transferring the points of appropriation to the Willamette Wellfield through the permit amendment process, installing required filter/UV equipment and booster pumps, adding 1-3 wells to the Willamette Wellfield, and completing construction of the water system and applying water to full beneficial use.

11. As of August 24, 2011, the permit holder has not appropriated any of the 6.0 cfs of water authorized under Permit G-12976 for municipal purposes. There is an undeveloped portion of 6.0 cfs of water under Permit G-12976 as per OAR 690-315-0010(6)(g).

12. In addition to the 6.0 cfs of water from the two wells authorized under Permit G-12976, the City holds the following rights:

- Permit G-8579 for 5.0 cfs of water from two wells within the Willamette River Basin;
- Certificate 39278 for 1.27 cfs of water, being 0.56 cfs from Well 1, 0.33 cfs from Well 2, and 0.38 cfs from Well 3, all within the Willamette River Basin;
- Certificate 62436 for 0.88 cfs of water, being 0.55 cfs from Well 4, 0.33 cfs from Well 5, all within the Willamette River Basin;

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[1] ORS 537.230 applies to surface water permits only.

[2] ORS 537.630 applies to ground water permits only.

[3] ORS 537.010(5) applies to surface water and ground water permits.

[4] Section 5, Chapter 410, Oregon Laws 2005 and OAR 690-315-0070(1)(d).

- Permit S-54332 for 4.46 cfs of water from the Willamette River, tributary to the Columbia River;
- Certificate 11656 for 0.3 cfs of water from overflow from Falls City Reservoir, tributary to Teal Creek;
- Certificate 11662 for 1.0 cfs of water from unnamed springs, tributary to Teal Creek;
- Certificate 15055 for 0.25 cfs of water from an unnamed spring, tributary to Teal Creek;
- Certificate 16992 for 1.0 cfs of water from two unnamed streams, tributaries of Teal Creek;
- Certificate 36021 for 0.61 cfs of water from Teal Creek, a tributary of the Little Luckiamute River;
- Certificate 49729 for 0.45 cfs of water from Teal Creek, a tributary of the Little Luckiamute River; and
- Certificate 45801 for 0.13 cfs of water from Teal Springs, tributary to Teal Creek.

The City's water right certificates and permits total 21.35 cfs of water, being 13.15 cfs of ground water, and 8.2 cfs of live flow (surface) water. The City of Monmouth has not yet made beneficial use of 12.12 cfs of water, being 6.0 cfs of water under Permit G-12976, 1.66 under Permit G-8579, and 4.46 cfs of water under Permit S-54332. According to the City, they are not currently exercising any of their surface water rights, or using wells authorized under Permit G-4087 or G-12976.

13. According to the City, their peak water demand within its service area boundaries was 3.69 cfs in 2010.

14. According to the City, in 2010, the population within the service boundary of the City of Monmouth was 9,545. The City of Monmouth anticipates the population to increase at an estimated growth rate of 3 percent per year, reaching an estimated population of 36,185 by the year 2055.

15. According to the City, their peak day demand is projected to be approximately 14.51 cfs of water by the year 2055.

16. Full development of Permit G-12976 is needed to address the present and future water demand of the City, including system redundancy and emergency use.

17. The City's request for an extension of time until October 1, 2055, to complete construction of the water system and to apply water to full beneficial use under the terms and conditions of Permit G-12976 is both reasonable and necessary.

Good Cause *[OAR 690-315-0080(1)(e) and (3)(a-g)and (4)]*

The Department's determination of good cause shall consider the requirements set forth under OAR 690-315-0080(3) and OAR 690-315-0080(4).

Reasonable Diligence and Good Faith of the Appropriator *[OAR 690-315-0080(3)(a),(3)(c) and (4)]*
Reasonable diligence and good faith of the appropriator must be demonstrated during the permit period or prior extension period as a part of evaluating good cause in determining whether or not to grant an extension. In determining the reasonable diligence and good faith of a municipal or quasi-municipal water use permit holder, the Department shall consider activities associated with the development of the right including, but not limited to, the items set forth under OAR 690-315-0080(4) and shall evaluate how well the applicant met the conditions of the permit or conditions of a prior extension period.

18. Work was accomplished (specified in the Application for Extension of Time) during the original development time frame under Permit G-12976.

19. Since the October 1, 1999, the City prepared a 2000 Water System Master Plan, prepared a 2004 Technical Report on the Buena Vista Well 1 and Well Test #2, and received approval for a plan to monitor and report impacts to water levels under Permit G-12976.

20. According to the City, as of August 24, 2011, they have invested approximately $95,000, which is approximately 8.7 percent of the total projected cost for complete development of this project. The City anticipates an additional $1,000,000 investment is needed for the completion of this project. The Department recognizes that while some of these investment costs are unique to construction and development solely under G-12976, other costs included in this accounting are not partitioned out for G-12976 because (1) they are incurred under the development of a water supply system jointly utilized under other rights held by the City, and/or (2) they are generated from individual activities counted towards reasonable diligence and good faith as listed in ORS 690-315-0080(4) which are not associated with just this permit, but with the development and exercise of all the City's water rights.

21. Since the issuance of Permit G-12976 on October 31, 1996, no water been appropriated for beneficial municipal purposes under the terms of this permit.

22. The Department has considered the City's compliance with conditions and did not identify any concerns.

Cost to Appropriate and Apply Water to a Beneficial Purpose *[OAR 690-315-0080(3)(b)]*

23. According to the City, as of August 24, 2011, they have invested approximately $95,000, which is 8.7 percent of the total projected cost for complete development of this project. The City anticipates an additional $1,000,000 investment is needed for the completion of this project.

The Market and Present Demands for Water *[OAR 690-315-0080(3)(d)]*

24. As described in Findings 11 through 16 above, the City has indicated, and the Department finds that the City must rely on full development of their Permit G-12976.

25. The City projects a population increase, on average, of 3 percent per year over a forty-five year period, being the year's 2010 to2055.

26. Given the current water supply situation of the City, including current and expected

demands, the need for system redundancy, and emergency water supply, there is a market and present demand for the water to be supplied under G-12976.

27. OAR 690-315-0090(3) requires the Department to place a condition on this extension of time to provide that diversion of any water under Permit G-12976 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86. A "Development Limitation" condition" is specified under Item 1 of the "Conditions" section of this PFO to meet this requirement.

Fair Return Upon Investment *[OAR 690-315-0080(3)(e)]*

28. Use and income from the permitted water development project would result in reasonable returns upon the investment made in the project to date.

Other Governmental Requirements *[OAR 690-315-0080(3)(f)]*

29. Delays caused by any other governmental requirements in the development of this project have not been identified.

Events which Delayed Development under the Permit *[OAR 690-315-0080(3)(g)]*

30. Delay of development under Permit G-12976 was due, in part, poor water quality in the Buena Vista/Duck Slough well field, and to the size and scope of the municipal water system, which was designed to be phased in over a period of years.

Maintaining the Persistence of Listed Fish Species *[OAR 690-315-0080(1)(f) and (2)]*
The Department's determination regarding maintaining the persistence of listed fish species shall be based on existing data and advice of the Oregon Department of Fish and Wildlife (ODFW). The determination shall be limited to impacts related to stream flow as a result of use of the undeveloped portion of the permit and further limited to where, as a result of use of the undeveloped portion of the permit, ODFW indicates that stream flow would be a limiting factor for the subject listed fish species.

31. On February 27, 2006, and September 7, 2011, the Water Resources Department determined under OAR Chapter 690 Division 9, that use of water under this ground water Permit G-12976 has the potential for substantial interference with surface water. The Department determined that use undeveloped portion of Permit G-12976, being 6.0 cfs, will result in 2.53 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is not hydraulically connected to the Willamette River which typically occurs June through November, and will result in 4.84 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is hydraulically connected to the Willamette River which typically occurs December through May.

32. The pending municipal Application for Extension of Time for Permit G-12976 was delivered to ODFW on February 2, 2012, for ODFW's review under OAR-690-315-0080.

33. Notification that the pending municipal Application for Extension of Time for Permit G-

12976 was delivered to ODFW for review was sent to the City on April 29, 2010.

34. Notification that the pending municipal Application for Extension of Time for Permit G-12976 was delivered to ODFW for review was published in the Department's Public Notice dated May 4, 2010. No public comments were received regarding this notice.

35. On February 8, 2011, the Department received ODFW's Division 315 Fish Persistence Evaluation for Permit G-12976.

36. Summary and Excerpts of Advice from ODFW:

Use of water under the portion of this permit that is undeveloped as of the date of the extension final order and is found to have the Potential for Substantial Interference (PSI) with the Willamette River should be conditioned to maintain, in the portions of waterways affected by water use under the permit, the persistence of listed fish species. ODFW has determined that the Willamette River will be affected by water use under this permit. ODFW's advice is based on the best available information and existing data.

ODFW recognizes that long term climatic variations will affect the amount of water the USACE will be able to release in any given year. In favorable water years, fish populations tend to increase and in unfavorable water years, fish populations contract. Climate change is likely to cause a long-term reduction in the frequency of favorable water years. The long term objective for a listed species is to have the population increase to a sustainable level over time and to be able to maintain itself through natural fluctuations in the environment.

The streamflows, in Table 1, below, are ODFW's recommended flows measured at Salem, Oregon, for maintaining the persistence of listed fish species in the Willamette River. ODFW advises the Water Resources Department to develop conditions that allow municipalities to meet their water needs while maintaining the persistence of listed fish species. Such conditions would apply if the USACE is not able to maintain the recommended fish flows.

The severity of the measures to be taken by the permit holder should reflect the degree to which the recommended streamflows are being missed and the percentage of water that is withdrawn by the municipality as compared to the overall streamflow level, and be adjusted by the ratio of water withdrawn to water being returned directly to the Willamette River through effluent discharges.

Table 1

ODFW'S RECOMMENDED MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT SALEM, OREGON	
Month	Cubic Feet per Second
July 1 – October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000 – 19,200
April 16 – April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

Streamflow Measurement Point

After analysis of flow records and how the USACE stores and releases water from its facilities to meet mainstem Willamette target flows, ODFW has determined that measuring flows at the Salem gage is sufficient for ensuring flows to maintain the persistence of listed fish are met throughout the mainstem Willamette River. Therefore, ODFW advises the Department to establish the Salem gage as the point for determining whether fish flows are being met for this municipal permit extension.

37. Department's Findings Based on Review of ODFW's Advice:

The Department is proposing conditions in this extension of time consistent with ODFW's advice (*See* Item 1 of the "Conditions" section of this PFO). There is an undeveloped portion of 6.0 cfs of water under Permit G-12976 as per OAR 690-315-0010(6)(g). Authorization to use any water under this permit can only be granted through the Department's review and approval of the municipal permit holder's future WMCPs (OAR 690-086). When ODFW's recommended target flows are missed, the Department's proposed conditions may result in a reduction in the amount of the undeveloped portion of water under Permit G-12976 having PSI with the Willamette River that can be appropriated. The proposed conditions in this extension of time are based on the following findings:

a. As determined by the Department on February 27, 2006, and September 7, 2011, use of the undeveloped portion of this permit, being 6.0 cfs, will result in 2.53 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is not hydraulically connected to the Willamette River which typically occurs June through November, and will result in 4.84 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is hydraulically connected to the Willamette River which typically occurs December through May. For the purpose of conditioning this permit to

maintain the persistence of fish, the Department finds that the amount of the undeveloped portion of water under G-12976 having PSI with the Willamette River is 2.53 cfs during the months of June through November, and 4.84 cfs during the months of December through May.

b. The streamflows needed to maintain the persistence of fish must be measured at Salem, Oregon, USGS GAGE No.14191000, or its equivalent.

c. From April 1 through April 15, the target flow is expressed as a range. Because these flows are the "Recommended Fish flow Minimums" the lesser number in the range (15,000 cfs) is used in developing conditions to maintain the persistence of fish species.

d. When target flows are missed, use of the undeveloped portion of the permit that impacts Willamette River surface water may need to be reduced in proportion to the degree to which the recommended streamflows are being missed. ODFW's formula for determining the percent shortfall, or missed target flows in the Willamette River is defined as:

$$1 - (Q / Q_T),$$

where Q is the flow at the point of interest, and Q_T is the target flow (from Table 1).

e. For the period of April through June, ODFW's advice recognized that the main influence on river flow levels is federal management of the dams and release of surplus storage water to meet listed fish flow needs. The advice also noted that withdrawal of water in the spring months will have minimal overall impact on streamflows. The full use of the undeveloped portion of Permit G-12976 represents a very small fraction of the April-June recommended streamflows in the Willamette River at Salem.

For the period of July through October, ODFW's advice recognized that the main influence on river flow levels continues to be the federal management of the dams. While the advice noted that withdrawal of water in these summer-fall months will have a proportionally greater effect on flows, it represents an only slightly higher impact compared to the April-June impact; the full use of the undeveloped portion of Permit G-12976 represents a higher, but still small fraction of the July-October recommended streamflows in the Willamette River at Salem.

In most years, late fall and winter flows are much higher than the recommended flows during this time period.

Therefore, consistent with ODFW's advice that the main influence of river flow levels is the federal management of the dams and that the severity of the measures to be taken by the permit holder should reflect the percentage of water that is

withdrawn by the municipality as compared to the overall streamflow level, the Department proposes to limit any overall reduction to the undeveloped portion having PSI with the Willamette River to no more than 20 percent of the undeveloped portion having PSI with the Willamette River.

f. ODFW's advice recognizes that municipalities may return a certain amount of flow to a river or stream through their effluent discharge. If the withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, then ODFW recommends that any reduction to use of the amount of the undeveloped portion of Permit G-12976 that impacts Willamette River surface water should be adjusted by the monthly estimated percentage of the difference between the total water withdrawals and their return flows. Therefore, consistent with ODFW's advice, when appropriate, the Department proposes to adjust any reduction by a "Consumptive Use Percentage," as generally determined by (1- [total municipal wide returned flows/ total municipal wide appropriated flows]).

38. The Department finds, based on ODFW's advice, that in the absence of conditions, the use of the undeveloped portion of Permit G-12976 that impacts Willamette River surface water will not maintain the persistence of listed fish species in the portions of the waterways affected by water use under the permit, and as a result of the use of the undeveloped portion of the permit with surface water impacts, streamflow would be a limiting factor for the listed fish species.

39. Based on ODFW's advice, the Department proposes to require conditions to maintain, in the portions of the waterways affected by water use under Permit G-12976, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law. (See Item 2 of the "Conditions" section of this PFO.)[5]

40. On September 20, 2011, ODFW notified the Department that the proposed "Conditions to Maintain the Persistence of Listed Fish" for Permit G-12976 are consistent with their advice.

41. On September 21, 2011, the Department notified the City as per OAR 690-315-0080(2)(f) of ODFW's written advice and the "Conditions to Maintain the Persistence of Listed Fish" proposed in this PFO for the pending municipal Application for Extension of Time for Permit G-12976.

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[5] The Department, based on advice from the ODFW, has determined that the conditions contained in this PFO are appropriate for this extension. In other municipal extensions that require conditions to maintain the persistence of listed species, different conditions may be warranted depending on the advice received from ODFW and communications with the particular extension applicant.

CONCLUSIONS OF LAW

1. The City is entitled to apply for an extension of time to complete construction and/or completely apply water to the full beneficial use pursuant to ORS 537.630(2).

2. The City has submitted a complete extension application form and the fee specified under ORS 536.050(1)(k), as required by OAR 690-315-0080(1)(a).

3. Pursuant to Section 5, Chapter 410, Oregon Laws 2005, the permit holder is not required to demonstrate that actual construction of the project began within one year of the date of issuance of the permit, as otherwise required by OAR 690-315-0080(1)(b).

4. The time requested to complete construction and apply water to full beneficial use is reasonable, as required by OAR 690-315-0080(1)(c).

5. Completion of construction and full application of water to beneficial use can be completed by October 1, 2055[6] pursuant to OAR 690-315-0080(1)(d).

6. The Department has considered the reasonable diligence and good faith of the appropriator, the cost to appropriate and apply water to a beneficial purpose, the market and present demands for water to be supplied, the financial investment made and the fair return upon the investment, the requirements of other governmental agencies, and unforeseen events over which the water right permit holder had no control, and the Department has determined that the City has shown good cause for an extension of time to complete construction of the water system and to apply the water to full beneficial use pursuant to OAR 690-315-0080(1)(e).

7. As required by OAR 690-315-0090(3) and as described in Finding 27, above, and specified under Item 1 of the "Conditions" section of this PFO, the diversion of any water under Permit G-12976 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan under OAR Chapter 690, Division 86.

8. In accordance with In accordance with OAR 690-315-0080(1)(f), and as described in Findings 31 through 41, above, the persistence of listed fish species will not be maintained in the portions of the waterways affected by water use under this municipal use permit of the undeveloped portion with surface water impacts, in the absence of special conditions. Therefore, the diversion of any water beyond under Permit G-12976 will be subject to the conditions specified under Item 2 of the "Conditions" section of this PFO.

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6 For permits applied for or received on or before July 9, 1987, upon complete development of the permit, you must notify the Department that the work has been completed and either: (1) hire a water right examiner certified under ORS 537.798 to conduct a survey, the original to be submitted as required by the Department, for issuance of a water right certificate; or (2) continue to appropriate water under the water right permit until the Department conducts a survey and issues a water right certificate under ORS 537.625.

Proposed Order

Based upon the foregoing Findings of Fact and Conclusions of Law, the Department proposes to issue an order to:

extend the time to complete construction of the water system under Permit G-12976 from October 1, 1998 to October 1, 2055.

extend the time to apply the water to beneficial use under Permit G-12976 from October 1, 1999 to October 1, 2055.

Subject to the following conditions:

CONDITIONS

1. **Development Limitations**
Diversion of any water under Permit G-12976 shall only be authorized upon issuance of a final order approving a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86. The required WMCP shall be submitted to the Department within 3 years of an approved extension of time application. Use of water under Permit G-12976 must be consistent with this and subsequent WMCP's approved under OAR Chapter 690, Division 86 that is on file with the Department.

The deadline established in the Extension Final Order for submittal of a WMCP shall not relieve a permit holder of any existing or future requirement for submittal of a WMCP at an earlier date as established through other orders of the Department. A WMCP submitted to meet the requirements of this order may also meet the WMCP submittal requirements of other Department orders.

2. **Conditions to Maintain the Persistence of Listed Fish**

A. Minimum Fish Flow Needs
Minimum fish flow needs in the Willamette River as recommended by ODFW are in Table 2, below; flows are to be measured in the Willamette River at Salem, Oregon (USGS Gage Number 14191000, or its equivalent).

Table 2

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
Month	Cubic Feet per Second
July 1– August 31[1]	5,630
September 1 – October 31	5,630

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 –April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

[1] A condition on the permit allows the use of water during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

B. Determining Water Use Reductions - Generally

The undeveloped portion of water under G-12976 having PSI with the Willamette River is 2.53 cfs during the months of June through November, and 4.84 cfs during the months of December through May. The maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is determined in proportion to the amount by which the flows shown in Table 2 are missed based on a seven day rolling average of mean daily flows measured in the Willamette River at Salem (USGS Gage Number 14191000, or its equivalent). The percent of missed target flows is defined as:

$$(1 - (Q_A / Q_T)) \times 100\%,$$

where Q_A is the actual flow measured at the designated gage based on the seven day rolling average, and Q_T is the target flow (from Table 2).

The percent missed target flows applied to the undeveloped portion of this permit having PSI with the Willamette River provides the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition, and is defined as:

$$E_{PSI} - (E_{PSI} \times \% \text{ missed target flows}),$$

where E_{PSI} is undeveloped portion of the permit as of this extension having PSI with the Willamette River, being 2.53 cfs June through November, and 4.84 cfs December through May.

The maximum amount of water that can be appropriated as a result of this persistence condition may be adjusted by a Consumptive Use Percentage, when applicable, as per Item 2.C., below. The overall reduction to the amount of the

undeveloped portion having PSI with the Willamette River of the permit will not exceed 20%.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages
The City of Monmouth has not identified any Consumptive Use Percentages based on the return of flows to the Willamette River through effluent discharge. Thus, at this time the City may not utilize Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages
Utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 2.C.f., below.

Consumptive Use Percentages submitted to the Department for review must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates
Continuing the utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition beyond an approval period (as described in 2.C.f., below) is contingent upon the City submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 2.C.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine

the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices

If there are changes to either wastewater technology or the practices at the City's waster water treatment facility resulting in 25% or more reductions in average monthly return flows to the Willamette River, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to the Willamette River as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 2.C.f., below.

If such changes to either wastewater technology or the practices at the City's waster water treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

e. Relocation of the Point(s) of Appropriation (s) and/or Return Flows

If the point(s) of appropriation(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

After relocation of the point(s) of appropriation(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 2.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages

The utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may continue for a 10 year approval period that begins 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 2.C.d., or 2.C.e. (above) are applicable.

Consumptive Use Percentages (first time utilization or updates) which are submitted and receive the Director's concurrence will begin a new 10 year approval period. The approval period begins on the date of the Water Resources Director's concurrence with Consumptive Use Percentages Updates, as evidenced by the record. The City at its discretion may submit updates prior to the end of an approval period.

D. Examples

Example 1: Target flow met

On June 20, the last seven mean daily flows were 9500, 9200, 9000, 8500, 8750, 7500 and 7250 cfs. The seven day rolling average (Q_A) is 8528 cfs. The amount of the undeveloped portion of the permit having PSI with the Willamette River that can be appropriated would not be reduced because the 7 day average of mean daily flows is greater than the 8500 cfs target flows (Q_T) for June 20.

Example 2: Target flow missed.

Step 1: If on June 20, the average of the last seven mean daily flows was 7200 cfs, and the target flow is 8500 cfs, then the target flow would be missed by 15.3%.

$$(1 - (7200 / 8500)) \times 100\% = 15.3\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%[7] during the month of June and the utilization of this percentage is authorized, and the target flow is missed by 15.3% (from Step 1), then the amount of the undeveloped portion of the permit having PSI with the Willamette River that could be appropriated would be reduced by 12.0%.

$$(78.7\% \times 15.3\%) / 100 = 12.0\%$$

(If adjustments are not to be made by a Consumptive Use Percentage, then the undeveloped portion of the permit having PSI with the Willamette River would only be reduced by the % by which the target flow is missed – 15.3% in this example).

Step 3: The overall reduction of 12% of the amount of the undeveloped portion of the permit having PSI with the Willamette River does not exceed 20%.

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[7] Currently, the City of Monmouth may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7% is only for illustrative purposes in this example.

Step 4: The undeveloped portion of this permit having PSI with the Willamette River (E_{PSI}) during June is 2.53 cfs. Therefore, in this example, the maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is 2.23 cfs.

$$2.53 - ((2.53 \times 12.0\%) / 100) = 2.23$$

Step 5: Given that the entire permit, being 6.0 cfs, is undeveloped and the undeveloped portion having PSI with the Willamette River in June is 2.53 cfs, if the amount of water legally authorized for appropriation at a given point in time (for example, authorization provided through a WMCP) is 4.0 cfs, then 0.53 cfs of the undeveloped water having PSI with the Willamette River would be used to satisfy the 4.0 cfs.

$$4.0 - (6.0 - 2.53) = 0.53$$

Note: (6.0 – 2.53) equals the undeveloped portion of the permit not having PSI

In this example, the 0.53 cfs of undeveloped water having PSI with the Willamette River is less than the 2.23 cfs maximum undeveloped portion of the permit having PSI with the Willamette River (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, there would be no required reduction in water use of the undeveloped portion under the permit.

Step 6: If the amount of water legally authorized for appropriation at a given point in time is 6.0 cfs, then 2.53 cfs of undeveloped water having PSI with the Willamette River would be used to satisfy the 6.0 cfs.

$$6.0 - (6.0 - 2.53) = 2.53$$

In this example, the 2.53 cfs of undeveloped water is greater than the 2.23 cfs maximum undeveloped portion having PSI with the Willamette (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, the amount of undeveloped water (having PSI with the Willamette River) appropriated would need to be reduced by 0.30 cfs.

$$2.53 - 2.23 = 0.30$$

In this example, the maximum amount of water that could be appropriated is 5.70 cfs.

$$6.0 - 0.30 = 5.70$$

E. Relocation of the Point(s) of Appropriation (s) and New Quantification of PSI.

Any relocation of the point(s) of appropriation(s) through a permit amendment or transfer process will require a new OWRD ground water review pursuant to OAR Chapter 690 Division 9 to determine if use of water at the relocated point(s) of appropriation(s) has the potential for substantial interference (PSI) with surface water. This review will be used to quantity a new value for E_{PSI}, being the undeveloped portion of the permit as of this extension having PSI with the surface water based on the new locations of the point(s) of appropriation(s). The new value for E_{PSI} will be then utilized in the calculations for determining the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition.

DATED: October 25, 2011

Dwight French
Water Right Services Division Administrator

If you have any questions, please check the information box on the last page for the appropriate names and phone numbers.

Proposed Final Order Hearing Rights

1. Under the provisions of OAR 690-315-0100(1) and 690-315-0060, the applicant or any other person adversely affected or aggrieved by the proposed final order may submit a written protest to the proposed final order. The written protest must be received by the Water Resources Department no later than **December 9, 2011,** being 45 days from the date of publication of the proposed final order in the Department's weekly notice.

2. A written protest shall include:
   a. The name, address and telephone number of the petitioner;
   b. A description of the petitioner's interest in the proposed final order and if the protestant claims to represent the public interest, a precise statement of the public interest represented;
   c. A detailed description of how the action proposed in the proposed final order would adversely affect or aggrieve the petitioner's interest;
   d. A detailed description of how the proposed final order is in error or deficient and how to correct the alleged error or deficiency;
   e. Any citation of legal authority supporting the petitioner, if known;
   f. Proof of service of the protest upon the water right permit holder, if petitioner is other than the water right permit holder; and
   g. The applicant or non-applicant protest fee required under ORS 536.050.

3. Within 60 days after the close of the period for requesting a contested case hearing, the

Municipal or Quasi-Municipal

Extension PFO Checklist for Water Use Permits

issued on or prior to November 2, 1998

(OAR 690-315-0010 through OAR 690-315-0060)

Application: G- 13521 Permit: G- 12976 Permit Amendment? No ☒ Yes ☐ T- _____ ☐ pending ☐ approved

Permit Holder's Name: City of Monmouth Attn: Russ Cooper

Permit Holder's Mailing Address: 151 W Main St., Monmouth, OR 97361 email brooke@4bengineering.com

Phone Number: 503-838-0722

POD Location: Township 9S Range 4W Section 3, SWSE; 10 NWNE ¼¼ _____

Drainage Basin: 2 County: Polk Watermaster District: 16 Watermaster: Mike McCord

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Date Permit was issued: 10/31/1996 **Priority Date:** 10/1/1993 **Date of PN:** 4/1/2063

Source: Two Wells within the Duck Slough Basin

Use: ☒ Municipal ☐ Quasi Municipal _____

"Q": 6.0 cfs

Orig "A" Date: 10/31/1997 **Orig "B" Date:** 10/1/1998 **Orig "C" Date:** 10/1/1999

Extension request rec'd: 10/7/1999

updated: 3-26-2003 8-24-2011, 8-31-2011
5-3-2005 8-24-2011

Request Number (1, 2, 3…): 1st

Last Authorized "B" Date: 10/1/1998

Proposed "B" Date: 10/1/2030 ~~2055~~

10.11.2011

Last Authorized "C" Date: 10/1/1999

Proposed C Date: 10/1/2035 ~~2055~~ 2055

Conditions of Permit:

Condition Met?	Condition Not Met?	Permit Condition
☐	☐	install meter - no water use
☐	☐	submit water use records annually - no water use
☒	☐	develop a plan to monitor and reports impacts to water levels - approved July 5, 2005
☐	☐	
☐	☐	

Factors to consider in determining "Reasonable Diligence" [OAR 690-315-0040(3)]:

Yes No

☒ ☐ Work was accomplished within the time allowed in the permit or previous extension

☒ ☐ Water right permit holder conformed with the permit or previous extension conditions

☐ ☒ Beneficial use made of the water during the permit or previous extension time limits

- Permit holder has beneficially used 0.0 ☒cfs☐gpm☐af Undeveloped portion 6.0 ☒cfs☐gpm☐af

☒ ☐ Financial investments were made toward developing the beneficial water use.

- Amount Invested to date: $95,000 Estimated Remaining Cost: $1,000,000

GW REVIEW: Y N _____

MITIGATION REVIEW: Y N

Has the applicant pursued perfection of the right in good faith and with reasonable diligence? Yes ☒ No ☐

Population 9,545 **As of (Year)** 2010 ☐**Growth** 3.0% ☐**Population** ~~19,985~~ 36,185 **Projected by (Year)** ~~2035~~ 2055 **Calculated? Yes** ☐

Peak Demand 3.69 **cfs As of (Year)** 2010 ☒**Peak Demand** ~~9.68~~ ~~7.81 cfs~~ 14.51 **Projected cfs by (Year)** ~~3035~~ 2055 **Calculated? Yes** ☐

2

For MUNICIPAL permits ONLY.

Yes No

☒ ☐ Is this a Municipal use Permit (If **YES**, proceed. If **NO**, skip to "Good Cause")

☐ ☒ Has full "Q" been beneficially used? (If YES, skip to "Good Cause")

☒ ☐ Is this the first extension issued since 6/29/05? (If NO, skip to "Good Cause")

☐ ☐ If GW permit, does it have PSI? (If NO, skip to "Good Cause")

☐ ☒ Does the permit holder have any existing fish protection agreements with a state or federal agency?

Date sent to ODFW for review 2-2-2010

Date returned from ODFW 2-8-2011

Based on the written record, can the Department make a finding of "Good Cause" to approve the extension request?

Yes... "Good Cause" can be found. ☒ Approval of Extension Request

No ... "Good Cause" *cannot* be found. ☐ Denial of Extension Request

Conditions to be included in Extension PFO (if applicable)? Yes ☒ No ☐

***(NOTE:** Check the file record for documentation to add a condition(s) at the extension stage.)*

☒ Max "Q" Development Limitations and Div. 86 Water Management and Conservation Plan

☒ Other: Fish Persistence Conditions

Footnote regarding Claim of Beneficial Use. Choose the appropriate language below and insert as a footnote in the PFO:

☐ **COBU Requirement - Surface/Ground Water - on or prior to July 9, 1987**

"For permits applied for or received on or before July 9, 1987, upon complete development of the permit, you must notify the Department that the work has been completed and either: (1) Hire a water right examiner certified under ORS 537.798 to conduct a survey, the original to be submitted as required by the Water Resources Department, for issuance of a water right certificate; or (2) Continue to appropriate water under the water right permit until the Water Resources Department conducts a survey and issues a water right certificate under ORS 537.250 or 537.625."

☐ **COBU Requirement - Surface Water - post July 9, 1987**

"Pursuant to ORS 537.230(4), upon the completion of beneficial use of water allowed under the permit, the permit holder shall hire a certified water rights examiner to survey the appropriation. Within one year after the complete application of water to a beneficial use (or by the date allowed for the complete application of water to a beneficial use), the permit holder shall submit a map of the survey and the claim of beneficial use."

☒ **COBU Requirement - Ground Water - post July 9, 1987**

"Pursuant to ORS 537.630(4), upon the completion of beneficial use of water allowed under the permit, the permit holder shall hire a certified water rights examiner to survey the appropriation. Within one year after the complete application of water to a beneficial use (or by the date allowed for the complete application of water to a beneficial use), the permit holder shall submit a map of the survey and the claim of beneficial use."

NOTES:

cc Brooke Saltarello; 4BEngineering $ Consulting; 3700 River Rd. N., Suite 2; Kiezer, OR 97303

Extension "PFO" Dates

Mailing / Issuance Date: _____ **Protest Deadline Date:** _____

Reviewer's Name: _____ **Date:** _____

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem Oregon 97301-1266
(503) 986-0900
www.wrd.state.or.us

Application for Extension of Time for Municipal and Quasi-Municipal Water Use Permits

Make use of this form, *Application for Extension of Time for Municipal and Quasi-Municipal Water Use Permits*, only if the permit uses the word "Municipal" or "Quasi-municipal" in the description of the purpose or use to which water is to be applied.

TO THE DIRECTOR OF THE OREGON WATER RESOURCES DEPARTMENT

A separate extension application must be submitted for each permit as per OAR 690-315-0070(2). This page, with an original signature by the permit holder of record, must accompany the extension of time application.

This application and a summary of review criteria and procedures that are generally applicable to this application are available at http://www.wrd.state.or.us/OWRD/PUBS/forms.shtml

I, City of Monmouth
NAME OF PERMIT HOLDER *[OAR 690-315-0070(1) and (3)(a)]*

Russ Cooper
NAME OF CONTACT

151 W. Main Street	Monmouth	OR	97361
ADDRESS	CITY	STATE	ZIP

503-838-0722
PHONE

brooke@4bengineering.com
E-MAIL ADDRESS

the permit holder of: Application Number G-13521

Permit Number G-12976
[OAR 690-315-0070(3)(b)]

RECEIVED
OCT 11 2011
WATER RESOURCES DEPT
SALEM, OREGON

do hereby request that the time in which to:

☒ complete construction (of diversion/appropriation works and/or purchase and installation of the equipment necessary to the use of water), which time now expires on October 1, 1998, be extended to October 1, 2055,

and/or the time in which to:

☒ apply water to full beneficial use under the terms and conditions of the permit, which time now expires on October 1, 1999, be extended to October 1, 2055.

I am the permittee, or have written authorization from the permittee, to apply for an extension of time under this permit. I certify that the information I have provided in this application is true and correct to the best of my knowledge.

Russell Cooper DIRECTOR — 09-22-2011
Signature — Date

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OCT 1 1 2011
WATER RESOURCES DEPT
SALEM, OREGON

Extension of Time Application Questions

1) Extension fee: **Already submitted with first extension of time**

2) For Quasi-Municipal water use holders, provide evidence of the actions taken to begin actual construction on the project if required under applicable statue: **N/A**

3) For Municipal water use permits issued on or after June 29, 2005, evidence of actions taken to begin actual construction on the project: **N/A- Permit issued October 1, 1993**

4) Provide evidence of actions taken to develop the water right permit within the permitted time period and/or the time period of the previous extension.

Dates	**All Work and actions accomplished before permit was issued**	**Cost**
	N/A	
Dates	**All Work and actions accomplished during permitted time period**	**Cost**
4/1997	Wells drilled (well logs enclosed)	$95,000.00
Dates	**All Work and actions accomplished after permitted time period**	**Cost**
	Total Cost to Date	

5) Provide evidence of compliance with conditions contained in the original permit, and any previous extension(s), or the reason the condition was not satisfied.

Conditions were as stated:

A) Permittee shall install a meter or other suitable measuring device. **No water meters were installed due to the water in the well being unusable.**

B) Permittee shall allow watermaster access to meter or measuring device. **No water meters were installed due to the water in the well being unusable.**

6) Maximum instantaneous rate used to date = N/A-water in well had low water quality and was unusable

7) The population for the City of Monmouth was 9,545 in 2010 (PSU website)

8) The peak water demand for the current population (Year 2011) is 1,657 GPM (3.69 CFS). (Found in the City of Monmouth Master Plan-February, 2000)

9) The main event that caused the City of Monmouth to not be able to perfect the water in the time allowed is the well drilling provided water that had poor water quality and was unusable.

10-A) Inventory of Water Rights

Ground Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
G-4332 G-4087	39278	Well #1, 2,3-Inactive	MU	April 17, 1968	1.27 CFS	NA	NA-Not active at this time
G-5106 G-4818	62436	Well #4, 5	MU	Feb 17, 1970	.88 CFS	.88 CFS	Aquifer
G-8926 G-8579	NA	Marion County #1 (Portion will be transferred to M.C. #2)	MU	Aug 14, 1978	5.0 CFS	5.0 CFS	Aquifer
G-13521 G-12976	NA	Buena Vista Wells	MU	Oct 1, 1993	6.0 CFS	NA	NA-Not active at this time

Surface Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
S-6716 S-4305	49729	Teal Creek	MU	Oct 13, 1924	0.45 CFS	NA	NA-Not active at this time
S-9883 S-6521	45801	Teal Creek	MU	Aug 19, 1919	0.13 CFS	NA	NA-Not active at this time
S-16134 S-11941	11656	Teal Creek	MU	Nov 7, 1935	0.3 CFS	NA	NA-Not active at this time
S-16248 S-12058	11662	Teal Creek	MU	Feb 13, 1936	1.0 CFS	NA	NA-Not active at this time
S-16832 S-12602	15055	Teal Creek	MU	April 2, 1937	.25 CFS	NA	NA-Not active at this time
S-22133 S-18321	16992	Teal Creek	MU	Dec 11, 1946	1.0 CFS	NA	NA-Not active at this time
S-41310 S-30886	36021	Teal Creek	MU	Aug 31, 1965	.61 CFS	NA	NA-Not active at this time
S-86399 S-54332	NA	Willamette River	MU	Aug 10 , 2005	4.46 CFS	NA	NA-Construction not completed

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SALEM, OREGON

Pending Applications

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
NONE							

10- B) The City of Monmouth does not have any contracts or agreements to supply water to other entities.

10-C) The City of Monmouth Projected Population in 2055 is 36,185, with a 3.0% growth rate per year. (Standard 3% increase as per Monmouth Master Plan-2000)

Year	Estimated Population
2010	9,545-Actual
2015	11,065
2020	12,827
2025	14,870
2030	17,240
2035	19,985
2040	23,183
2045	26,892
2050	31,194
2055	36,185

10-D) Future Peak Water Demands for the City of Monmouth

Year	Estimated Peak Demand
2015	1,921 GPM (4.28 CFS)
2020	2,227 GPM (4.97 CFS)
2025	2,581 GPM (5.76 CFS)
2030	3,000 GPM (6.68 CFS)
2035	3,500 GPM (7.81 CFS)
2040	4,173 GPM (9.30 CFS)
2045	4,840 GPM (10.78 CFS)
2050	5,615 GPM (12.51 CFS)
2055	6,513 GPM (14.51 CFS)

10-E) The potential growth expected by the Year 2055 is the development and enlargement of Western Oregon University which will require more housing and apartments in the area to accommodate the students. Also undeveloped land in Monmouth is expected to be developed by the Year 2055.

10-F) The estimated completion date for this permit is January, 2055. After the extension of time is completed the City of Monmouth will be submitting a permit amendment to move the 6 CFS water to the Willamette Wellfield immediately.
11) The estimate for work to be completed is:

Approximate Date Range	Work and Actions to be Accomplished	Estimated Cost
2011-2012	Permit amendment to move water from existing location at Buena Vista wellfield to Willamette Wellfield	N/A
2012-2015	Complete building and install required filter/UV equipment and booster pumps	$750,000.00
2015-2030	Add 1-2 new wells to Willamette Wellfield	$150,000.00
2030-2045	Add possible 1 additional well to Willamette Wellfield	$100,000.00
2045-2055	Estimated 10 year period of time to achieve full expected grow out in Monmouth. The full beneficial use is expected to be achieved in the Year 2055.	
	Total Cost to Date	**$1,000,000.00**

12) Justify the time required to complete the project and/or apply the water to full beneficial use.

The City of Monmouth as stated will be unable to complete the project at the Buena Vista/Duck Slough site as water quality is poor. After the extension is complete and the water has been transferred to the Willamette Wellfield the City of Monmouth will not have any problems applying the water to full beneficial use by the extension date of 2055. The present three (3) Willamette Wellfield wells are capable of producing up to 1,200 GPM and the present plan for build out of the project is to add two to three more wells with an estimated capacity of 1200-1800 GPM.

13) Any other information:

After construction of four test wells, a production well was drilled in 1997. This well showed that the water quality made the water unusable and the project in this location was abandoned. The City of Monmouth worked on finding another location for a wellfield and in 2004 located the Willamette Wellfield. The Willamette Wellfield presently has three (3) water wells that have provided both good water quality and quantity. The City of Monmouth is extending the permit for Buena Vista Wells/Duck Slough (Permit #G-12976) and after the approved extension will be transferring the water to the Willamette Wellfield.

14) For Municipal water use permits issued before November 2, 1998, for the first extension issued after June 29, 2005, provide a copy of any agreements regarding the use of the undeveloped portion of the permit between the permit holder and a federal/state agency that includes conditions or required actions that maintain the persistence of listed fish species.
N/A-No other extensions exist for this permit

RECEIVED
OCT 1 1 2011
WATER RESOURCES DEPT
SALEM, OREGON

STATE OF OREGON

COUNTY OF POLK

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

CITY OF MONMOUTH
151 W MAIN ST (503)838-0722
MONMOUTH, OREGON 97361

The specific limits for the use are listed below along with conditions of use.

APPLICATION FILE NUMBER: G-13521

SOURCE OF WATER: TWO WELLS IN THE DUCK SLOUGH BASIN

PURPOSE OR USE: MUNICIPAL

MAXIMUM RATE: 6.0 CUBIC FOOT PER SECOND

PERIOD OF USE: YEAR ROUND

DATE OF PRIORITY: October 1, 1993

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POINT OF DIVERSION LOCATION: SW 1/4 SE 1/4, SECTION 3, NW 1/4 NE 1/4, SECTION 10, T9S, R4W, W.M.; WELL A - 1550 FEET NORTH & 1600 FEET WEST; WELL B - 1050 FEET NORTH & 850 FEET WEST, BOTH FROM SE CORNER DLC 40

THE PLACE OF USE IS LOCATED AS FOLLOWS:

WITHIN THE CITY OF MONMOUTH SERVICE AREA

Measurement, recording and reporting conditions:

A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.

B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

The water user shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit (or replacement well) displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the water user's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The water user shall in no instance allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The use of water allowed herein may be made during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

STANDARD CONDITIONS

The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

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SALEM, OREGON

ALL prior ~~Superceded~~ by Oct. 11, 2011 ~~to~~ Application

Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem Oregon 97301-1266
(503) 986-0900
www.wrd.state.or.us

Application for Extension of Time for Municipal and Quasi-Municipal Water Use Permits

Make use of this form, *Application for Extension of Time for Municipal and Quasi-Municipal Water Use Permits*, only if the permit uses the word "Municipal" or "Quasi-municipal" in the description of the purpose or use to which water is to be applied.

TO THE DIRECTOR OF THE OREGON WATER RESOURCES DEPARTMENT

A separate extension application must be submitted for each permit as per OAR 690-315-0070(2). This page, with an original signature by the permit holder of record, must accompany the extension of time application.

This application and a summary of review criteria and procedures that are generally applicable to this application are available at http://www.wrd.state.or.us/OWRD/PUBS/forms.shtml

I, City of Monmouth
NAME OF PERMIT HOLDER *[OAR 690-315-0070(1) and (3)(a)]*

Russ Cooper
NAME OF CONTACT

151 W. Main Street	Monmouth	OR	97361
ADDRESS	CITY	STATE	ZIP

503-838-0722
PHONE

brooke@4bengineering.com
E-MAIL ADDRESS

the permit holder of: Application Number G-13521

Permit Number G-12976
[OAR 690-315-0070(3)(b)]

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WATER RESOURCES DEPT
SALEM, OREGON

do hereby request that the time in which to:

☒ complete construction (of diversion/appropriation works and/or purchase and installation of the equipment necessary to the use of water), which time now expires on October 1, 1998, be extended to October 1, 2030,

and/or the time in which to:

☒ apply water to full beneficial use under the terms and conditions of the permit, which time now expires on October 1, 1999, be extended to October 1, 2035.

I am the permittee, or have written authorization from the permittee, to apply for an extension of time under this permit. I certify that the information I have provided in this application is true and correct to the best of my knowledge.

Russell W Cox — 08-19-2011
Signature PUBLIC WORKS DIRECTOR — Date

Before submitting, make sure the following items are included:

- Completed Application for Extension of Time
- Statutory fee of $500 (ORS 536.050)
- Signature page (page 1 of application) for Application for Extension of Time
- All supporting documentation and/or evidence referenced in the Application for Extension of Time

MAIL COMPLETED APPLICATION

along with the

$500 STATUTORY FEE (ORS 536.050) TO:

Water Resources Department
Attn: Water Right Permit Extensions
725 Summer Street NE, Suite A
Salem, Oregon 97301-1266

RECEIVED
AUG 24 2011
WATER RESOURCES DEPT
SALEM, OREGON

Ann Reece

From: epbpe@4bengineering.com
Sent: Wednesday, August 31, 2011 11:32 AM
To: brooke@4bengineering.com; Ann Reece
Subject: Re: Monmouth Extension

Ann, Although I realize Brooke is providing you with amended figures, I wish to clarify how the discrepency in the estimates arose and can easily happen. Generally, when we are asked for the "peak demand" of a water system, it is based on the actual peak demand of the entire water system at any given time from all combined resources, including sources, storage, and booster pumping facilities, if available. This value is usually 2-3 times the actual value of what is termed as the "maximum day demand" imposed on the source(s) themselves, the value you actually need. In some cases, these values are identical, especially for smaller water systems with little or no water storage and where water is delivered directly from the sources (usually groundwater) to the customers, however, Monmouth does not fit this classification as the city utilizes several million gallons of water storage. I have fully explained this difference to my staff to insure you are provided with the figure that accurately reflects the demand that will be placed on the sources, not on the entire water system. I trust this will satisfy your inquiry and I thank you for your consideration.

Edward P. Butts, PE, CWRE, BCEE, CPI, FASCE 4B Engineering and Consulting, LLC 3700 River Road N., Suite #2 Keizer, OR 97303
Ph: 503-589-1115--fax: 503-589-1118

-----Original Message-----
From: "Ann Reece" [reeceal@wrd.state.or.us]
Date: 08/30/2011 04:02 PM
To: "brooke@4bengineering.com" <brooke@4bengineering.com>
Subject: Monmouth Extension

Brooke,
The current peak demand is stated as 6650 gpm (14.82 cfs) – Item 8

The Estimated peak demand for 2035 is stated as 4344 gpm (9.68 cfs) – Item 10-D.

What is the correct current peak demand?

Best Regards,
Ann Reece
---------- Water Rights Services Division Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

Ann Reece

From: brooke@4bengineering.com
Sent: Wednesday, August 31, 2011 11:29 AM
To: Ann Reece
Subject: Re: Monmouth Extension

Attachments: Extension of Time Application Questions.doc



Extension of
ne Application

Ann,

Attached is the updated questions. There is some confussion on what the state is calling "peak demand". In engineering terms and in a Master Plan as it was stated on Item #8 "peak demand" is the hour of most demand on the max day. When I talked to you you said you wanted future "peak demand" to be the max day's usage. I have updated the questions to both include what the max day's demand would be.

I will be out of the office the rest of the day so please feel free to call me on my cell phone or email me with any questions. If you want different numbers please let me know. Or let me know what exactly you want for "peak demand". I tried to contact your direct line and the main WRD phone line but both just ring with no answer so I am assuming that the lines may be down.

Brooke Saltarello
4B Engineering & Consulting LLC
3700 River Road N
Suite 2
Keizer, Oregon 97303
Phone: 503-589-1115
Fax: 503-589-1118
Cell: 503-881-6198

-----Original Message-----
From: "Ann Reece" [reeceal@wrd.state.or.us]
Date: 08/30/2011 04:02 PM
To: "brooke@4bengineering.com" <brooke@4bengineering.com>
CC: "epbpe@4bengineering.com" <epbpe@4bengineering.com>
Subject: Monmouth Extension

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- Water Rights Services Division Oregon Water Resources Department
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Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

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SALEM, OREGON

Extension of Time Application Questions

1) Extension fee: **Already submitted with first extension of time**

2) For Quasi-Municipal water use holders, provide evidence of the actions taken to begin actual construction on the project if required under applicable statue: **N/A**

3) For Municipal water use permits issued on or after June 29, 2005, evidence of actions taken to begin actual construction on the project: **N/A- Permit issued October 1, 1993**

4) Provide evidence of actions taken to develop the water right permit within the permitted time period and/or the time period of the previous extension.

Dates	**All Work and actions accomplished before permit was issued**	**Cost**
	N/A	
Dates	**All Work and actions accomplished during permitted time period**	**Cost**
4/1997	Wells drilled (well logs enclosed)	$95,000.00
Dates	**All Work and actions accomplished after permitted time period**	**Cost**
	Total Cost to Date	

5) Provide evidence of compliance with conditions contained in the original permit, and any previous extension(s), or the reason the condition was not satisfied.

Conditions were as stated:

A) Permittee shall install a meter or other suitable measuring device. **No water meters were installed due to the water in the well being unusable.**

B) Permittee shall allow watermaster access to meter or measuring device. **No water meters were installed due to the water in the well being unusable.**

6) Maximum instantaneous rate used to date = N/A-water in well had low water quality and was unusable

7) The population for the City of Monmouth was 9,545 in 2010 (PSU website)

8) The peak water demand for the current population (Year 2011) is 1,657 GPM (3.69 CFS). (Found in the City of Monmouth Master Plan-February, 2000)

9) The main event that caused the City of Monmouth to not be able to perfect the water in the time allowed is the well drilling provided water that had poor water quality and was unusable.

10-A) Inventory of Water Rights

Ground Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
G-4332 G-4087	39278	Well #1, 2,3-Inactive	MU	April 17, 1968	1.27 CFS	NA	NA-Not active at this time
G-5106 G-4818	62436	Well #4, 5	MU	Feb 17, 1970	.88 CFS	.88 CFS	Aquifer
G-8926 G-8579	NA	Marion County #1 (Portion will be transferred to M.C. #2)	MU	Aug 14, 1978	5.0 CFS	5.0 CFS Undeveloped portion was 3.34 on 8-18-2011 FO for Extension	Aquifer
G-13521 G-12976	NA	Buena Vista Wells	MU	Oct 1, 1993	6.0 CFS	NA	NA-Not active at this time

4.22

Surface Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
S-6716 S-4305	49729	Teal Creek	MU	Oct 13, 1924	0.45 CFS	NA	NA-Not active at this time
S-9883 S-6521	45801	Teal Creek	MU	Aug 19, 1919	0.13 CFS	NA	NA-Not active at this time
S-16134 S-11941	11656	Teal Creek	MU	Nov 7, 1935	0.3 CFS	NA	NA-Not active at this time
S-16248 S-12058	11662	Teal Creek	MU	Feb 13, 1936	1.0 CFS	NA	NA-Not active at this time
S-16832 S-12602	15055	Teal Creek	MU	April 2, 1937	.25 CFS	NA	NA-Not active at this time
S-22133 S-18321	16992	Teal Creek	MU	Dec 11, 1946	1.0 CFS	NA	NA-Not active at this time
S-41310 S-30886	36021	Teal Creek	MU	Aug 31, 1965	.61 CFS	NA	NA-Not active at this time
S-86399 S-54332	NA	Willamette River	MU	Aug 10 , 2005	4.46 CFS	NA	NA-Construction not completed

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SALEM, OREGON

Pending Applications

Application/ Permit Number	*Certificate Number*	*Source*	*Use*	*Priority Date*	*Authorized Amount of Water*	*Max Amount of Beneficial Water Use*	*Use Limitations*
NONE							

10- B) The City of Monmouth does not have any contracts or agreements to supply water to other entities.

10-C) The City of Monmouth Projected Population in 2035 is 19,985, with a 3.0% growth rate per year. (Standard 3% increase as per Monmouth Master Plan-2000)

Year	Estimated Population
2010	9,545-Actual
2015	11,065
2020	12,827
2025	14,870
2030	17,240
2035	19,985

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10-D) Future Peak Water Demands for the City of Monmouth

Year	Estimated Peak Demand
2015	1,921 GPM (4.28 CFS)
2020	2,227 GPM (4.97 CFS)
2025	2,581 GPM (5.76 CFS)
2030	3,000 GPM (6.68 CFS)
2035	3,500 GPM (7.81 CFS)

10-E) The potential growth expected by the Year 2035 is the development and enlargement of Western Oregon University which will require more housing and apartments in the area to accommodate the students. Also undeveloped land in Monmouth is expected to be developed by the Year 2035.

10-F) The estimated completion date for this permit is January, 2035. After the extension of time is completed the City of Monmouth will be submitting a permit amendment to move the 6 CFS water to the Willamette Wellfield immediately.

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11) The estimate for work to be completed is:

Approximate Date Range	Work and Actions to be Accomplished	Estimated Cost
2011-2012	Permit amendment to move water from existing location at Buena Vista wellfield to Willamette Wellfield	N/A
2011-2013	Complete building and install required filter/UV equipment and booster pumps	$750,000.00
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2020-2025	Add possible 1 additional well to Willamette Wellfield	$100,000.00
2025-2035	Estimated 10 year period of time to achieve full expected grow out in Monmouth. The full beneficial use is expected to be achieved in the Year 2035.	
	Total Cost to Date	**$1,000,000.00**

12) Justify the time required to complete the project and/or apply the water to full beneficial use.

The City of Monmouth as stated will be unable to complete the project at the Buena Vista/Duck Slough site as water quality is poor. After the extension is complete and the water has been transferred to the Willamette Wellfield the City of Monmouth will not have any problems applying the water to full beneficial use by the extension date of 2035. The present three (3) Willamette Wellfield wells are capable of producing up to 1,200 GPM and the present plan for build out of the project is to add two (2) more wells with an estimated capacity of 1000-1200 GPM.

13) Any other information:

After construction of four test wells, a production well was drilled in 1997. This well showed that the water quality made the water unusable and the project in this location was abandoned. The City of Monmouth worked on finding another location for a wellfield and in 2004 located the Willamette Wellfield. The Willamette Wellfield presently has three (3) water wells that have provided both good water quality and quantity. The City of Monmouth is extending the permit for Buena Vista Wells/Duck Slough (Permit #G-12976) and after the approved extension will be transferring the water to the Willamette Wellfield.

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N/A-No other extensions exist for this permit

Superceded by Aug 31, 2011 updates

Extension of Time Application Questions

1) Extension fee: **Already submitted with first extension of time**

2) For Quasi-Municipal water use holders, provide evidence of the actions taken to begin actual construction on the project if required under applicable statue: **N/A**

3) For Municipal water use permits issued on or after June 29, 2005, evidence of actions taken to begin actual construction on the project: **N/A- Permit issued October 1, 1993**

4) Provide evidence of actions taken to develop the water right permit within the permitted time period and/or the time period of the previous extension.

Dates	**All Work and actions accomplished before permit was issued**	**Cost**
	N/A	
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6) Maximum instantaneous rate used to date = N/A-water in well had low water quality and was unusable

7) The population for the City of Monmouth was 9,545 in 2010 (PSU website)

Superseded by Aug 31, 2011 updates

8) The peak water demand for the current population (Year 2011) is 6,650 GPM (14.82 CFS). (Found in the City of Monmouth Master Plan-February, 2000)

9) The main event that caused the City of Monmouth to not be able to perfect the water in the time allowed is the well drilling provided water that had poor water quality and was unusable.

10-A) Inventory of Water Rights

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G-8926 G-8579	NA	Marion County #1 (Portion will be transferred to M.C. #2)	MU	Aug 14, 1978	5.0 CFS	5.0 CFS As per Undeveloped portion on Extension issued 8-18-2011 = 334	Aquifer
G-13521 G-12976	NA	Buena Vista Wells	MU	Oct 1, 1993	6.0 CFS	NA	NA-Not active at this time

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2035	19,985

10-D) Future Peak Water Demands for the City of Monmouth

Year	Estimated Peak Demand
2015	2,405 GPM (5.36 CFS)
2020	2,788 GPM (6.21 CFS)
2025	3,232 GPM (7.2 CFS)
2030	3,747 GPM (8.36 CFS)
2035	4,344 GPM (9.68 CFS)

10-E) The potential growth expected by the Year 2035 is the development and enlargement of Western Oregon University which will require more housing and apartments in the area to accommodate the students. Also undeveloped land in Monmouth is expected to be developed by the Year 2035.

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Superseded w/ Aug 31, 2011 updates

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WATER RESOURCES DEPT
SALEM, OREGON

Superceded 8-29-2011 updates

Extension of Time Application Questions

1) Extension fee: **Already submitted with first extension of time**

2) For Quasi-Municipal water use holders, provide evidence of the actions taken to begin actual construction on the project if required under applicable statue: **N/A**

3) For Municipal water use permits issued on or after June 29, 2005, evidence of actions taken to begin actual construction on the project: **N/A- Permit issued October 1, 1993**

4) Provide evidence of actions taken to develop the water right permit within the permitted time period and/or the time period of the previous extension.

Dates	**All Work and actions accomplished before permit was issued**	**Cost**
	N/A	
Dates	**All Work and actions accomplished during permitted time period**	**Cost**
4/1997	Wells drilled (well logs enclosed)	
Dates	**All Work and actions accomplished after permitted time period**	**Cost**
	Total Cost to Date	

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5) Provide evidence of compliance with conditions contained in the original permit, and any previous extension(s), or the reason the condition was not satisfied.

Conditions were as stated:

A) Permittee shall install a meter or other suitable measuring device. **No water meters were installed due to the water in the well being unusable.**

B) Permittee shall allow watermaster access to meter or measuring device. **No water meters were installed due to the water in the well being unusable.**

6) Maximum instantaneous rate used to date = N/A-water in well had low water quality and was unusable

7) The population for the City of Monmouth was 9,545 in 2010 (PSU website)

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8) The peak water demand for the current population (Year 2011) is 6,650 GPM (14.82 CFS). (Found in the City of Monmouth Master Plan-February, 2000)

9) The main event that caused the City of Monmouth to not be able to perfect the water in the time allowed is the well drilling provided water that had poor water quality and was unusable.

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10-A) Inventory of Water Rights

Ground Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
G-4332 G-4087	39278	Well #1, 2,3-Inactive	MU	April 17, 1968	1.27 CFS	NA	NA-Not active at this time
G-5106 G-4818	62436	Well #4, 5	MU	Feb 17, 1970	.88 CFS	.88 CFS	Aquifer
G-8926 G-8579	NA	Marion County #1 (Portion will be transferred to M.C. #2)	MU	Aug 14, 1978	5.0 CFS	5.0 CFS	Aquifer
G-13521 G-12976	NA	Buena Vista Wells	MU	Oct 1, 1993	6.0 CFS	NA	NA-Not active at this time

Surface Water

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations
S-6716 S-4305	49729	Teal Creek	MU	Oct 13, 1924	0.45 CFS	NA	NA-Not active at this time
S-9883 S-6521	45801	Teal Creek	MU	Aug 19, 1919	0.13 CFS	NA	NA-Not active at this time
S-16134 S-11941	11656	Teal Creek	MU	Nov 7, 1935	0.3 CFS	NA	NA-Not active at this time
S-16248 S-12058	11662	Teal Creek	MU	Feb 13, 1936	1.0 CFS	NA	NA-Not active at this time
S-16832 S-12602	15055	Teal Creek	MU	April 2, 1937	.25 CFS	NA	NA-Not active at this time
S-22133 S-18321	16992	Teal Creek	MU	Dec 11, 1946	1.0 CFS	NA	NA-Not active at this time
S-41310 S-30886	36021	Teal Creek	MU	Aug 31, 1965	.61 CFS	NA	NA-Not active at this time
S-86399 S-54332	NA	Willamette River	MU	Aug 10 , 2005	4.46 CFS	NA	NA-Construction not completed

Pending Applications

Application/ Permit Number	Certificate Number	Source	Use	Priority Date	Authorized Amount of Water	Max Amount of Beneficial Water Use	Use Limitations

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NONE							

10- B) The City of Monmouth does not have any contracts or agreements to supply water to other entities.

10-C) The City of Monmouth Projected Population in 2035 is 19,985, with a 3.0% growth rate per year. (Standard 3% increase as per Monmouth Master Plan-2000)

Year	Estimated Population
2010	9,545-Actual
2015	11,065
2020	12,827
2025	14,870
2030	17,240
2035	19,985

10-D) Future Peak Water Demands for the City of Monmouth

Year	Estimated Peak Demand
2015	2,405 GPM (5.36 CFS)
2020	2,788 GPM (6.21 CFS)
2025	3,232 GPM (7.2 CFS)
2030	3,747 GPM (8.36 CFS)
2035	4,344 GPM (9.68 CFS)

10-E) The potential growth expected by the Year 2035 is the development and enlargement of Western Oregon University which will require more housing and apartments in the area to accommodate the students. Also undeveloped land in Monmouth is expected to be developed by the Year 2035.

10-F) The completion date for this permit is undetermined at this time. After the extension of time is completed the City of Monmouth will be transferring the 6 CFS water to the Willamette Wellfield immediately.

11) The estimate for work to be completed is:

Dates	All Work and actions accomplished	Cost
	None at the Buena Vista wells as water in drilled wells was unusable, water to be transferred to Willamette Wellfield	$0.00
	Total Cost to Date	**$0.00**

12) Justify the time required to complete the project and/or apply the water to full beneficial use.

The City of Monmouth as stated will be unable to complete the project at the Buena Vista/Duck Slough site as water quality is poor. After the extension is complete and the water has been transferred to the Willamette

Superceded 8-29-2011 updates

Wellfield the City of Monmouth will not have any problems applying the water to full beneficial use by the extension date of 2035. The present three (3) Willamette Wellfield wells are capable of producing up to 1,200 GPM and the present plan for build out of the project is to add two (2) more wells with an estimated capacity of 800 GPM.

13) Any other information:

After construction of four test wells, a production well was drilled in 1997. This well showed that the water quality made the water unusable and the project in this location was abandoned. The City of Monmouth worked on finding another location for a wellfield and in 2004 located the Willamette Wellfield. The Willamette Wellfield presently has three (3) water wells that have provided both good water quality and quantity. The City of Monmouth is extending the permit for Buena Vista Wells/Duck Slough (Permit #G-12976) and after the approved extension will be transferring the water to the Willamette Wellfield.

14) For Municipal water use permits issued before November 2, 1998, for the first extension issued after June 29, 2005, provide a copy of any agreements regarding the use of the undeveloped portion of the permit between the permit holder and a federal/state agency that includes conditions or required actions that maintain the persistence of listed fish species.
N/A-No other extensions exist for this permit

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Polk
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WELL I.D.# 34

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

(START CARD) # 095448

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number P-1
Name City of Monmouth
Address 151 W Main St.
City Monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 57 ft.
Explosives used ☐ Yes ☒ No Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
16	0	57	Cement	0	25	39+ bent

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from 25 ft. to 27 ft. Material 3/8 Crushed
Gravel placed from 57 ft. to 27 ft. Size of gravel P-gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	12in	+3	34	.250	☒	☐	☒	☐
	12in	44	57	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s) ____

(7) PERFORATIONS/SCREENS:
☐ Perforations Method ____
☒ Screens Type V-Slot Material Stainless steel

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
34	44	250		12in		☐	☐
						☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.
1000	22 ft		5 1/2
950	22 ft.		18 1/2 hr

Temperature of water 54 Depth Artesian Flow Found ____
Was a water analysis done? ☐ Yes By whom ____
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other ____
Depth of strata: ____

(9) LOCATION OF WELL by legal description:
County Polk Latitude ____ Longitude ____
Township 9-S N or S Range 4-W E or W. WM.
Section 3 SW 1/4 SE 1/4
Tax Lot 700 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) North of Intersection of Buena Vista Rd + Davidson Rd on W-Side

(10) STATIC WATER LEVEL:
10 ft ft. below land surface. Date 6-2-97
Artesian pressure ____ lb. per square inch. Date ____

(11) WATER BEARING ZONES:
Depth at which water was first found 19

From	To	Estimated Flow Rate	SWL
19	25	Cased off	
25	45.5	950	10

(12) WELL LOG:
Ground Elevation ____

Material	From	To	SWL
Fill	0	4	
Sticky brown clay	4	19	
Fine Sand + Gray Clay	19	25	
Fine to Med Grey Sand	25	30	
Coarse Water Sand	30	32	
Coarse Sand + Gravel mostly gravel	32	34	
Coarse Gravel + small amount of Sand	34	45.5	
Brown Clay	45.5	48	
Red Sticky Clay	48	57	

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Date started 5-13-97 Completed 6-4-97

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number 1629
Signed ____ Date 6-10-97

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 1273
Signed Floyd A Sipe Date 6-10-97

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

Water Right Information Query Results

Contact Information

Current contact information

OWNER:
CITY OF MONMOUTH
151 W MAIN ST
MONMOUTH, OR 97361

Water Right Information

Status: Non-Cancelled

County: Polk

File Folder Location: Salem

Watermaster District: 16

Documents

View all scanned documents

Application: G 13521

Received: 10/1/1993

Permit: G 12976 document , paper map

Signature: 10/31/1996

Permit Workflow			
Action	Date	Result	Completed By
Permit Issued	10/31/1996		
Completion Date [C Date]	10/1/1999		
Extension Received	10/7/1999		ANNREECE
Extension Public Notice	4/1/2003		ANNREECE

View right with Web Mapping

View Places of Use from Water Rights in the Same Area

Point(s) of Diversion

POD 1 - A WELL > DUCK SLOUGH

- **Description**
- **POD Rate**
- **MUNICIPAL USES (Primary)**

POD 2 - A WELL > DUCK SLOUGH

- **Description**
- **POD Rate**
- **MUNICIPAL USES (Primary)**

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 10/1/1993

T-R-S	QQ	DLC	Gov't Lot	Taxlot	Acres	Status	Linked PODs	Inchoate Info	Remarks
8.00S-4.00W-19	SW NE					NC			
8.00S-4.00W-19	SE NE					NC			
8.00S-4.00W-19	SW NW					NC			
8.00S-4.00W-19	SE NW					NC			
8.00S-4.00W-19	NE SW					NC			
8.00S-4.00W-19	NW SW					NC			
8.00S-4.00W-19	SW SW					NC			
8.00S-4.00W-19	SE SW					NC			
8.00S-4.00W-19	NE SE					NC			
8.00S-4.00W-19	NW SE					NC			
8.00S-4.00W-19	SW SE					NC			
8.00S-4.00W-19	SE SE					NC			
8.00S-4.00W-20	SW NW					NC			
8.00S-4.00W-20	NW SW					NC			
8.00S-4.00W-20	SW SW					NC			
8.00S-4.00W-29	SW NW					NC			
8.00S-4.00W-29	NW SW					NC			
8.00S-4.00W-29	SW SW					NC			
8.00S-4.00W-30	NE NE					NC			
8.00S-4.00W-30	NW NE					NC			
8.00S-4.00W-30	SW NE					NC			
8.00S-4.00W-30	SE NE					NC			
8.00S-4.00W-30	NE NW					NC			
8.00S-4.00W-30	NW NW					NC			
8.00S-4.00W-30	SW NW					NC			
8.00S-4.00W-30	SE NW					NC			
8.00S-4.00W-30	NE SW					NC			
8.00S-4.00W-30	NW SW					NC			

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8.00S-4.00W-30	SW SW					NC				
8.00S-4.00W-30	SE SW					NC				
8.00S-4.00W-30	NE SE					NC				
8.00S-4.00W-30	NW SE					NC				
8.00S-4.00W-30	SW SE					NC				
8.00S-4.00W-30	SE SE					NC				
8.00S-4.00W-31	NW NE					NC				
8.00S-4.00W-31	NE NW					NC				
8.00S-4.00W-31	NW NW					NC				
8.00S-5.00W-24	SE NE					NC				
8.00S-5.00W-24	NE SW					NC				
8.00S-5.00W-24	NW SW					NC				
8.00S-5.00W-24	SW SW					NC				
8.00S-5.00W-24	SE SW					NC				
8.00S-5.00W-24	NE SE					NC				
8.00S-5.00W-24	NW SE					NC				
8.00S-5.00W-24	SW SE					NC				
8.00S-5.00W-24	SE SE					NC				
8.00S-5.00W-25	NE NE					NC				
8.00S-5.00W-25	NW NE					NC				
8.00S-5.00W-25	SW NE					NC				
8.00S-5.00W-25	SE NE					NC				
8.00S-5.00W-25	NE NW					NC				
8.00S-5.00W-25	NW NW					NC				
8.00S-5.00W-25	SW NW					NC				
8.00S-5.00W-25	SE NW					NC				
8.00S-5.00W-25	NE SW					NC				
8.00S-5.00W-25	NW SW					NC				
8.00S-5.00W-25	SE SW					NC				
8.00S-5.00W-25	NE SE					NC				
8.00S-5.00W-25	NW SE					NC				
8.00S-5.00W-25	SW SE					NC				
8.00S-5.00W-25	SE SE					NC				
8.00S-5.00W-36	NE NE					NC				
8.00S-5.00W-36	NW NE					NC				
8.00S-5.00W-36	NE NW					NC				
Sum of Acres: 0.0										

Water Right Genealogy

No genealogy records available for this water right, try the family link below instead.

View Water Rights in same Family

Help understanding and working with the Water Rights Information System

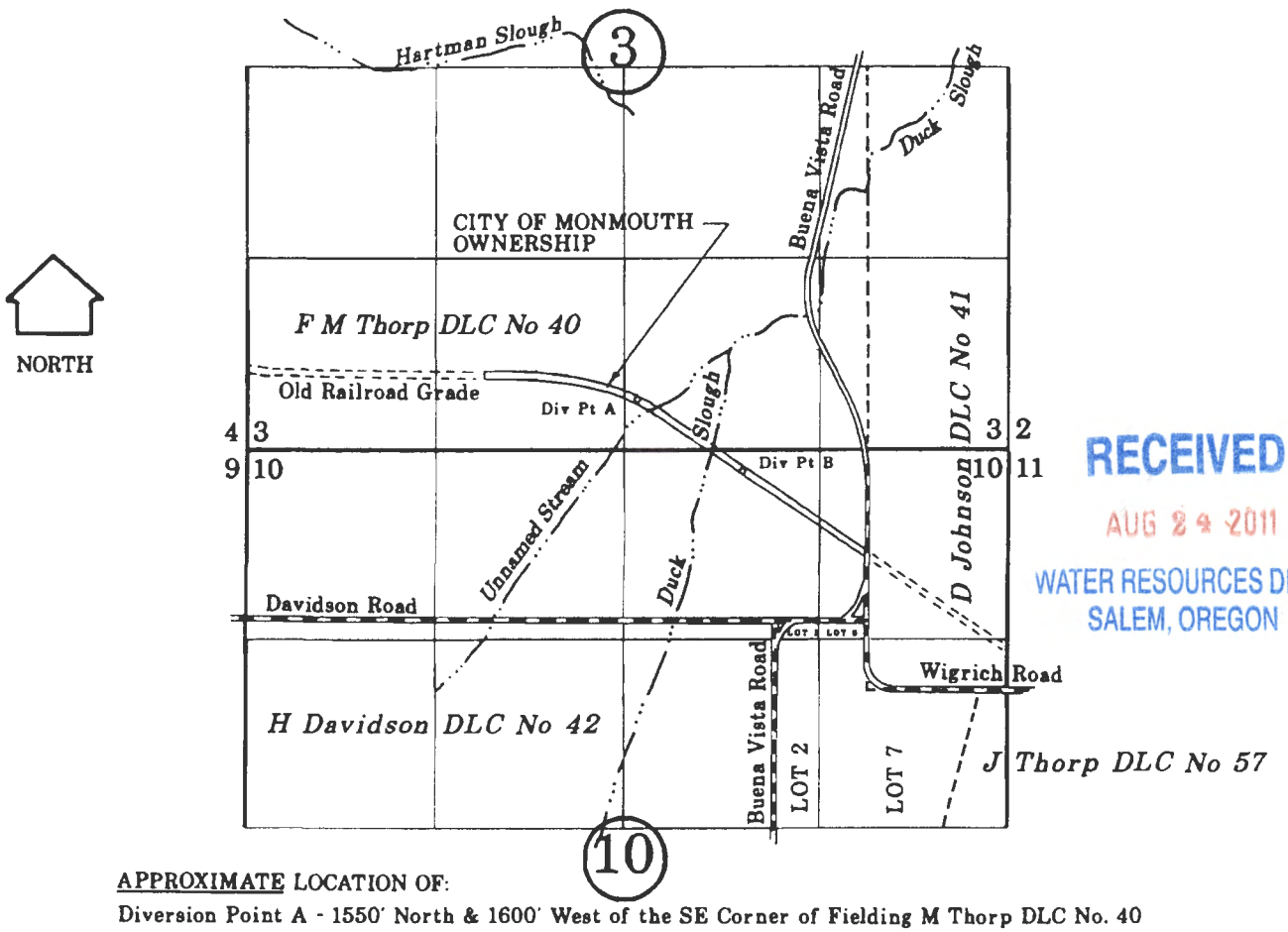
Report Errors with Water Right Data

Return to WRIS Query

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T 9 S, R 4 W, WM

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APPROXIMATE LOCATION OF:

Diversion Point A - 1550' North & 1600' West of the SE Corner of Fielding M Thorp DLC No. 40

Diversion Point B - 1050' North & 850' West of the SE Corner of Fielding M Thorp DLC No. 40

APPLICATION TO APPROPRIATE GROUND WATER

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SALEM, OREGON

Application G13521 Permit G12976

City of Monmouth

Scale: 1" = 1320'

October 1, 1993

Certified Water Right Examiner
#208 WRE
Corbey Boatwright
May 30, 1989
STATE OF OREGON

NOTE: This map is for the purpose of identifying the location of water rights and has no intent to dimension or locate property ownership lines.

Places of Use from Water Rights in the Same Area

The following rights have acreage in the same quarter-quarter as Permit: G 12976 *

Right	Name	Decree	App	Permit	Cert	Priority	Status	Use	T-R-S-QQ	DLC	Gov't Lot	Acres
CLAIM:GR 72 *	ELLIS H BREEDEN					12/31/1948	NC	IR	08.00S-05.00W-25-SESE			16.0000
CLAIM:GR 2868 *	FRED F NOYES					6/24/1950	NC	IR	08.00S-04.00W-30-NENE			5.0000
								IR	08.00S-04.00W-19-SESE			5.0000
PERMIT: G 6093 *	LUCKIAMUTE DOMESTIC WATER COOPERATIVE		G-6816	G-6093		2/18/1975	NC	QM	08.00S-05.00W-36-NENE			
								QM	08.00S-05.00W-36-NWNE			
								QM	08.00S-05.00W-36-NENW			
								QM	08.00S-04.00W-31-NWNW			
								QM	08.00S-04.00W-31-NWNE			
								QM	08.00S-04.00W-31-NENW			
PERMIT: G 8747 *	LUCKIAMUTE DOMESTIC WATER COOPERATIVE		G-9321	G-8747		7/23/1979	NC	GD	08.00S-04.00W-31-NENW			
								GD	08.00S-04.00W-31-NWNE			
								GD	08.00S-04.00W-31-NWNW			
								GD	08.00S-05.00W-36-NENW			
								GD	08.00S-05.00W-36-NWNE			
								GD	08.00S-05.00W-36-NENE			
PERMIT: G 9543 *	LUCKIAMUTE DOMESTIC WATER COOPERATIVE		G-9789	G-9543		1/6/1982	NC	GD	08.00S-05.00W-25-NENW			
								GD	08.00S-05.00W-25-NWNW			
								GD	08.00S-05.00W-25-SENW			
								GD	08.00S-05.00W-25-SWNW			
								GD	08.00S-05.00W-25-NESW			
								GD	08.00S-05.00W-25-NWSW			
								GD	08.00S-05.00W-25-SESW			
CERT:83231 OR *	CITY OF INDEPENDENCE		G-11243	G-10375	83231	3/8/1984	NC	QM	08.00S-04.00W-20-NWSW			
								QM	08.00S-04.00W-20-SWSW			
								QM	08.00S-04.00W-29-SWNW			
PERMIT: G 12001 *	LUCKIAMUTE DOMESTIC WATER COOPERATIVE		G-12706	G-12001		11/13/1991	NC	QM	08.00S-05.00W-36-NENE			
								QM	08.00S-05.00W-36-NWNE			
								QM	08.00S-05.00W-36-NENW			
								QM	08.00S-05.00W-24-SENE			
								QM	08.00S-05.00W-24-NESE			
								QM	08.00S-05.00W-24-NWSE			
								QM	08.00S-05.00W-24-NESW			
								QM	08.00S-05.00W-24-NWSW			
								QM	08.00S-04.00W-29-SWSW			
								QM	08.00S-04.00W-29-NWSW			
								QM	08.00S-05.00W-24-SESW			
								QM	08.00S-05.00W-24-SWSW			
								QM	08.00S-04.00W-31-NWNW			
								QM	08.00S-05.00W-25-SWNW			
								QM	08.00S-05.00W-25-NWNW			
								QM	08.00S-05.00W-25-NENW			
								QM	08.00S-04.00W-31-NWNE			
								QM	08.00S-04.00W-31-NENW			
								QM	08.00S-04.00W-30-NESE			
								QM	08.00S-04.00W-30-NWSE			

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							QM	08.00S-04.00W-30-SESE				
							QM	08.00S-04.00W-30-SWSE				
							QM	08.00S-04.00W-30-NESW				
							QM	08.00S-04.00W-30-SESW				
							QM	08.00S-04.00W-30-SWSW				
							QM	08.00S-05.00W-25-NWSW				
							QM	08.00S-05.00W-25-SENW				
							QM	08.00S-05.00W-25-NESW				
							QM	08.00S-05.00W-25-SESW				
CERT:31516 OR *	MELFORD M NELSON	R-36589	R-2702	31516	8/9/1961	NC	ST	08.00S-05.00W-25-NESW		60		
CERT:71041 OR *	CHARLES LAUDES	R-77450		71041	1/1/1993	NC	LV	08.00S-04.00W-31-				
							LV	08.00S-04.00W-31-				
							LV	08.00S-04.00W-31-				
PERMIT: R 14069 *	RON SHINKLE	R-86044	R-14069		7/13/2004	NC	MP	08.00S-04.00W-19-SENW				
CERT:9877 OR *	OREGON MILLING & WAREHOUSE CO.	S-14015	S-10106	9877	3/30/1931	NC	IR	08.00S-04.00W-19-SWSE				15.0000
CERT:12347 OR *	W T HOFFMAN	S-15757	S-11615	12347	3/22/1935	NC	IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-SWNE		66		5.2000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-SENE		66		2.7000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-NWSE		66		10.0000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-NESE		66		0.2000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
							IR	08.00S-04.00W-19-			2	0.3000
							IR	08.00S-04.00W-19-			3	0.8000
CERT:19467 OR *	FRED F NOYES	S-22820	S-17961	19467	9/18/1947	NC	IR	08.00S-04.00W-30-NENE		66		2.6000
							IR	08.00S-04.00W-19-SESE		66		5.4000
CERT:31517 OR *	MELFORD M NELSON	S-36590	S-27702	31517	8/9/1961	NC	IR	08.00S-05.00W-25-NWNE		60		0.2000
							IR	08.00S-05.00W-25-SWNE		70		0.5000
							IR	08.00S-05.00W-25-SENW		60		7.2000
							IR	08.00S-05.00W-25-NESW		60		0.2000
CERT:57841 OR *	FRED C / LENA M VOIGT	S-56026	S-41944	57841	6/6/1977	NC	IR	08.00S-05.00W-25-SESE		70		2.0000

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WATER RESOURCES DEPT
SALEM, OREGON

Oregon
John A. Kitzhaber, MD, Governor

Water Resources Department
North Mall Office Building
725 Summer St. NE, Suite A
Salem, OR 97301
Phone 503-986-0900
FAX 503-986-0904
www.wrd.state.or.us

September 21, 2011

CITY OF MONMOUTH
ATTENTION: CRAIG JOHNS
151 WEST MAIN ST
MONMOUTH, OR 97361

REFERENCE: Pending Application for Extension of Time for Application G-13521 (Permit G-12976)

Dear Municipal Water Right Holder:

On May 24, 2011, the Department provided you with a copy of the proposed fishery resource protection conditions that may be proposed in the proposed final order for the extension of time for Permit G-12973. After receiving further clarification from the Department's GW section regarding the hydraulic connection between Duck slough and the Willamette River, the conditions proposed in the May 24, 2011 letter have been revised.

The purpose of this letter is to provide you with notification as per OAR 690-315-0080(2)(f) of revised fishery resource protection conditions that may be proposed in the proposed final order under OAR 690-315-0050; the revised conditions are enclosed for your review. Significant revisions are highlighted in the copy being mailed to you.

This letter will also act to provide you notice of your opportunity to request the Department place any of the above referenced municipal permit extension applications on administrative hold.

If you should have any questions concerning your extension request you may contact me at (503) 986-0827.

Sincerely,

Ann L. Reece
Water Rights Specialist

Enclosures

cc: Appl G-13521
Mike McCord, Watermaster District # 16
Brooke Salterello, 4B Engineering & Consulting, 3700 River Rd N, Suite 2, Keizer, OR 97303

Ann Reece

From: Tim S Hardin [tim.s.hardin@state.or.us]
Sent: Tuesday, September 20, 2011 11:24 AM
To: REECE Ann L
Subject: RE: Duck Slough and Willamette River / Fish Persistence Conditions for Permit G-12976

Ann,

ODFW concurs that these revised conditions are consistent with the advice we provided 2/1/2011.

TH

Tim Hardin
Instream Flow Specialist
Oregon Department of Fish and Wildlife
3406 Cherry Avenue NE
Salem, OR 97303
ph. 503-947-6093
fax 503-947-6070
email: Tim.S.Hardin@state.or.us

From: Ann Reece [mailto:ann.l.reece@state.or.us]
Sent: Tuesday, September 13, 2011 10:00 AM
To: HARDIN Tim S
Subject: FW: Duck Slough and Willamette River / Fish Persistence Conditions for Permit G-12976

Tim:

Based on ODFW's advice for the above referenced permit and OWRD's continuing review, OWRD has re-drafted the proposed fish persistence conditions for this extension of time.

I received further clarification from the GW section regarding their February 27, 2006 Fish Persistence GW Review. The estimated PSI with the Willamette River depends on the hydraulic connection between Duck Slough and the Willamette River; Duck Slough is hydraulically connected to the Willamette River only during part of the year. Please see the e-mail chain below for a better explanation. Furthermore, the permit has a condition that restricts the use of water during the months of July and August when Duck Slough is flowing into the Willamette River. I revised the Fish Persistence Condition to more fully reflect the GW review and the permit condition mentioned above.

Additionally, language was added to the Fish Persistence Condition to anticipate relocations of the point(s) of appropriation(s) and the resulting requirement for a new Division 9 GW review to quantify PSI, if any, at the new locations.

All changes are highlighted in yellow.

Please let me know if ODFW concurs that these revised proposed conditions are consistent with the fish persistence advice provided to OWRD on February 1, 2011. The revised proposed conditions for the City of Monmouth are attached to this e-mail.

Best Regards,

Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

From: Karl Wozniak
Sent: Tuesday, September 13, 2011 8:10 AM
To: Ann Reece
Subject: RE: Duck Slough and Willamette River

That is correct.
Karl Wozniak

From: Ann Reece
Sent: Wednesday, September 07, 2011 12:37 PM
To: Karl Wozniak
Subject: RE: Duck Slough and Willamette River

Karl,

If I understand correctly, then for the purpose of a Fish Persistence condition that the best PSI values to use in order to best estimate the impacts on the Willamette River is should be follows:

> December through May (months when Duck Slough is hydraulically connected to the Willamette River: 4.84 cfs (PSI with Duck Slough during first 6 months of pumping)
>
> June through November (months when Duck Slough is not hydraulically connected to the Willamette River: 2.53 cfs (PSI with the Willamette River during the first 6 months of pumping)

Once I have understood your e-mail correctly, and you confirm it, then I will make this e-mail chain a part of the extension record and that will suffice for clarification of the GW review for Persistence of Fish for Permit G-12976.

Best Regards,
Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

From: Karl Wozniak
Sent: Wednesday, September 07, 2011 11:36 AM
To: Ann Reece
Subject: RE: Duck Slough and Willamette River

Ann,

The model that I used to evaluate interference can only estimate impacts to a single stream with no other streams in the system. It cannot evaluate the simultaneous impact to two different streams. However, we can estimate the combined impacts in the following manner.

Because the hydraulic connection between the aquifer and Duck Slough is expected to be very efficient, Duck Slough will be the principal hydraulic boundary when water is present in Duck Slough. Under these conditions, all stream depletion from the wells will occur in Duck Slough in close proximity to the wells. However, since Duck Slough is tributary to the Willamette River (1.8 miles downstream), decreases in flow to Duck Slough will produce similar flow decreases in the Willamette River with very little time lag. When water is not present in Duck Slough, the cone of depression from the wells will expand to the Willamette River and then begin to deplete flow in the river. One way to estimate the magnitude and timing of impacts to the Willamette River is to assume that pumping is first begun in December. From December through May, Duck Slough has water in it so the decrease in flow to the Willamette for these months is essentially the decrease in flow to Duck Slough over the first 6 months of pumping (the first 6 months of the table for Duck Slough in the Extension Review). From June through November, when Duck Slough is dry, the cone of depression will expand to the Willamette River and the decrease in flow to the Willamette River during these months will be equivalent to the first six months of pumping from the wells estimated by the model scenario for the Willamette River only (the first 6 months of the table for the Willamette River in the Extension Review). To summarize, an estimate of the impacts to the Willamette River from the first year of pumping can be made by combining the first 6 months of the model scenario that uses Duck Slough as the only stream and the first 6 months of the model scenario that uses the Willamette River as the only stream.

Let me know if this needs further clarification. Can we use this email or do we need a formal memo or re-review to document this logic in the file?

Karl

From: Ann Reece
Sent: Wednesday, September 07, 2011 8:10 AM
To: Karl Wozniak
Subject: Duck Slough and Willamette River

Karl,

I see in my notes from when I talked to Mike M. that Duck Slough is connected to the Willamette River Dec > May. Does that change your thinking in how you could simply add a couple of sentences to the GW review to address PSI with the Willamette?

Ann

Willamette River – Proposed Fish Persistence Conditions
for Extension of Time Proposed Final Order (PFO)
for Application G-13521 (Permit G-12976)
City of Monmouth

FINDINGS

1. Summary and Excerpts of Advice from ODFW:

Use of water under the portion of this permit that is undeveloped as of the date of the extension final order and is found to have the Potential for Substantial Interference (PSI) with the Willamette River should be conditioned to maintain, in the portions of waterways affected by water use under the permit, the persistence of listed fish species. ODFW has determined that the Willamette River will be affected by water use under this permit. ODFW's advice is based on the best available information and existing data.

ODFW recognizes that long term climatic variations will affect the amount of water the USACE will be able to release in any given year. In favorable water years, fish populations tend to increase and in unfavorable water years, fish populations contract. Climate change is likely to cause a long-term reduction in the frequency of favorable water years. The long term objective for a listed species is to have the population increase to a sustainable level over time and to be able to maintain itself through natural fluctuations in the environment.

The streamflows, in Table 1, below, are ODFW's recommended flows measured at Salem, Oregon, for maintaining the persistence of listed fish species in the Willamette River. ODFW advises the Water Resources Department to develop conditions that allow municipalities to meet their water needs while maintaining the persistence of listed fish species. Such conditions would apply if the USACE is not able to maintain the recommended fish flows.

The severity of the measures to be taken by the permit holder should reflect the degree to which the recommended streamflows are being missed and the percentage of water that is withdrawn by the municipality as compared to the overall streamflow level, and be adjusted by the ratio of water withdrawn to water being returned directly to the Willamette River through effluent discharges.

Table 1

ODFW'S RECOMMENDED MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT SALEM, OREGON	
Month	Cubic Feet per Second
July 1 – October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000 – 19,200

ODFW'S RECOMMENDED MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT SALEM, OREGON	
April 16 – April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

Streamflow Measurement Point

After analysis of flow records and how the USACE stores and releases water from its facilities to meet mainstem Willamette target flows, ODFW has determined that measuring flows at the Salem gage is sufficient for ensuring flows to maintain the persistence of listed fish are met throughout the mainstem Willamette River. Therefore, ODFW advises the Department to establish the Salem gage as the point for determining whether fish flows are being met for this municipal permit extension.

2. Department's Findings Based on Review of ODFW's Advice:

The Department is proposing conditions in this extension of time consistent with ODFW's advice (*See* Item 1 of the "Conditions" section of this PFO). There is an undeveloped portion of 6.0 cfs of water under Permit G-12976 as per OAR 690-315-0010(6)(g). Authorization to use any water under this permit can only be granted through the Department's review and approval of the municipal permit holder's future WMCPs (OAR 690-086). When ODFW's recommended target flows are missed, the Department's proposed conditions may result in a reduction in the amount of the undeveloped portion of water under Permit G-12976 having PSI with the Willamette River that can be appropriated. The proposed conditions in this extension of time are based on the following findings:

a. As determined by the Department on February 27, 2006, and September 7, 2011, use of the undeveloped portion of this permit, being 6.0 cfs, will result in 2.53 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is not hydraulically connected to the Willamette River which typically occurs June through November, and will result in 4.84 cfs of surface water interference with the Willamette River after 180 days of pumping when Duck Slough is hydraulically connected to the Willamette River which typically occurs December through May. For the purpose of conditioning this permit to maintain the persistence of fish, the Department finds that the amount of the undeveloped portion of water under G-12976 having PSI with the Willamette River is 2.53 cfs during the months of June through November, and 4.84 cfs during the months of December through May.

b. The streamflows needed to maintain the persistence of fish must be measured at

Salem, Oregon, USGS GAGE No.14191000, or its equivalent.

c. From April 1 through April 15, the target flow is expressed as a range. Because these flows are the "Recommended Fish flow Minimums" the lesser number in the range (15,000 cfs) is used in developing conditions to maintain the persistence of fish species.

d. When target flows are missed, use of the undeveloped portion of the permit that impacts Willamette River surface water may need to be reduced in proportion to the degree to which the recommended streamflows are being missed. ODFW's formula for determining the percent shortfall, or missed target flows in the Willamette River is defined as:

$$1 - (Q / Q_T),$$

where Q is the flow at the point of interest, and Q_T is the target flow (from Table 1).

e. For the period of April through June, ODFW's advice recognized that the main influence on river flow levels is federal management of the dams and release of surplus storage water to meet listed fish flow needs. The advice also noted that withdrawal of water in the spring months will have minimal overall impact on streamflows. The full use of the undeveloped portion of Permit G-12976 represents a very small fraction of the April-June recommended streamflows in the Willamette River at Salem.

For the period of July through October, ODFW's advice recognized that the main influence on river flow levels continues to be the federal management of the dams. While the advice noted that withdrawal of water in these summer-fall months will have a proportionally greater effect on flows, it represents an only slightly higher impact compared to the April-June impact; the full use of the undeveloped portion of Permit G-12976 represents a higher, but still small fraction of the July-October recommended streamflows in the Willamette River at Salem.

In most years, late fall and winter flows are much higher than the recommended flows during this time period.

Therefore, consistent with ODFW's advice that the main influence of river flow levels is the federal management of the dams and that the severity of the measures to be taken by the permit holder should reflect the percentage of water that is withdrawn by the municipality as compared to the overall streamflow level, the Department proposes to limit any overall reduction to the undeveloped portion having PSI with the Willamette River to no more than 20 percent of the undeveloped portion having PSI with the Willamette River.

f. ODFW's advice recognizes that municipalities may return a certain amount of

flow to a river or stream through their effluent discharge. If the withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, then ODFW recommends that any reduction to use of the amount of the undeveloped portion of Permit G-12976 that impacts Willamette River surface water should be adjusted by the monthly estimated percentage of the difference between the total water withdrawals and their return flows. Therefore, consistent with ODFW's advice, when appropriate, the Department proposes to adjust any reduction by a "Consumptive Use Percentage," as generally determined by (1- [total municipal wide returned flows/ total municipal wide appropriated flows]).

1. Conditions to Maintain the Persistence of Listed Fish

A. Minimum Fish Flow Needs

Minimum fish flow needs in the Willamette River as recommended by ODFW are in Table 2, below; flows are to be measured in the Willamette River at Salem, Oregon (USGS Gage Number 14191000, or its equivalent).

Table 2

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
Month	Cubic Feet per Second
July 1– August 31[1]	5,630
September 1 – October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 –April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

[1] A condition on the permit allows the use of water during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

B. Determining Water Use Reductions - Generally

The undeveloped portion of water under G-12976 having PSI with the Willamette

River is 2.53 cfs during the months of June through November, and 4.84 cfs during the months of December through May. The maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is determined in proportion to the amount by which the flows shown in Table 2 are missed based on a seven day rolling average of mean daily flows measured in the Willamette River at Salem (USGS Gage Number 14191000, or its equivalent). The percent of missed target flows is defined as:

$$(1 - (Q_A / Q_T)) \times 100\%,$$

where Q_A is the actual flow measured at the designated gage based on the seven day rolling average, and Q_T is the target flow (from Table 2).

The percent missed target flows applied to the undeveloped portion of this permit having PSI with the Willamette River provides the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition, and is defined as:

$$E_{PSI} - (E_{PSI} \times \% \text{ missed target flows}),$$

where E_{PSI} is undeveloped portion of the permit as of this extension having PSI with the Willamette River, being 2.53 cfs June through November, and 4.84 cfs December through May.

The maximum amount of water that can be appropriated as a result of this persistence condition may be adjusted by a Consumptive Use Percentage, when applicable, as per Item 1.C., below. The overall reduction to the amount of the undeveloped portion having PSI with the Willamette River of the permit will not exceed 20%.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages
The City of Monmouth has not identified any Consumptive Use Percentages based on the return of flows to the Willamette River through effluent discharge. Thus, at this time the City may not utilize Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages
Utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to

each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 1.C.f., below.

Consumptive Use Percentages submitted to the Department for review must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates

Continuing the utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition beyond an approval period (as described in 1.C.f., below) is contingent upon the City submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 1.C.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices

If there are changes to either wastewater technology or the practices at the City's waster water treatment facility resulting in 25% or more reductions in average monthly return flows to the Willamette River, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to the Willamette River as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 1.C.f., below.

If such changes to either wastewater technology or the practices at the City's waster water treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates as per 1.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

e. Relocation of the Point(s) of Appropriation (s) and/or Return Flows
If the point(s) of appropriation(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

After relocation of the point(s) of appropriation(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 1.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages
The utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may continue for a 10 year approval period that begins 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 1.C.d., or 1.C.e. (above) are applicable.

Consumptive Use Percentages (first time utilization or updates) which are submitted and receive the Director's concurrence will begin a new 10 year approval period. The approval period begins on the date of the Water Resources Director's concurrence with Consumptive Use Percentages Updates, as evidenced by the record. The City at its discretion may submit updates prior to the end of an approval period.

D. Examples

Example 1: Target flow met

On June 20, the last seven mean daily flows were 9500, 9200, 9000, 8500, 8750, 7500 and 7250 cfs. The seven day rolling average (Q_A) is 8528 cfs. The amount of the undeveloped portion of the permit having PSI with the Willamette River that can be appropriated would not be reduced because the 7 day average of mean daily flows is greater than the 8500 cfs target flows (Q_T) for June 20.

Example 2: Target flow missed.

Step 1: If on June 20, the average of the last seven mean daily flows was 7200 cfs, and the target flow is 8500 cfs, then the target flow would be missed by 15.3%.

$$(1 - (7200 / 8500)) \times 100\% = 15.3\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%[1] during the month of June and the utilization of this percentage is authorized, and the target flow is missed by 15.3% (from Step 1), then the amount of the undeveloped portion of the permit having PSI with the Willamette River that could be appropriated would be reduced by 12.0%.

$$(78.7\% \times 15.3\%) / 100 = 12.0\%$$

(If adjustments are not to be made by a Consumptive Use Percentage, then the undeveloped portion of the permit having PSI with the Willamette River would only be reduced by the % by which the target flow is missed – 15.3% in this example).

Step 3: The overall reduction of 12% of the amount of the undeveloped portion of the permit having PSI with the Willamette River does not exceed 20%.

Step 4: The undeveloped portion of this permit having PSI with the Willamette River (E_{PSI}) during June is 2.53 cfs. Therefore, in this example, the maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is 2.23 cfs.

$$2.53 - ((2.53 \times 12.0\%) / 100) = 2.23$$

Step 5: Given that the entire permit, being 6.0 cfs, is undeveloped and the undeveloped portion having PSI with the Willamette River in June is 2.53 cfs, if the amount of water legally authorized for appropriation at a given point in time (for example, authorization provided through a WMCP) is 4.0 cfs, then 0.53 cfs of the undeveloped water having PSI with the Willamette River would be used to satisfy the 4.0 cfs.

$$4.0 - (6.0 - 2.53) = 0.53$$

Note: (6.0 – 2.53) equals the undeveloped portion of the permit not having PSI

In this example, the 0.53 cfs of undeveloped water having PSI with the

[1] Currently, the City of Monmouth may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7% is only for illustrative purposes in this example.

Willamette River is less than the 2.23 cfs maximum undeveloped portion of the permit having PSI with the Willamette River (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, there would be no required reduction in water use of the undeveloped portion under the permit.

Step 6: If the amount of water legally authorized for appropriation at a given point in time is 6.0 cfs, then 2.53 cfs of undeveloped water having PSI with the Willamette River would be used to satisfy the 6.0 cfs.

$$6.0 - (6.0 - 2.53) = 2.53$$

In this example, the 2.53 cfs of undeveloped water is greater than the 2.23 cfs maximum undeveloped portion having PSI with the Willamette (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, the amount of undeveloped water (having PSI with the Willamette River) appropriated would need to be reduced by 0.30 cfs.

$$2.53 - 2.23 = 0.30$$

In this example, the maximum amount of water that could be appropriated is 5.70 cfs.

$$6.0 - 0.30 = 5.70$$

E. Relocation of the Point(s) of Appropriation (s) and New Quantification of PSI.

Any relocation of the point(s) of appropriation(s) through a permit amendment or transfer process will require a new OWRD ground water review pursuant to OAR Chapter 690 Division 9 to determine if use of water at the relocated point(s) of appropriation(s) has the potential for substantial interference (PSI) with surface water. This review will be used to quantity a new value for E_{PSI}, being the undeveloped portion of the permit as of this extension having PSI with the surface water based on the new locations of the point(s) of appropriation(s). The new value for E_{PSI} will be then utilized in the calculations for determining the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition.

Oregon
Theodore R. Kulongoski, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1266
503-986-0900
FAX 503-986-0904

April 29, 2010

City of Monmouth
Attn: Public Works Director
151 West Main Street
Monmouth, OR 97361

REFERENCE: Pending Application for Extension of Time
Water Right Application G-13521 (Permit G-12976)

Dear Municipal Water Right Holder:

The purpose of this letter is to provide you with notification as per OAR 690-315-0080(2)(b) that the above referenced municipal permit extension application was delivered to ODFW on February 2, 2010 for review under OAR 690-315-0080.

If you have any questions concerning your extension request you may contact me at (503) 986-0813.

Sincerely,

Scott Kudlemyer
Water Rights Specialist

cc: Application G-13521 (Permit G-12976)
Mike McCord Watermaster District 16

Memo

Oregon Water Resources Department
Water Rights & Adjudication Division

To: Rick Kepler, ODFW Date: 2/2/10

From: Dwight French, Administrator
Water Rights & Adjudication Division

RE: Recommendation on maintaining the persistence of listed fish species
ODFW's review under OAR 690-315-0080

Attached to this cover memo please find the extension of time application for the **City of** Monmouth water right file **Appl** G-13521 / **Permit** G-12976. Also attached is any supplemental information we have received from the extension applicant including a copy of any agreements they might have that may address the issue of "persistence." To assist your review, we have also attached water availability information (80% and 50% tables) for the diversion point. If this is a ground water file, the Department has found that there is the potential for substantial interference with surface water and the information we have developed to support this finding is attached.

The source of water for this permit is: 2 wells in the Duck Slough Basin

The undeveloped portion of this permit is: 6.0 cfs

Please send us a Division 315 Fish Persistence Evaluation or check one of the following four statements and sign, date and return this form to Scott Kudlemyer at OWRD (fax number 503-986-0901).

___ Use of the undeveloped portion of this permit <u>will</u> maintain the persistence of listed fish species.

___ Use of the undeveloped portion of this permit <u>will not</u> maintain the persistence of listed fish species.

___ Use of (and as a result of) the undeveloped portion of this permit will maintain the persistence of listed fish species only if the attached fishery resource conditions are made a part of the permit for the undeveloped portion of this permit.

___ An agreement exists regarding use of the undeveloped portion of the permit between the permit holder and a federal or state agency that includes conditions or required actions that maintain the persistence of listed fish species in the portions of waterways affected by water use under the permit.

ODFW Staff Date

Oregon
Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
Office of the Director
3406 Cherry Avenue, NE
Salem, OR 97303
503.947.6044
FAX 503.947.6042
TTY 503.947.6339
www.dfw.state.or.us

April 29, 2010

Mr. Phil Ward
Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271

Dear ~~Mr.~~ Phil Ward:

With this letter, the Oregon Department of Fish and Wildlife is notifying the Water Resources Department, as allowed under OAR 690-315-0080 (2) (d) that ODFW will require additional time to complete the review and evaluation of Municipal Water Right Extension G-13521/12976 for the City of Monmouth. The additional time will not exceed 60 days or a total of 120 days for review unless the applicant consents to more time.

Sincerely,

Curtis E Melcher

Curt Melcher
Deputy Director

Cc: Craig Johns, Director, Public Works Department, City of Monmouth
Brooke Blakemore, 4B Engineering

RECEIVED
MAY 11 2010
WATER RESOURCES DEPT
SALEM OREGON

Permit Extension Ground Water Review

Date: February 27, 2006

To: Doug Woodcock, Ground Water Section Manager

From: Karl C. Wozniak, Permit Extension Review

Subject: Ground Water Review for File #G-13521 / Permit #G-1297 C

(Date permit issued: Oct. 31, 1996 *)*

The above referenced permit is currently being reviewed for an extension of time. Before I can determine whether or not an extension of time should be granted, a Ground Water review for this file is necessary. Special designations affecting this permit are as follows:

NOTE: *Original Division 9 review completed by:* D. Woodcock (Nov. 2, 1993)

☐ Located within a Ground Water Administrative Area *(Critical, Limited, etc.)* _____

☐ 5-Year Limited Permit

☐ Other: _____

☑ None *(no special designations)*

For Ground Water / Hydrology Staff Use:

Please answer the following questions. If necessary, attach an additional sheet.

1. Does the ground water source under this permit have the potential for substantial interference with surface water? Yes
   *[**NOTE:** Applies **ONLY** to **Municipal permits issued before November 2, 1998** - see OAR 690-315-0080(1) & (2)]*

2. Should any additional conditions be added to this permit? No

3. Should the extension of time request be ***DENIED*** due to ground water supply concerns? No
   *[**NOTE:** Does **NOT** apply to **Quasi-Municipal or Municipal** permits issued on or before November 2, 1998 - see OAR 690-315-0080(5)]*

4. Should the Department establish a new reference level for water level declines due to the failure of permittee to submit annual measurements? No

5. Other issues or concerns? A water-level monitoring plan was submitted on June 28, 2005 (8 years after it was due) and approved on July 5, 2005. The plan stipulates that a reference level will be measured in September 2005 and that measurements will be made annually in September. However, no measurement was submitted for 2005.

Ann Reece

From: Karl Wozniak
Sent: Tuesday, September 13, 2011 8:10 AM
To: Ann Reece
Subject: RE: Duck Slough and Willamette River

That is correct.
Karl Wozniak

From: Ann Reece
Sent: Wednesday, September 07, 2011 12:37 PM
To: Karl Wozniak
Subject: RE: Duck Slough and Willamette River

Karl,

If I understand correctly, then for the purpose of a Fish Persistence condition that the best PSI values to use in order to best estimate the impacts on the Willamette River is should be follows:

> December through May (months when Duck Slough is hydraulically connected to the Willamette River: 4.84 cfs (PSI with Duck Slough during first 6 months of pumping)
>
> June through November (months when Duck Slough is not hydraulically connected to the Willamette River: 2.53 cfs (PSI with the Willamette River during the first 6 months of pumping)

Once I have understood your e-mail correctly, and you confirm it, then I will make this e-mail chain a part of the extension record and that will suffice for clarification of the GW review for Persistence of Fish for Permit G-12976.

Best Regards,
Ann Reece

- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

From: Karl Wozniak
Sent: Wednesday, September 07, 2011 11:36 AM
To: Ann Reece
Subject: RE: Duck Slough and Willamette River

Ann,

The model that I used to evaluate interference can only estimate impacts to a single stream with no other

streams in the system. It cannot evaluate the simultaneous impact to two different streams. However, we can estimate the combined impacts in the following manner.

Because the hydraulic connection between the aquifer and Duck Slough is expected to be very efficient, Duck Slough will be the principal hydraulic boundary when water is present in Duck Slough. Under these conditions, all stream depletion from the wells will occur in Duck Slough in close proximity to the wells. However, since Duck Slough is tributary to the Willamette River (1.8 miles downstream), decreases in flow to Duck Slough will produce similar flow decreases in the Willamette River with very little time lag. When water is not present in Duck Slough, the cone of depression from the wells will expand to the Willamette River and then begin to deplete flow in the river. One way to estimate the magnitude and timing of impacts to the Willamette River is to assume that pumping is first begun in December. From December through May, Duck Slough has water in it so the decrease in flow to the Willamette for these months is essentially the decrease in flow to Duck Slough over the first 6 months of pumping (the first 6 months of the table for Duck Slough in the Extension Review). From June through November, when Duck Slough is dry, the cone of depression will expand to the Willamette River and the decrease in flow to the Willamette River during these months will be equivalent to the first six months of pumping from the wells estimated by the model scenario for the Willamette River only (the first 6 months of the table for the Willamette River in the Extension Review). To summarize, an estimate of the impacts to the Willamette River from the first year of pumping can be made by combining the first 6 months of the model scenario that uses Duck Slough as the only stream and the first 6 months of the model scenario that uses the Willamette River as the only stream.

Let me know if this needs further clarification. Can we use this email or do we need a formal memo or re-review to document this logic in the file?

Karl

From: Ann Reece
Sent: Wednesday, September 07, 2011 8:10 AM
To: Karl Wozniak
Subject: Duck Slough and Willamette River

Karl,

I see in my notes from when I talked to Mike M. that Duck Slough is connected to the Willamette River Dec > May. Does that change your thinking in how you could simply add a couple of sentences to the GW review to address PSI with the Willamette?

Ann

OREGON WATER RESOURCES DEPARTMENT
GROUND WATER REVIEW: MUNICIPAL PERMIT EXTENSION OF TIME

Date: February 27, 2006

To: Water Rights Section

From: Karl C. Wozniak, Staff Hydrogeologist

Extension Review for File # G- 13521 **/ Permit # G-** 12976

****

The undeveloped portion of this permit has been evaluated under the Department's 690-09 rules and **Was** ☒ **/ was not** ☐ found to have the Potential for Substantial Interference with surface water. The evaluation was conducted pursuant to OAR 690-315. Forward files found to have the potential for substantial interference to Oregon Department of Fish and Wildlife.

Undeveloped Portion of Permit in CFS: 6.0

Estimate of impact and location of evaluation (River mile or PLS)
Stream depletion occurs over a stream reach. Depletion can be variable due to the presence or absence of confining layers within the aquifer. The majority of the impact will extend over a reach twice the distance between the well and the stream.

Stream: Duck Slough **Location** _____

Days of Pumping

30	60	90	120	150	180	210	240	270	300	330	360
3.60	4.15	4.431	4.61	4.74	4.84	4.92	4.98	5.04	5.08	5.12	5.16

Interference in CFS

Direct interference with Duck slough and its tributaries (as estimated in the above table) will only occur when the water table is at or above the elevation of the bed of the slough. This is likely only in the wet winter and spring months. However, pumping at other times will continue to lower the water table and increase the length of time that the slough remains dry during the year. When Duck slough is dry, most pumping impacts will be at the Willamette River. This table of estimated impacts is only valid when Duck slough has water in it.

Stream: Willamette River **Location** River Mile 98

Days of Pumping

30	60	90	120	150	180	210	240	270	300	330	360
0.30	0.99	1.54	1.95	2.28	2.53	2.74	2.92	3.07	3.20	3.32	3.42

Interference in CFS

This table of estimated impacts is only valid when Duck slough is not flowirg for 360 days.

Municipal/Quasi-Municipal Extension of Time Review

TO: Water Rights Section Date **February 27, 2006**

FROM: Ground Water/Hydrology Section **Karl C. Wozniak**
Reviewer's Name

SUBJECT: File G- **13521** Supersedes review of _____
Date of Review(s)

Criteria for Department Review of Extension Applications for Municipal and Quasi-Municipal Water Use Permits (Ground Water)

OAR 690-315-0080 (2)(c): *For ground water permits submitted to ODFW under this rule* (permits determined to have the potential for substantial interference), *the Department shall provide to ODFW and the applicant the Department's estimate of surface water impacts that would result from the use of the undeveloped portion of the ground water permit.* **This review is based upon available information and agency policies in place at the time of evaluation.**

A. GENERAL INFORMATION: Applicant's Name: **City of Monmouth** County: **Polk**

Applicant(s) seek(s) **6.00** cfs from **2** well(s) in the **Willamette** Basin,

Duck Slough subbasin Quad Map: **Monmouth**

Proposed use: **Municipal** Seasonality: **Year Round**

Well and aquifer data **(attach and number logs for existing wells; mark proposed wells as such under logid)**:

Well	Logid	Applicant's Well #	Proposed Aquifer*	Proposed Rate(cfs)	Location (T/R-S QQ-Q)	Location, metes and bounds, e.g. 2250' N, 1200' E fr NW cor S 36
1	**POLK 50392**	**A**	**Alluvium**	**6.00**	**09S/04W-03 SW/SE**	**1550' N, 1600' W fr SE cor DLC 40**
2	**Proposed**	**B**	**Alluvium**	**6.00**	**09S/04W-10 NW/NE**	**1050' N, 850' W fr SE cor DLC 40**
3						
4						
5						

* Alluvium, CRB, Bedrock

Well	Well Elev ft msl	First Water ft bls	SWL ft bls	SWL Date	Well Depth (ft)	Seal Interval (ft)	Casing Intervals (ft)	Liner Intervals (ft)	Perforations Or Screens (ft)	Well Yield (gpm)	Draw Down (ft)	Test Type
1	**164**	**19**	**10**	**6/2/97**	**57**	**0-25**	**-3-34**		**34-44**	**950**	**22**	**P**
1	**165**						**44-57**					

Use data from application for proposed wells.

Comments: The applicant's wells will produce water from late Pleistocene alluvial sands and gravels deposited by the Willamette River. These Willamette River flood-plain sediments form a wedge that thickens toward the river. The wedge of permeable sediments thins to a zero edge against low-yield Tertiary marine sediments that outcrop in the hills about 1 mile to the west. Well 2 (B) should have similar characteristics to Well 1 (A).

☐ **Well(s) #** _____, _____, _____, _____, _____, tap(s) an aquifer limited by an administrative restriction.
Name of administrative area: _____
Comments: _____

File 13521 continued Date February 27, 2006

GROUND WATER/SURFACE WATER CONSIDERATIONS, OAR 690-09-040

690-09-040 (1): Evaluation of aquifer confinement:

Well	Aquifer or Proposed Aquifer	Confined	Unconfined
1	**Alluvium**	☐	☒
2	**Alluvium**	☐	☒
		☐	☐
		☐	☐
		☐	☐

Basis for aquifer confinement evaluation: Although local semi-confinement by fine-grained overbank deposits is likely, the coarse-grained nature of the sediment package (see well log) and the depositional environment of the sediments (see O'Connor, and others, 2001) indicate that the alluvial aquifer in the vicinity of the well is likely to be unconfined.

690-09-040 (2) (3): Evaluation of distance to, and hydraulic connection with, surface water sources. All wells located a horizontal distance less than ¼ mile from a surface water source that produce water from an unconfined aquifer shall be assumed to be hydraulically connected to the surface water source. Include in this table any streams located beyond one mile that are evaluated for PSI.

Well	SW #	Surface Water Name	GW Elev ft msl	SW Elev ft msl	Distance (ft)	Hydraulically Connected? YES	NO	ASSUMED	Potential for Subst. Interfer. Assumed? YES	NO
1	1	**Duck Slough & tributaries**	**154-165**	**140**	**75**	☒	☐	☐	☒	☐
2	1	**Duck Slough & tributaries**	**154-165**	**140**	**250**	☒	☐	☐	☒	☐
1	2	**Willamette River**	**154**	**140**	**5900**	☒	☐	☐	☐	☒
2	2	**Willamette River**	**154**	**140**	**6400**	☒	☐	☐	☐	☒
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐
						☐	☐	☐	☐	☐

Basis for aquifer hydraulic connection evaluation: Ground water in coarse-grained alluvial sediments is generally hydraulically connected to local streams. This is consistent with published water-level maps which indicate that ground-water flows toward, and discharges to, the Willamette River. Hydraulic connection to Duck slough will only occur during those times of the year when the water table rises above the elevation of the bed of the slough. This is probably likely only in the wet winter and spring months. At other times of the year, the wells will interfere with the Willamette River.

Water Availability Basin the well(s) are located within: WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000

690-09-040 (4): Evaluation of stream impacts for each well that has been determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. Limit evaluation to instream rights and minimum stream flows that are pertinent to that surface water source, and not lower SW sources to which the stream under evaluation is tributary. Compare the requested rate against the 1% of 80% *natural* flow for the pertinent Water Availability Basin (WAB). If Q is not distributed by well, use full rate for each well. Any checked ☒ box indicates the well is assumed to have the potential to cause PSI.

Well	SW #	Well < ¼ mile?	Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
1	1	☒	☒			☐	**3620**	☐	**60**	☒
2	1	☒	☒			☐	**3620**	☐	**60**	☒
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐
		☐	☐			☐		☐		☐

690-09-040 (4): Evaluation of stream impacts by total appropriation for all wells determined or assumed to be **hydraulically connected and less than 1 mile** from a surface water source. **Complete only if Q is distributed among wells.** Otherwise same evaluation and limitations apply as in C3a above.

	SW #		Qw > 5 cfs?	Instream Water Right ID	Instream Water Right Q (cfs)	Qw > 1% ISWR?	80% Natural Flow (cfs)	Qw > 1% of 80% Natural Flow?	Interference @ 30 days (%)	Potential for Subst. Interfer. Assumed?
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐
			☐			☐		☐		☐

Comments: Direct interference with Duck slough and its tributaries will only occur when the water table is at or above the elevation of the bed of the slough. However, pumping at other times will continue to lower the water table and increase the length of time that the slough remains dry during the year.

690-09-040 (5): Estimated impacts on **hydraulically connected surface water sources greater than one mile** as a percentage of the proposed pumping rate. Limit evaluation to the effects that will occur up to one year after pumping begins. This table encompasses the considerations required by 09-040 (5)(a), (b), (c) and (d), which are not included on this form. Use additional sheets if calculated flows from more than one WAB are required.

Non-Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	2	%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS		**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**	**6.00**
Interference CFS		**0.295**	**0.986**	**1.537**	**1.953**	**2.275**	**2.532**	**2.744**	**2.921**	**3.073**	**3.204**	**3.319**	**3.421**

Distributed Wells Well	SW#	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
		%	%	%	%	%	%	%	%	%	%	%	%
Well Q as CFS													
Interference CFS													
Total Interf. CFS													

Comments: Impacts to the Willamette River were only estimated for well 1 which is nearer to the river. Impacts from well 2 will be slightly less because of the slightly greater distance. These impacts will only occur when Duck slough is dry.

Extension Review Remarks / Conditions:

Attach estimates of surface water impacts to this review

References Used:

Conlon, T.D., and others, 2005. Ground-Water Hydrology of the Willamette Basin, Oregon. USGS Scientific Investigations Report 2005-5168.

Gannett, M.W. and Caldwell, R.R., 1998, Geologic Framework of the Willamette Lowland Aquifer System, Oregon and Washington: U.S. Geological Survey Professional Paper 1424-A.

Gonthier, J.B., 1983, Groundwater Resources of the Dallas-Monmouth Area, Polk, Benton, and Marion Counties, Oregon: Oregon Water Resources Department Ground Water Report No. 28.

O'Connor, and others, 2001, Origin, Extent, and Thickness of Quaternary Geologic Units in the Willamette Valley, Oregon: U.S. Geological Survey Professional Paper 1620.

Water Availability Tables

DETAILED REPORT ON THE WATER AVAILABILITY CALCULATION
Water Availability as of 2/27/2006 for
WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000

Watershed ID #: 183 Basin: WILLAMETTE Exceedance Level: 80
Time: 13:08 Date: 02/27/2006

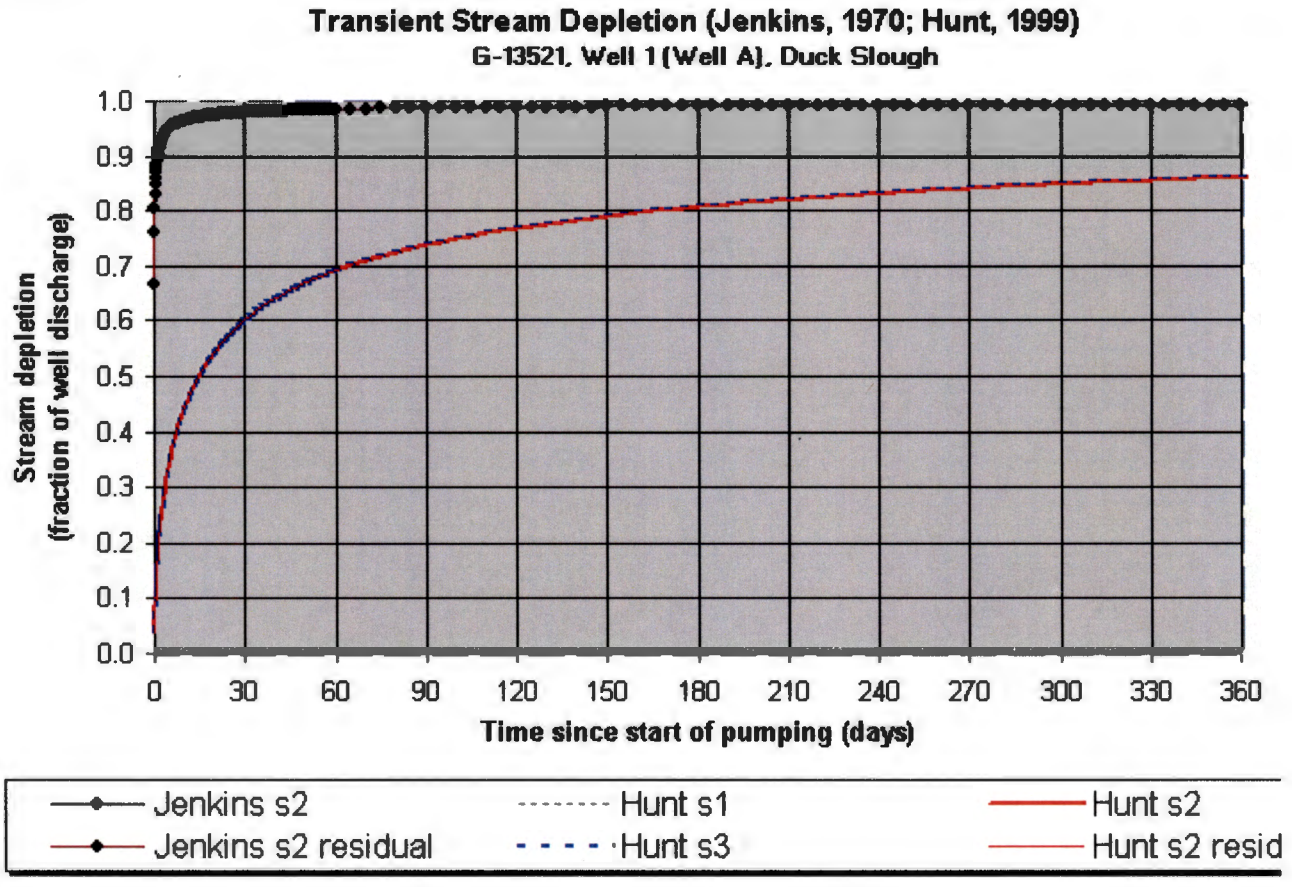
Month	Natural Stream Flow	Consumptiv Use and Storage	Expected Stream Flow	Reserved Stream Flow	Instream Require-ments	Net Water Available
1	18400.00	1961.90	16400.00	0.00	1300.00	15100.00
2	20100.00	7149.70	13000.00	0.00	1300.00	11700.00
3	19600.00	6937.60	12700.00	0.00	1300.00	11400.00
4	18000.00	6595.00	11400.00	0.00	1300.00	10100.00
5	15500.00	3882.70	11600.00	0.00	1300.00	10300.00
6	8310.00	1459.00	6850.00	0.00	1300.00	5550.00
7	4710.00	1217.00	3490.00	0.00	1300.00	2190.00
8	3620.00	1105.30	2520.00	0.00	1300.00	1220.00
9	3680.00	931.30	2750.00	0.00	1300.00	1450.00
10	4650.00	475.30	4170.00	0.00	1300.00	2870.00
11	9400.00	582.30	8820.00	0.00	1300.00	7520.00
12	16700.00	634.90	16100.00	0.00	1300.00	14800.00
Stor-50%	13500000	1962800	11500000	0	942000	10600000

DETAILED REPORT OF INSTREAM REQUIREMENTS
Water Availability as of 2/27/2006 for
WILLAMETTE R > COLUMBIA R - AB MILL CR AT GAGE 14191000

Watershed ID #: 183 Basin: WILLAMETTE Exceedance Level: 80
Time: 13:08 Date: 02/27/2006

APP #	MF 183	0	0	0	0	0	0	MAXIMUM
Status	Cert.							
1	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
2	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
3	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
4	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
5	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
6	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
7	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
8	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
9	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
10	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
11	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00
12	1300.00	0.00	0.00	0.00	0.00	0.00	0.00	1300.00

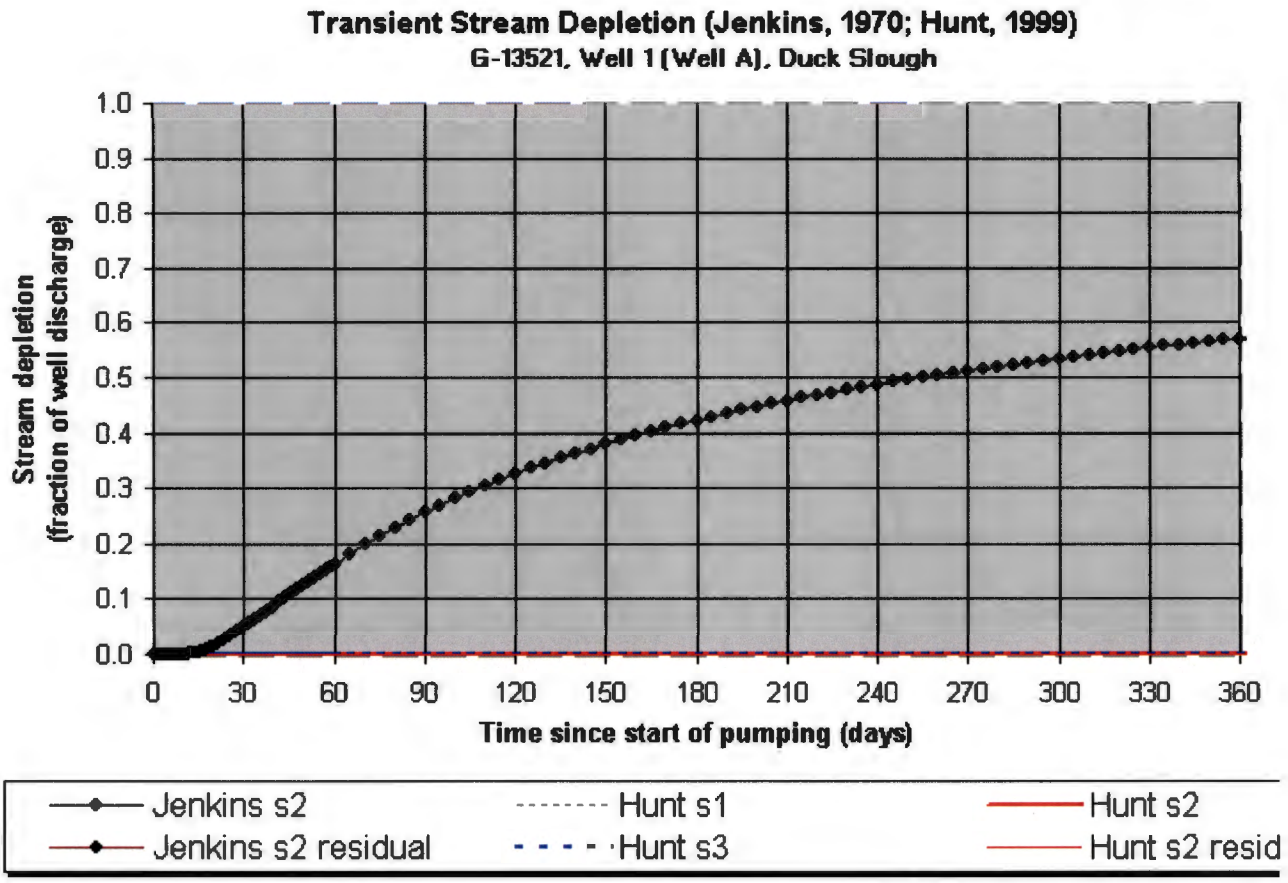
Interference Estimates



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 365 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	0.601	0.691	0.739	0.769	0.790	0.807	0.820	0.831	0.840	0.847	0.854	0.860
Qw, cfs	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
H SD s2, cfs	3.605	4.148	4.431	4.613	4.743	4.841	4.920	4.984	5.039	5.085	5.125	5.160
Jkns s2, cfs	5.880	5.915	5.931	5.940	5.946	5.951	5.955	5.958	5.960	5.962	5.964	5.965

Parameters:		**Scenario 1**	**Scenario 2**	**Scenario 3**	**Units**
Net steady pumping rate	Qw	6	6	6	cfs
Distance to stream	a	75	75	75	ft
Aquifer hydraulic conductivity	K	1000	1000	1000	ft/day
Aquifer thickness	b	30	30	30	ft
Aquifer transmissivity	T	30000	30000	30000	ft*ft/day
Aquifer storage coefficient	S	0.2	0.2	0.2	
Stream width	ws	10	10	10	ft
Streambed hydraulic conductivity	Ks	10	10	10	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	33.33333333	33.33333333	33.33333333	ft/day
Stream depletion factor (Jenkins)	sdf	0.0375	0.0375	0.0375	days
Streambed factor (Hunt)	sbf	0.083333333	0.083333333	0.083333333	



Output for Hunt Stream Depletion, Scenerio 2 (s2): Time pump on = 365 days

Days	30	60	90	120	150	180	210	240	270	300	330	360
Hunt SD s2	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
Qw, cfs	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000	6.000
H SD s2, cfs	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
Jkns s2, cfs	0.295	0.986	1.537	1.953	2.275	2.532	2.744	2.921	3.073	3.204	3.319	3.421

Parameters:		Scenario 1	Scenario 2	Scenario 3	Units
Net steady pumping rate	Qw	6	6	6	cfs
Distance to stream	a	5900	5900	5900	ft
Aquifer hydraulic conductivity	K	1000	1000	1000	ft/day
Aquifer thickness	b	30	30	30	ft
Aquifer transmissivity	T	30000	30000	30000	ft*ft/day
Aquifer storage coefficient	S	0.2	0.2	0.2	
Stream width	ws	400	400	400	ft
Streambed hydraulic conductivity	Ks	10	10	10	ft/day
Streambed thickness	bs	3	3	3	ft
Streambed conductance	sbc	1333.333333	1333.333333	1333.333333	ft/day
Stream depletion factor (Jenkins)	sdf	232.0666667	232.0666667	232.0666667	days
Streambed factor (Hunt)	sbf	262.2222222	262.2222222	262.2222222	

Polk
50392

RECEIVED
JUN 19 1997
WATER RESOURCES DEPT.
SALEM, OREGON

WELL I.D.# 134
(START CARD) # 095448

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

Instructions for completing this report are on the last page of this form.

(1) OWNER: Well Number P - 1
Name City of Monmouth
Address 151 W Main St.
City Monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 57 ft.
Explosives used ☐ Yes ☒ No Type ____ Amount ____

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
16	0	57	Cement	0	25	39 + bent

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from 25 ft. to 27 ft. Material 3/8 Crushed
Gravel placed from 57 ft. to 27 ft. Size of gravel P-gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	12in	+3	34	.250	☒	☐	☒	☐
	12in	44	57	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☒ Screens Type V-Slot Material Stainless steel

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
34	44	250		12in		☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.
1000	22 ft		5 1/2
950	22 ft.		18 1/2 hr

Temperature of water 54 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other
Depth of strata:

(9) LOCATION OF WELL by legal description:
County Polk Latitude ____ Longitude ____
Township 9-S N or S Range 4-W E or W. WM.
Section 3 SW 1/4 SE 1/4
Tax Lot 700 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) North of Intersection of Buena Vista Rd + Davidson Rd on W-Side

(10) STATIC WATER LEVEL:
10 ft ft. below land surface. Date 6-2-97
Artesian pressure ____ lb. per square inch. Date ____

(11) WATER BEARING ZONES:
Depth at which water was first found 19

From	To	Estimated Flow Rate	SWL
19	25	Cased off	
25	45.5	950	10

(12) WELL LOG:
Ground Elevation

Material	From	To	SWL
Fill	0	4	
Sticky brown clay	4	19	
Fine Sand + Gray Clay	19	25	
Fine to Med Grdy Sand	25	30	
Coarse Water Sand	30	32	
Coarse Sand + Gravel mostly gravel	32	34	
Coarse Gravel + small amount of Sand	34	45.5	
Brown Clay	45.5	48	
Red Sticky Clay	48	57	

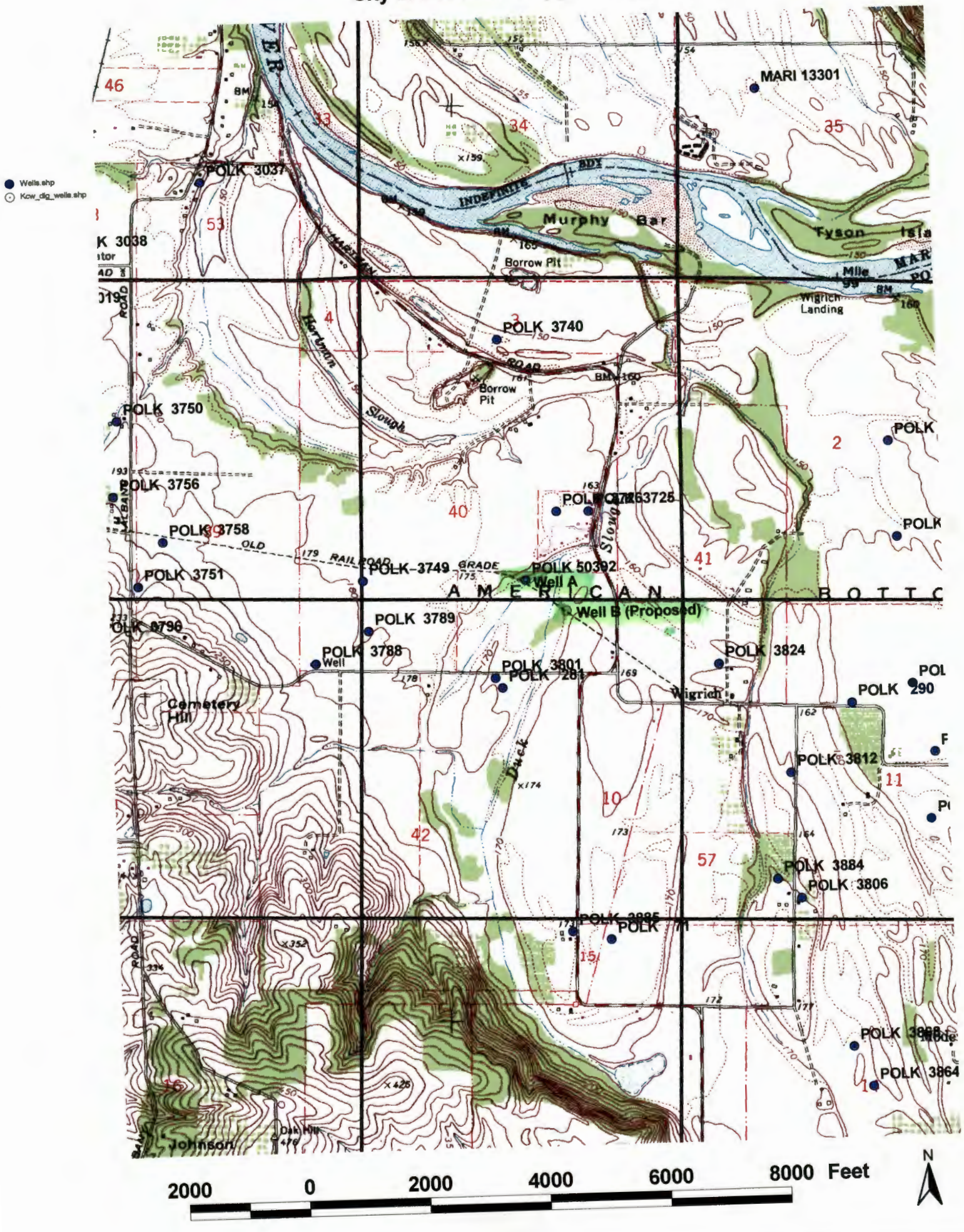
Date started 5-13-97 Completed 6-4-97

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number 1629
Signed ____ Date 6-10-97

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
WWC Number 1273
Signed Floyd A Sipe Date 6-10-97

ORIGINAL & FIRST COPY-WATER RESOURCES DEPARTMENT SECOND COPY-CONSTRUCTOR THIRD COPY-CUSTOMER

City of Monmouth Appl. G-13521



Oregon
John A. Kitzhaber, MD, Governor

Department of Fish and Wildlife
Office of the Director
3406 Cherry Ave NE
Salem, OR 97303-4924
503.947.6044
Fax 503.647.6042
www.dfw.state.or.us

February 1, 2011

RECEIVED
FEB 08 2011
WATER RESOURCES DEPT
SALEM, OREGON

Mr. Phil Ward, Director
Water Resources Department
725 Summer Street NE, Suite A
Salem, OR 97301

Re: ODFW's Division 315 Evaluation of Fish Persistence for Municipal Extension
City of Monmouth Application # G-13521

Dear Director Ward:

The City of Monmouth has requested an extension of time to develop the municipal water right referenced above. The undeveloped portion of their permit is 6.0 cfs, and a WRD analysis (K. Wozniak 2006) determined that this groundwater was hydraulically connected to the Willamette River. ORS 537.230(2)(c) and 537.630(2)(c) directs the Water Resource Department (WRD) to find that the undeveloped portion of the permit is conditioned to maintain, in the portions of waterways affected by water use under the permit, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law. WRD is to base their findings on existing data and advice from the Oregon Department of Fish and Wildlife (ODFW). This letter is the advice provided to WRD by ODFW.

Summary

The Water Resource Commission has recognized the need to maintain flows in the Willamette Basin for aquatic life and to minimize pollution through the adoption of Minimum Perennial Streamflows from natural flow, plus additional storage releases, in the Willamette Basin Program. The Willamette Basin Program established a minimum perennial stream flow (MPSF) from natural flow for fish of 1,500 cfs at Wilsonville (OAR 690-502-0050). The MPSF at Salem, the location of USGS Gage #14191000, is 1,300 cfs. Additionally, several other flows have been identified as necessary to maintain the persistence of listed fish species.

- An additional amount up to 4,700 cfs from storage was recommended by WRD's Willamette Basin Program to address instream flow needs;
- Higher spring flows were identified by ODFW as necessary to facilitate migration of listed Winter Steelhead through the Willamette River in April, May and June;
- Congressionally authorized minimum flows were set for July – September;

- DEQ has developed Total Maximum Daily Loads (TMDL's) for a number of constituents within the basin. Loads are based on concentrations that protect the most sensitive species at a 7Q10 base flow. The water temperature standard is of special importance, as it is set to maintain the health of salmonids, which are two of the listed fish species in this basin;

- Finally, a Biological Opinion for the Willamette River Basin Flood Control Project (BiOp) was recently completed by NOAA Fisheries. This BiOp addresses the recovery of Threatened Winter Steelhead and Spring Chinook, and includes flow targets for these listed species from the beginning of April to the end of October.

There are 13 United States Army Corps of Engineers (USACE) storage projects in the basin, which store about 1.6 million acre feet of water. The Willamette Basin Program and the USACE have identified a number of beneficial uses for this stored water, including fish and wildlife needs; however, the Bureau of Reclamation, through the state water right system, originally applied for all the storage water to be designated for irrigation. This designation means that no other water use may apply for a stored water right; therefore, all other uses (including flows for fish and municipal use) must rely on natural flow or releases of uncontracted surplus stored water. Although listed fish species rely on the release of stored water to maintain viability, there is currently no means to acquire a corresponding instream flow water right or contract from stored water. The Willamette BiOp directs the USACE to meet specific flow targets to maintain flows for listed fish while balancing fish flows and water quality needs with other demands for the surplus stored water within the basin.

Evaluation

Listed Species

Fall Chinook – (Federal - Threatened, State Sensitive)
Spring Chinook – (Federal – Threatened, State Sensitive)
Coastal Cutthroat – (State Sensitive, below Willamette Falls)
Coho – (Federal - Threatened, State - Endangered)
Pacific Lamprey – (State Sensitive, Federal – petitioned for listing)
Winter Steelhead – (Federal - Threatened, State Sensitive)
Oregon Chub – (Federal - Threatened, State Sensitive).

Findings and Justification

Fish Flow Analysis: (Water Availability and Fish Flow Needs).

According to WRD's Water Availability Tables, water is still available for all months of the year; the lowest flow months are typically August and September. Regarding fish needs, only the live flow (non-storage) portion of the water needed for fish (1,300 cfs) is included in the water availability calculations. The Willamette Basin Program (OAR

690-502-0500 with Tables) identifies the Minimum Perennial Streamflows for the Willamette River Sub-basin. The identified flows were split into two components: a "Minimum Perennial Streamflow" value and an additional amount to be supplied through storage releases. These combined flows are needed for fish persistence and are one measure of fish flow needs.

In the past, the Corps of Engineers (USACE et al. 1997) augmented flows in the Willamette River through the release of water from its 13 projects to meet annually established operational target flows in the Willamette River at Albany and Salem and the basin's tributaries. These augmented flows address fish flow needs and maintain adequate water quality while balancing recreation, flood control and other needs. Flows were not guaranteed, because most of the water in storage is designated for irrigation use and could be contracted for irrigation use, although at the current time, less than 5% has been contracted for irrigation.

The USACE consulted with NOAA Fisheries, who developed a Biological Opinion (July 2008) for Winter Steelhead and Spring Chinook in the Willamette basin. The Biological Opinion included flow targets for April 1 – October 31. April-June flows were based on the ODFW analysis for steelhead migration (see above); June-September flows are the congressionally authorized flows, established in the 1950's as part of the authorization for the development of the Willamette Basin projects. The flows represent those needed to maintain navigation in the Willamette during the summer and fall and are not specifically set as flows to sustain listed fish populations (October designated flows are an extension of the authorized flows). Table 1 summarizes the monthly flows based on all the above-mentioned references, and includes an overall ODFW minimum flow recommendation for each month.

Spring flows: A study by ODFW identified the need for minimum and target flows in the Willamette and its tributaries to maintain the persistence of Winter Steelhead (Summary of Flow and Temperature Analysis for Willamette River Wild Winter Steelhead, November 24, 2003 Draft, Tom Friesen and Mary Buckman). The report focused on flows needed from April through June for spring migration of Winter Steelhead smolts out of the system (out-migration).

Two flow levels were identified for Winter Steelhead out-migration: a minimum flow (to avoid declining population growth) and a target flow (to provide positive population growth and recruitment). This advice letter, while recognizing the importance of higher target flows, is confined to minimum recommended flows.

The bulk of steelhead out-migration occurs in May with part occurring in April when flows are naturally higher, and ending in June when flows begin to decline. This range of flows is important in maintaining the genetic diversity of the species, because different portions of the population probably key in on different flow ranges. April and May flows should mimic the higher flows that would occur naturally, and June flows should mimic the declining flows; a range of flows allows the system to maintain the natural diversity of the species and its relationship to flows. The April-June flows (Table 1, Column 4) are

the ODFW-estimated minimum flows to maintain the persistence of winter steelhead populations. The Willamette BiOp suggests slightly higher flows than what ODFW has suggested for this period.

Summer-Fall flows: Flows in the summer and fall (July-October) were established by USACE in consultation with DEQ (and other state and federal agencies) to address water quality concerns and to meet water quality standards (many of the standards are set to protect fish and aquatic life). DEQ has calculated acceptable loads (TMDL's) for maintenance of water quality standards based on a 7Q10 flow (the regulated streamflow at its lowest consecutive seven day level in an average 10 year period). These 7Q10 flows need to be met to maintain water quality at a level that would continue to protect the health of listed salmonids. Therefore, these flows are one measure of the minimum needed July-October to maintain the persistence of listed fish species. The Willamette BiOp has designated the congressionally authorized flows for the USACE projects as the flows needing to be met during this period. These flows would provide adequate protection for the listed species as they are above the TMDL flows.

Late Fall and Winter flows: ODFW is recommending that the instream flows applied for by ODFW be maintained to provide habitat for listed fish rearing in the Willamette and its tributaries. These flows are the combination of the minimum perennial streamflows and the instream storage flows which would both be needed to maintain the appropriate level of habitat. In most years, flows are much higher than the recommended flows during this time period.

ODFW is recommending the use of the state's flow recommendations rather than the Willamette Biological Opinion flows. The differences between the state and federal flow recommendations are based on the objectives each law is attempting to implement. In the case of the federal Willamette Basin Biological Opinion, the objective is to set flows to allow for the recovery of federally listed fish species. Current litigation on Columbia River management of the hydroelectric system is establishing what kinds of actions are required to achieve "recovery" under the federal ESA. The state's case, on the other hand, is instructed through state law to condition the permit "to maintain, in the portions of waterways affected by water use under the permit, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law". The standard of maintaining the persistence of the listed fish is a question of state, not federal law. Under this direction, the state will be identifying the minimum flows necessary to maintain the persistence of listed fish species. ODFW is required by state law to address situations that put listed fish populations at risk of decline and extirpation. If current flows are putting a listed species at risk, then ODFW is required to restrict further depletions of flow caused by the development of currently undeveloped municipal water rights.

Table 1 – Identified fish flow needed at Salem for listed fish species.

Month	Minimum perennial streamflow (cfs)	Instream Storage Flows Not Included in Water Availability (cfs)	ODFW Minimum Recommendation for winter steelhead (cfs)	DEQ TMDL 7Q10 Flow (cfs)	Willamette BiOp Flows (cfs)	**ODFW Recommended Minimum Fish Flows** (cfs)
Oct	1,300	4,700		5,630	7,000 [2] / 5,000[3]	**5,630**
Nov	1,300	4,700				**6,000**
Dec	1,300	4,700				**6,000**
Jan	1,300	4,700				**6,000**
Feb	1,300	4,700				**6,000**
Mar	1,300	4,700				**6,000**
Apr1-15	1,300	4,700	15,000 to 19,200		17,800 / 15,000[3]	**15,000 to 19,200**
Apr16-30	1,300	4,700	17,000		17,800 / 15,000[3]	**17,000**
May	1,300	4,700	15,000		15,000 / 15,000[3]	**15,000**
Jun1-15	1,300	4,700	12,600		13,000 / 11,000[3]	**12,600**
Jun16-30	1,300	4,700	8,500		8,700 / 5,500[3]	**8,500**
Jul	1,300	4,700		5,630	6,000 [1] / 5,000[3]	**5,630**
Aug1-15	1,300	4,700		5,630	6,000 [1] / 5,000[3]	**5,630**
Aug16-31	1,300	4,700		5,630	6,500 [1] / 5,000[3]	**5,630**
Sept	1,300	4,700		5,630	7,000 [1] / 5,000[3]	**5,630**

Explanation of Table Columns

- Minimum perennial streamflow: amount of flow provided by the Willamette Basin Program (OAR 690-502) from natural flow.
- Instream Storage Flows : an additional amount of flow that can be provided from storage to address instream flow needs.
- ODFW Recommendation for Winter Steelhead: Minimum Flows to Avoid Decline in the Population (Friesen and Buckman 2003. DRAFT).
- DEQ's TMDL: 7Q10 Flows at Salem used to establish TMDL loadings to maintain water quality standards.
- Willamette BiOp: NMFS Willamette Project Biological Opinion (July 2008).
- "ODFW Recommended Fish Flow Minimums" ODFW flow recommendations taking all columns into account.
- [1]- Congressionally authorized minimum flow at Salem
- [2]-Extension of Congressionally-authorized flow to October
- [3]-Dry year flows the USACE will be targeting (not a persistence flow)

Table 2. Monthly flows with the 2008 Biological Opinion and ODFW flows, and percentage of time those flows were not met based on 1970-2007 gage records at Salem.

Time	BiOp flow	% Time Not met		ODFW flow	% Time Not met	
		1970-2007	2000-2007		1970-2007	2000-2007
October	7,000	1.8%	9.7%	5,630	0.0%	0.0%
November	6,000	0.0%	0.0%	6,000	0.0%	0.0%
December	6,000	0.0%	0.0%	6,000	0.0%	0.0%
January	6,000	0.6%	0.0%	6,000	0.6%	0.0%
February	6,000	2.1%	0.0%	6,000	2.1%	0.0%
March	6,000	0.0%	0.0%	6,000	0.0%	0.0%
April1-15	17,800	68.9%	16.7%	19,200	87.9%	37.5%
April16-30	17,800	77.8%	30.0%	17,000	67.8%	22.5%
May	15,000	33.7%	15.7%	15,000	33.7%	15.7%
June1-15	13,000	45.8%	35.8%	12,600	42.5%	29.2%
June16-30	8,700	34.6%	42.5%	8,500	33.2%	38.3%
July	6,000	13.8%	12.9%	5,630	2.9%	8.5%
August1-15	6,000	15.6%	21.7%	5,630	2.6%	12.5%
August16-31	6,500	14.8%	34.4%	5,630	0.8%	3.9%
September	7,000	11.8%	30.4%	5,630	0.0%	0.0%

*** During this period (2000-2007) the USACE operated the 13-dam complex to provide for fish flows and water quality needs as well as other beneficial uses.**

Analysis of Risk to Fish Persistence (Stock Status and Flow Restoration)

Winter Steelhead – Winter steelhead upstream of Willamette Falls make up the Upper Willamette River DPS (Distinct Population Segment). Populations in the four subbasins of this DPS are considered to be at low risk of extinction; the desired status is "very low risk" in three of these.

Migration and rearing occur in the mainstem and tributaries up- and downstream of the POD. ODFW data indicate low flows are a constraining factor for this species, especially in the spring.

Spring Chinook – Spring Chinook upstream of Willamette Falls make up the Upper Willamette River ESU (Evolutionarily Significant Unit). Populations in five of the seven subbasins of this ESU are considered to be at very high risk of extinction; the desired status is moderate to low risk in most subbasins. The mainstem Willamette is used for rearing and as a migration corridor. Adequate flows are one of the constraining factors for this ESU.

Pacific Lamprey – Species occurs throughout the basin, the stock status criteria for this species are not being met, populations are declining and there is little information about flow requirement needs.

Fall Chinook – Some of the stock status criteria are not being met for this species in downstream tributaries (Clackamas River). The species uses the mainstem Willamette for rearing and as a migration corridor, where flow can be a constraining factor.

Coho – The species is native downstream of Willamette Falls. It occurs in numerous tributaries downstream of the POD and has met all the stock status criteria in those tributaries. The mainstem Willamette is used for rearing and as a migration corridor, where flows are not considered a constraining factor.

Coastal Cutthroat – Species occurs throughout the basin and meets all the stock status criteria.

Oregon Chub – Presence/absence is unconfirmed in the vicinity of the POD. Populations exist in several Willamette tributaries, but not in the mainstem.

Chum – Extinct in tributaries downstream of the POD and in the mainstem Willamette.

Flow Restoration Priorities

Based on the Oregon Plan Flow Restoration 2001 priorities developed by ODFW and OWRD, the Willamette River downstream of the POD shows a low need for flow restoration if USACE target flows are maintained.

Existing Fish Protection Agreement

None noted

ODFW's Advice to WRD on Maintaining the Persistence of Listed Fish Species as the City of Monmouth Develops the Undeveloped Portions of its Water Right Permit for the Mainstem Willamette River

General Considerations

As directed by ORS 537.230 (2)(c) and ORS 537.630 (2)(c), ODFW provides the following advice to WRD to maintain, in the portions of waterways affected by water use under the permit, the persistence of fish species listed as sensitive, threatened or endangered under state or federal law. ODFW's advice is based on existing data. ODFW recommends the following flows and advises WRD to develop conditions which allow The City of Monmouth to meet its water needs while maintaining the persistence of listed fish species.

- The main influence on river flow levels is the federal management of the dams and release of surplus storage water to meet out-migration flow needs for listed Winter Steelhead. This species has evolved and adapted under flow conditions that vary seasonally and year to year. Winter Steelhead are adapted to the natural flow variation in the system, with flows typically high in April and slowly declining over the spring months. ODFW in consultation with the USACE and other state and federal agencies in the past have attempted to mimic this variation through surplus water storage releases in the spring and maintaining minimum flows for water quality in the summer. These flows have been recognized in the Willamette BiOp with recommended flows being generally higher than ODFW recommended flows.

- ODFW recognizes that long term climatic variations will affect the amount of water the USACE will be able to release in any given year. In favorable water years, fish populations tend to increase and in unfavorable water years, fish populations contract. Climate change is likely to cause a long-term decrease in the frequency of favorable water years. The long term objective for a listed species is to have the population increase to a sustainable level over time and be able to maintain itself through natural fluctuations in the environment.

- ODFW also recognizes that municipalities return a certain amount of flow to a river or stream through their effluent discharge. If the withdrawal point(s) and effluent discharge(s) are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, then ODFW recommends that curtailment of the water right extension be based on the monthly estimated ratio of the difference between the total water withdrawals and their return flows.

- Based on WRD's ground water review (K. Wozniak 2006), the wells are connected to the Willamette River. WRD may take this information, including the percentage connection, into consideration when setting conditions on the extension.

Specific Advice by Season of Use

April, May, June

- The Willamette BiOp recommended flows are slightly higher than the state recommendations for moderate and abundant water years. If the USACE meets the Willamette BiOp- prescribed flows, then ODFW's recommended flows will also be met during these years. During the low water years, the Willamette BiOp-prescribed flows are below those recommended by ODFW to maintain the persistence of listed fish species. In these years, municipalities should curtail their use of water as much as is feasible to provide additional flow for fish.

- Long term flow measurements at the Salem streamflow gage indicate that during this period the 7 day running averages of flow failed to meet the ODFW recommended fish flows in Table 1 about 34-88% of the time over the 1970-2007 period of record (Table 2). Since 2000 when the USACE has been managing the reservoir system to meet flows for fish and water quality, recommended flows were missed 16-38% of the time. USACE flow modeling for future operating conditions, based on the BiOp target flows, indicates that the recommended flows would be missed less than 5% of the time in "moderate" to "abundant" water years. In low water years (which, over the past 64-year period occurred 25% of the time), the USACE attempts to balance spring and summer flows with storage, recreation, irrigation contracts and other needs, and adjusts flow targets downward. The BiOp flows may be reduced below those flows which ODFW has determined are necessary to maintain the persistence of listed fish species; therefore, in low water years when the USACE is using lower flow targets, the municipality should curtail their use to minimize impacts to listed fish species.

- Use of the presently-undeveloped portion of the City of Monmouth's groundwater right would represent a very small fraction of the April-June streamflow in the Willamette at Salem. The City of Monmouth water use will typically be appreciably lower than its full right during this time of the year since the largest consumptive uses have not yet begun and the majority of the flow will return to the river at some point through sewerage discharges. Therefore, withdrawal of water in the spring will have minimal overall impact on streamflows.

ODFW Advice: Use of water under the portion of this permit that was undeveloped as of the date of the extension final order should be conditioned to maintain persistence of listed fish species consistent with the ODFW recommended flows in Table 1. If the USACE is not able to maintain the recommended fish flows, the City of Monmouth

should have the amount of water that can be diverted through this extension reduced, through conditioning the permit. The severity of the measures taken should reflect the degree to which the recommended flows are being missed, the percentage of water that is withdrawn by the municipality vs. the overall streamflow level and an adjustment to the amount to be curtailed by the ratio of water withdrawn to water being returned directly to the same stream through effluent discharges.

July, August, Sept, October

- The main influence on river flow levels continues to be the federal management of the dams. The USACE will be attempting to balance other water uses with the release of water to meet the Willamette BiOp flows and water quality needs. The main objectives for fish persistence review during this period are to maintain rearing habitat and good water quality for fish health.

- The TMDL 7Q10 flows represent the minimum necessary flow to maintain water quality. The 7Q10 flow level for the Willamette at Salem is currently 5,630 cfs, but could be modified in the future based on what flow levels the USACE is able to maintain over time, therefore, the 7Q10 flow levels for the TMDL could change over time based on what flows the USACE is able to consistently maintain. ODFW is recommending that the TMDL flows be met to maintain the listed fish populations during this period.

- The flows recommended in the Willamette BiOp during this period are the congressionally authorized flows, which are higher than the TMDL 7Q10 flows. Since the USACE will be attempting to meet the BiOp target flows in most years, the TMDL flows should be met. In low water years, the Willamette BiOp-prescribed flows are below those recommended by ODFW to maintain the persistence of listed fish species. In these low-flow years, municipalities should curtail their use of water as much as is feasible to provide additional flow for fish.

- During this time period, the City of Monmouth municipal water right is a higher, but still small, fraction of the flows recommended by ODFW. The consumptive portion of the City's use is expected to be appreciably higher than in the spring and winter, thus reducing the proportion that the municipality will return to the river with sewerage return flows. Willamette River flows are lower during this time period and therefore water withdrawals have a proportionally greater effect on flows. The recommended flows were missed from 0 to 3 % of the time based on the last 38 years of Salem gaging records (Table 2). USACE flow modeling for future operations, based on the BiOp flow targets, indicates that the recommended flows would be missed less than 5% of the time in "abundant" water years, and from 5-20% of the time in "moderate" water years.

ODFW Advice: Use of water under the portion of this permit that was undeveloped as of the date of the extension final order should be conditioned to maintain persistence of

listed fish species consistent with the recommended flows in Table 1. If the USACE is not able to maintain the recommended fish flows, the City of Monmouth should have the water that can be diverted through this extension reduced through conditioning the permit. The severity of the measures taken should reflect the degree to which the recommended flows are being missed, the percentage of water that is withdrawn by the municipality vs. the overall streamflow level and an adjustment to the amount to be curtailed by the ratio of water withdrawn to water being returned directly to the same stream through effluent discharges.

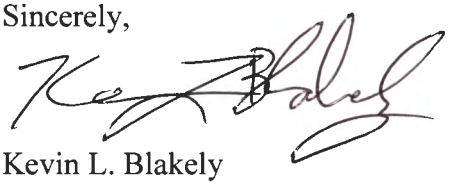
November – March

- Municipal use is typically low during this time of the year due to the discontinuation of the more substantial consumptive uses in the municipal system. Willamette River flows are dependent on storage schedules for filling USACE reservoirs. Typically, flows exceed minimum perennial streamflows and corresponding flows from storage for instream needs. Based on the past 38 years, the recommended flows were missed, during this period, from 0 to 2% of the time.

ODFW Advice: Use of water under the portion of this permit that was undeveloped as of the date of the extension final order should be conditioned to maintain persistence of listed fish species in the Willamette basin consistent with the recommended flows in Table 1. If the USACE is not able to maintain the recommended fish flows, the City of Monmouth should have the water that can be diverted through this extension reduced through conditioning the permit. The severity of the measures taken should reflect the degree to which the recommended flows are being missed, the percentage of water that is withdrawn by the municipality vs. the overall streamflow level, the estimated percent connection of the groundwater to the Willamette River, and an adjustment to the amount to be curtailed by the ratio of water withdrawn to water being returned directly to the same stream through effluent discharges.

This concludes ODFW's advice to WRD on City of Monmouth's Municipal Extension Application # G-13015. If you have questions about our advice or need further clarification please contact Rick Kepler, the manager of our Water Quality/Quantity Section, at 503-947-6084.

Sincerely,



Kevin L. Blakely
Acting Deputy Director

Cc: Rick Kepler, Oregon Department of Fish & Wildlife
Steve Marx, Oregon Department of Fish & Wildlife

Steve Mamoyac, Oregon Department of Fish & Wildlife
Craig Johns, City of Monmouth, Public Works
Scott McClure, City Manager, City of Monmouth
Brooke Saltarello, 4B Engineering and Consulting

Ann Reece

From: Tim S Hardin [tim.s.hardin@state.or.us]
Sent: Monday, May 23, 2011 10:40 AM
To: Ann Reece
Subject: RE: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

#8926 follows the same steps and calculations as #13521, so I concur with it as well.

Tim Hardin
Instream Flow Specialist
Oregon Department of Fish and Wildlife
3406 Cherry Avenue NE
Salem, OR 97303
ph. 503-947-6093
fax 503-947-6070
email: Tim.S.Hardin@state.or.us

From: Ann Reece [mailto:reeceal@wrd.state.or.us]
Sent: Thursday, April 14, 2011 2:12 PM
To: HARDIN Tim S
Subject: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

Tim Harden
ODFW
Salem, OR

RE: Appl G-13521 / Permit G-12976
Appl G-8926 / Permit G-8579

Tim:

Based on ODFW's advice for the above 2 referenced permits, OWRD has drafted the proposed fish persistence conditions for each extension. Please let me know if ODFW concurs that these proposed conditions are consistent with the fish persistence advice provided to OWRD on February 1, 2011. The proposed conditions are attached to this e-mail.

Best Regards,
Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

Ann Reece G-13521

From: Tim S Hardin [tim.s.hardin@state.or.us]
Sent: Monday, May 23, 2011 9:14 AM
To: Ann Reece
Subject: RE: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

Well, I notice that the bottom line in your PFO example is 0.45 curtailment. And since the amount of reduction is really what matters to the cities, I don't think I will be suggesting changes in the language.

The fact is, when you combine the curtailment formula with GL water, PSI, and return flow credits, it is going to be confusing no matter how you word it!

TH

Tim Hardin
Instream Flow Specialist
Oregon Department of Fish and Wildlife
3406 Cherry Avenue NE
Salem, OR 97303
ph. 503-947-6093
fax 503-947-6070
email: Tim.S.Hardin@state.or.us

From: Ann Reece [mailto:reeceal@wrd.state.or.us]
Sent: Thursday, May 19, 2011 4:37 PM
To: HARDIN Tim S
Subject: RE: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

GL= green light water

Tim,

6.0 – 0.45 (the amount of reduction to the undeveloped portion having PSI) = 5.55 as you calculated below. (GL water minus reduction = how much they can pump). Regardless of the amount of GL water, the amount they can pump will always = 5.55 (at 8.6% missed flow target) – so long as GL water exceeds the maximum undeveloped portion having PSI that they are allowed to pump.

I'm not sure if it is more helpful to show a City how much they have to cut back, or the bottom line for how much they can pump. It seems our emphasis has been on how much of their water they can't use. (The cost of fish persistence).

However, I am very open to suggestions if there is a better/clearer way to present the calculations. I don't always look at things in the most direct fashion.

What do you think?

Ann

From: Tim S Hardin [mailto:tim.s.hardin@state.or.us]
Sent: Thursday, May 19, 2011 11:21 AM
To: Ann Reece
Subject: FW: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

Hi Ann,

Just making sure I understand the conditions for G-13521

When you get to Step 6, you have that Monmouth can withdraw 4.71 out of the 5.16 that is connected (curtailment of 0.45)

They can also withdraw the whole 0.84 that is not connected, right? So they can actually pump 4.71 + 0.84 = 5.55 cfs?

TH

Tim Hardin
Instream Flow Specialist
Oregon Department of Fish and Wildlife
3406 Cherry Avenue NE
Salem, OR 97303
ph. 503-947-6093
fax 503-947-6070
email: Tim.S.Hardin@state.or.us

From: Ann Reece [mailto:reeceal@wrd.state.or.us]
Sent: Thursday, April 14, 2011 2:12 PM
To: HARDIN Tim S
Subject: Proposed Fish Persistence Conditions -Appl #s: G-13521; G-8926 --Monmouth

Tim Harden
ODFW
Salem, OR

RE: Appl G-13521 / Permit G-12976
Appl G-8926 / Permit G-8579

Tim:

Based on ODFW's advice for the above 2 referenced permits, OWRD has drafted the proposed fish persistence conditions for each extension. Please let me know if ODFW concurs that these proposed conditions are consistent with the fish persistence advice provided to OWRD on February 1, 2011. The proposed conditions are attached to this e-mail.

Best Regards,
Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

Willamette River – Proposed Fish Persistence Conditions
for Extension of Time Proposed Final Order (PFO)
for Application G-13521 (Permit G-12976)
City of Monmouth

FINDINGS

1. Summary and Excerpts of Advice from ODFW:

Use of water under the portion of this permit that is undeveloped as of the date of the extension final order and is found to have the Potential for Substantial Interference (PSI) with the Willamette River should be conditioned to maintain, in the portions of waterways affected by water use under the permit, the persistence of listed fish species. ODFW has determined that the Willamette River will be affected by water use under this permit. ODFW's advice is based on the best available information and existing data.

ODFW recognizes that long term climatic variations will affect the amount of water the USACE will be able to release in any given year. In favorable water years, fish populations tend to increase and in unfavorable water years, fish populations contract. Climate change is likely to cause a long-term reduction in the frequency of favorable water years. The long term objective for a listed species is to have the population increase to a sustainable level over time and to be able to maintain itself through natural fluctuations in the environment.

The streamflows, in Table 1, below, are ODFW's recommended flows measured at Salem, Oregon, for maintaining the persistence of listed fish species in the Willamette River. ODFW advises the Water Resources Department to develop conditions that allow municipalities to meet their water needs while maintaining the persistence of listed fish species. Such conditions would apply if the USACE is not able to maintain the recommended fish flows.

The severity of the measures to be taken by the permit holder should reflect the degree to which the recommended streamflows are being missed and the percentage of water that is withdrawn by the municipality as compared to the overall streamflow level, and be adjusted by the ratio of water withdrawn to water being returned directly to the Willamette River through effluent discharges.

Table 1

ODFW'S RECOMMENDED MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT SALEM, OREGON	
Month	Cubic Feet per Second
July 1 – October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000 – 19,200

ODFW'S RECOMMENDED MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT SALEM, OREGON	
April 16 – April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

Streamflow Measurement Point

After analysis of flow records and how the USACE stores and releases water from its facilities to meet mainstem Willamette target flows, ODFW has determined that measuring flows at the Salem gage is sufficient for ensuring flows to maintain the persistence of listed fish are met throughout the mainstem Willamette River. Therefore, ODFW advises the Department to establish the Salem gage as the point for determining whether fish flows are being met for this municipal permit extension.

2. Department's Findings Based on Review of ODFW's Advice:

The Department is proposing conditions in this extension of time consistent with ODFW's advice (*See* Item 1 of the "Conditions" section of this PFO). There is an undeveloped portion of 6.0 cfs of water under Permit G-12976 as per OAR 690-315-0010(6)(g). Authorization to use any water under this permit can only be granted through the Department's review and approval of the municipal permit holder's future WMCPs (OAR 690-086). When ODFW's recommended target flows are missed, the Department's proposed conditions may result in a reduction in the amount of the undeveloped portion of water under Permit G-12976 having PSI with the Willamette River that can be appropriated. The proposed conditions in this extension of time are based on the following findings:

a. As determined by the Department on February 27, 2006, use of the undeveloped portion of this permit, being 6.0 cfs, will result in 5.16 cfs of surface water interference with the Willamette River after 360 days of pumping. For the purpose of conditioning this permit to maintain the persistence of fish, the Department finds that the amount of the undeveloped portion of water under G-12976 having PSI with the Willamette River is 5.16 cfs.

b. The streamflows needed to maintain the persistence of fish must be measured at Salem, Oregon, USGS GAGE No.14191000, or its equivalent.

c. From April 1 through April 15, the target flow is expressed as a range. Because these flows are the "Recommended Fish flow Minimums" the lesser number in the range (15,000 cfs) is used in developing conditions to maintain the persistence of fish species.

d. When target flows are missed, use of the undeveloped portion of the permit that impacts Willamette River surface water may need to be reduced in proportion to the degree to which the recommended streamflows are being missed. ODFW's formula for determining the percent shortfall, or missed target flows in the Willamette River is defined as:

$$1 - (Q / Q_T),$$

where Q is the flow at the point of interest, and Q_T is the target flow (from Table 2).

e. For the period of April through June, ODFW's advice recognized that the main influence on river flow levels is federal management of the dams and release of surplus storage water to meet listed fish flow needs. The advice also noted that withdrawal of water in the spring months will have minimal overall impact on streamflows. The full use of the undeveloped portion of Permit G-12976 represents a very small fraction of the April-June recommended streamflows in the Willamette River at Salem.

For the period of July through October, ODFW's advice recognized that the main influence on river flow levels continues to be the federal management of the dams. While the advice noted that withdrawal of water in these summer-fall months will have a proportionally greater effect on flows, it represents an only slightly higher impact compared to the April-June impact; the full use of the undeveloped portion of Permit G-12976 represents a higher, but still small fraction of the July-October recommended streamflows in the Willamette River at Salem.

In most years, late fall and winter flows are much higher than the recommended flows during this time period.

Therefore, consistent with ODFW's advice that the main influence of river flow levels is the federal management of the dams and that the severity of the measures to be taken by the permit holder should reflect the percentage of water that is withdrawn by the municipality as compared to the overall streamflow level, the Department proposes to limit any overall reduction to the undeveloped portion having PSI with the Willamette River to no more than 20 percent of the undeveloped portion having PSI with the Willamette River.

f. ODFW's advice recognizes that municipalities may return a certain amount of flow to a river or stream through their effluent discharge. If the withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, then ODFW recommends that any reduction to use of the amount of the undeveloped portion of Permit G-12976 that impacts Willamette River surface water should be adjusted by the monthly estimated percentage of the difference between the total water withdrawals and their return flows. Therefore, consistent with ODFW's

advice, when appropriate, the Department proposes to adjust any reduction by a "Consumptive Use Percentage," as generally determined by (1- [total municipal wide returned flows/ total municipal wide appropriated flows]).

1. Conditions to Maintain the Persistence of Listed Fish

A. Minimum Fish Flow Needs

Minimum fish flow needs in the Willamette River as recommended by ODFW are in Table 1, below; flows are to be measured in the Willamette River at Salem, Oregon (USGS Gage Number 14191000, or its equivalent).

Table 1

MINIMUM FISH FLOW NEEDS IN THE WILLAMETTE RIVER MEASURED AT USGS GAGE 14191000 SALEM, OREGON	
Month	Cubic Feet per Second
July 1– October 31	5,630
November 1 – March 31	6,000
April 1 – April 15	15,000
April 16 –April 30	17,000
May 1 – May 31	15,000
June 1 – 15	12,600
June 16 – 30	8,500

B. Determining Water Use Reductions - Generally

The undeveloped portion of Permit G-12976 having PSI with the Willamette River is 5.16 cfs. The maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is determined in proportion to the amount by which the flows shown in Table 1 are missed based on a seven day rolling average of mean daily flows measured in the Willamette River at Salem (USGS Gage Number 14191000, or its equivalent). The percent of missed target flows is defined as:

$$(1 - (Q_A / Q_T)) \times 100\%,$$

where Q_A is the actual flow measured at the designated gage based on the seven day rolling average, and Q_T is the target flow (from Table 1).

The percent missed target flows applied to the undeveloped portion of this permit

having PSI with the Willamette River provides the maximum amount of water that could be appropriated under this permit as a result of this fish persistence condition, and is defined as:

$$E_{PSI} - (E_{PSI} \times \% \text{ missed target flows}),$$

where E_{PSI} is undeveloped portion of the permit as of this extension having PSI with the Willamette River, being 5.16 cfs.

The maximum amount of water that can be appropriated as a result of this persistence condition may be adjusted by a Consumptive Use Percentage, when applicable, as per Item 1.C., below. The overall reduction to the amount of the undeveloped portion having PSI with the Willamette River of the permit will not exceed 20%.

C. Consumptive Use Percentages

a. Initial Consumptive Use Percentages
The City of Monmouth has not identified any Consumptive Use Percentages based on the return of flows to the Willamette River through effluent discharge. Thus, at this time the City may not utilize Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

b. First Time Utilization of Consumptive Use Percentages
Utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may begin after the issuance of the Final Order for this extension of time.

First time utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that withdrawal points and effluent discharges are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting monthly Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the proposed Consumptive Use Percentages. Utilization of Consumptive Use Percentages is subject to an approval period described in 1.C.f., below.

Consumptive Use Percentages submitted to the Department for review must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The proposed Consumptive Use Percentages should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

c. Consumptive Use Percentages Updates
Continuing the utilization of Consumptive Use Percentages for the purpose of

calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition beyond an approval period (as described in 1.C.f., below) is contingent upon the City submitting updated Consumptive Use Percentages and receiving the Water Resources Director's concurrence with the Consumptive Use Percentages Updates. Utilization of Consumptive Use Percentages Updates is subject to an approval period described in 1.C.f., below.

The updates to the Consumptive Use Percentages must (1) be specified as a percentage (may be to the nearest 1/10 percent) for each month of the year and (2) include a description and justification of the methods utilized to determine the percentages. The updates should be submitted on the *Consumptive Use Percentages Update Form* provided with the Final Order for this extension of time.

d. Changes to Wastewater Technology and/or Wastewater Treatment Plant Practices

If there are changes to either wastewater technology or the practices at the City's waster water treatment facility resulting in 25% or more reductions in average monthly return flows to the Willamette River, then the Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The 25% reduction is based on a 10-year rolling average of monthly wastewater return flows to the Willamette River as compared to the average monthly wastewater return flows from the 10 year period just prior to date of the first approval period described in 1.C.f., below.

If such changes to either wastewater technology or the practices at the City's waster water treatment facility occur resulting in 25% reductions, further utilization of Consumptive Use Percentages is contingent upon the City submitting Consumptive Use Percentages Updates as per 1.C.c., above, and receiving the Water Resources Director's concurrence with the updated Consumptive Use Percentages.

e. Relocation of the Point(s) of Diversion(s) and/or Return Flows

If the point(s) of diversion(s) and/or return flows are relocated, Consumptive Use Percentages in effect at that time may no longer be utilized for the purposes of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition.

After relocation of the point(s) of diversion(s) and/or return flows, further utilization of Consumptive Use Percentages is contingent upon the City (1) providing evidence in writing that ODFW has determined that any relocated withdrawal points and effluent discharge points are within reasonable proximity to each other, such that fish habitat between the two points is not impacted significantly, and (2) submitting Consumptive Use Percentages Updates as per 1.C.c., above, and receiving the Water Resources

Director's concurrence with the updated Consumptive Use Percentages.

f. Approval Periods for Utilization of Consumptive Use Percentages
The utilization of Consumptive Use Percentages for the purpose of calculating the maximum amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition may continue for a 10 year approval period that begins 10 years from the Water Resources Director's most recent date of concurrence with Consumptive Use Percentages Updates as evidenced by the record, unless sections 1.C.d., or 1.C.e. (above) are applicable.

Consumptive Use Percentages (first time utilization or updates) which are submitted and receive the Director's concurrence will begin a new 10 year approval period. The approval period begins on the date of the Water Resources Director's concurrence with Consumptive Use Percentages Updates, as evidenced by the record. The City at its discretion may submit updates prior to the end of an approval period.

D. Examples

Example 1: Target flow met.

On July 15, the last seven mean daily flows were 7000, 6500, 6000, 5500, 5250, 5000 and 4750 cfs. The seven day rolling average (Q_A) is 5714 cfs. The amount of the undeveloped portion of the permit having PSI with the Willamette River that can be appropriated would not be reduced because the 7 day average of mean daily flows is greater than the 5,630 cfs target flows (Q_T) for July 15.

Example 2: Target flow missed.

Step 1: If on July 15, the average of the last seven mean daily flows was 5011 cfs, and the target flow is 5630 cfs, then the target flow would be missed by 11%.

$$(1 - (5011 / 5630)) \times 100\% = 11\%$$

Step 2: Assuming the Consumptive Use Percentage is 78.7%[1] during the month of July and the utilization of this percentage is authorized, and the target flow is missed by 11% (from Step 1), then the amount of the undeveloped portion of the permit having PSI with the Willamette River that could be appropriated would be reduced by 8.6%.

$$(78.7\% \times 11\%) / 100 = 8.6\%$$

[1] Currently, the City of Monmouth may not utilize Consumptive Use Percentages for the purpose of calculating the amount of the undeveloped portion of Permit G-12976 that can be appropriated as a result of this fish persistence condition. The utilization of the Consumptive Use Percentage 78.7% is only for illustrative purposes in this example.

(If adjustments are not to be made by a Consumptive Use Percentage, then the undeveloped portion of the permit having PSI with the Willamette River would only be reduced by the % by which the target flow is missed – 11% in this example).

Step 3: The overall reduction of 8.6% of the amount of the undeveloped portion of the permit having PSI with the Willamette River does not exceed 20%.

Step 4: The undeveloped portion of this permit having PSI with the Willamette River (E_{PSI}) is 5.16 cfs. Therefore, in this example, the maximum amount of the undeveloped portion of Permit G-12976 having PSI with the Willamette River that can be appropriated as a result of this fish persistence condition is 4.71 cfs.

$$5.16 - ((5.16 \times 8.6\%) / 100) = 4.71$$

Step 5: Given that the entire permit, being 6.0 cfs, is undeveloped and the undeveloped portion having PSI with the Willamette River is 5.16 cfs, if the amount of water legally authorized for appropriation at a given point in time (for example, authorization provided through a WMCP) is 3.0 cfs, then 2.16 cfs of the undeveloped water having PSI with the Willamette River would be used to satisfy the 3.0 cfs.

$$3.0 - (6.0 - 5.16) = 2.16$$

In this example, the 2.16 cfs of undeveloped water having PSI with the Willamette River is less than the 4.71 cfs maximum undeveloped portion of the permit having PSI with the Willamette River (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, there would be no required reduction in water use of the undeveloped portion under the permit.

Step 6: If the amount of water legally authorized for appropriation at a given point in time is 6.0 cfs, then 5.16 cfs of undeveloped water having PSI with the Willamette River would be used to satisfy the 6.0 cfs.

$$6.0 - (6.0 - 5.16) = 5.16$$

In this example, the 5.16 cfs of undeveloped water is greater than the 4.71 cfs maximum undeveloped portion having PSI with the Willamette (from Step 4) that can be appropriated as a result of this fish persistence condition. Therefore, the amount of undeveloped water (having PSI with the Willamette River) appropriated would need to be reduced by 0.45 cfs.

$$5.16 - 4.71 = 0.45$$

Oregon
John A. Kitzhaber, MD, Governor

Water Resources Department
North Mall Office Building
725 Summer St. NE, Suite A
Salem, OR 97301
Phone 503-986-0900
FAX 503-986-0904

May 24, 2011

CITY OF MONMOUTH
ATTENTION: CRAIG JOHNS
151 WEST MAIN ST
MONMOUTH, OR 97361

REFERENCE: Pending Application for Extension of Time
Water Right Application G-8926 (Permit G-8579)
Water Right Application G-13521 (Permit G-12976)

Dear Municipal Water Right Holder:

The purpose of this letter is to provide you with notification as per OAR 690-315-0080(2)(f) of fishery resource protection conditions that may be proposed in the proposed final order under OAR 690-315-0050; the conditions are enclosed for your review.

This letter will also act to provide you notice of your opportunity to request the Department place any of the above referenced municipal permit extension applications on administrative hold.

If you should have any questions concerning your extension request you may contact me at (503) 986-0827.

Sincerely,

Ann L. Reece
Water Rights Specialist

Enclosures

cc: Application File G-8926
Application File G-13521
Mike McCord, Watermaster District 16
Brooke Saltarello, 4B Engineering & Consulting LLC, 3700 River Rd N., Suite 2, Keizer, OR 97303

Ann Reece

From: Ann Reece
Sent: Tuesday, May 24, 2011 9:17 AM
To: 'epbpe@4bengineering.com'
Cc: Ann Reece
Subject: FW: City of Monmouth

Ed,

We are ready to issue this PFO, but we do not have the updates we need. Could you please let me know how soon we can expect these updates?

Best Regards,
Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

From: Ann Reece
Sent: Thursday, May 05, 2011 2:07 PM
To: 'epbpe@4bengineering.com'
Subject: FW: City of Monmouth

Ed,

I have attached "old" extension materials (in chronological order). Thank you in advance for the updated extension application. Please use the most current form available on our website.

Best wishes for your son's wedding!

Best Regards,
Ann Reece
- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

From: Ann Reece
Sent: Wednesday, May 04, 2011 2:00 PM
To: 'epbpe@4bengineering.com'
Subject: City of Monmouth

Ed,

The City of Monmouth has two pending extension applications.

The request for Permit G-8579 was received in 2009, and is requesting an extension until 2025.

The request for Permit G- 12976 was initially made in 1999. In 2003 the request was updated to request an extension until 2014. Will the City be able to perfect this right in 3 years? Also, as per a monitoring plan approved by OWRD on July 5, 2005, water level measurements were to be submitted in 2005 (initial reference level), and each September thereafter. I am not aware of any SWL measurements on file with OWRD for Permit G-12976.

Best Regards,
Ann Reece

- -
Water Rights Services Division
Oregon Water Resources Department
725 Summer St. NE Suite A
Salem, OR 97301
503-986-0827
reeceal@wrd.state.or.us

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

G-13521
CITY OF MONMOUTH
ATTN: GARY A. WILSON
151 W. MAIN ST.
MONMOUTH OR 97361

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X [signature] ☐ Agent ☐ Addressee

B. Received by (*Printed Name*) B. May C. Date of Delivery 12-21-04

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If YES, enter delivery address below: ☐ No

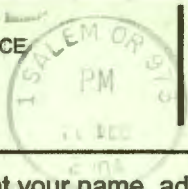
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☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
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WATER RESOURCES DEPARTMENT
725 SUMMER STREET NE SUITE A
SALEM OR 97301-1271

WATER RESOURCES DEPT
SALEM, OREGON
DEC 22 2004
RECEIVED

Oregon
Theodore R. Kulongoski, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
FAX 503-986-0904

CERTIFIED MAIL
Return Receipt Requested

December 20, 2004

City of Monmouth
Attn: Gary A. Wilson, Public Works Director
151 W. Main St.
Monmouth, OR 97361

REFERENCE: Pending Application for Extension of Time
Water Right Application #G-13521 (Permit #G-12976)

Dear Municipal Water Right Permit Holder:

The Department is currently evaluating your request for an extension of time on the above referenced Municipal water use permit. We have determined that your extension application does not provide sufficient detail necessary to fully evaluate your request. The information and materials that need clarification are listed below and must be submitted before evaluation can continue.

NOTE: ***If you make reference to other documents, reports and/or plans, you must provide copies with your responses and make specific references to the pages, tables and/or charts.***

Copies of your pending application received March 26, 2003, and your original permit are enclosed for reference.

Question #4 - OAR 690-315-0070(3)(e): *Provide evidence of compliance with conditions contained in the original permit, as well as any conditions added by previous extensions. If any conditions have not been satisfied, please explain the reason(s) why.*

- Permit #G-12976 contains a condition requiring the water user to develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted wells. This plan was to be submitted to the Department by October 31, 1997. To date the file does not indicate the plan has been submitted. **Please either describe how you have complied with this condition or submit the required plan.**

Question #10 - OAR 690-315-0070(3)(k):

A. *Provide an estimated demand projection and a description of the methodology(ies) used for the subject water right permit, considering the other water rights and contracts held by the municipal or quasi-municipal water use permit holder, and a date by which the water development is anticipated to be completed and water put to full beneficial use.*

- Your response to #10 states, "System demand projections used to anticipate future water needs are contained in the Feb. 2000 Water Master Plan, Chapter 8, pages 52-65." This information does not clearly indicate how the City of Monmouth will use the full amount of water under this permit by the requested date of October 1, 2014. Please be aware that you should request the reasonable amount of time necessary to fully develop the permit and complete the project. If you need additional time please amend your Application for Extension of Time.

  1) Inventory of Water Rights Held
  List all water rights held. The Department's website (*www.wrd.state.or.us*) may be a helpful source for compiling this information.

  This information is not clearly stated in your extension application. See enclosed Attachment "A" to assist you in providing a list of all water rights held by the City of Monmouth.

  Indicate which water rights are used to meet current water demands. Additionally, describe the manner in which the subject permit, other water rights and/or any water supply contracts you may hold are utilized to meet these present water needs. Identify any water rights not currently utilized, or used only in a limited capacity, and explain the reason(s) why. Describe any factors affecting use of the water rights, such as: system redundancy; emergency back-up water supply; climate patterns resulting in seasonal unavailability or high turbidity issues; reliability or quality of existing water supplies; and/or agreements to supply water to other entities.

  Describe how the subject permit, other water rights and/or any water supply contracts you may hold are planned or expected to be used to meet anticipated future water needs.

2) Other Justification
Provide any other information that justifies your current and future need for the water under the subject permit.

Please submit this information to the Department by **March 21, 2005**. If you cannot provide the requested information by this deadline, you must notify the Department in writing, explaining the reason(s) why, and indicate a date certain by which you anticipate the requested information can be supplied.

If the Department has not received the requested information by **March 21, 2005**, and has not received written notification explaining why the deadline for submittal cannot be met, the Department **will** return your "Application for Extension of Time for Quasi-Municipal and Municipal Water Use Permits" as incomplete and refund all fees paid toward the extension of time request.

If you have any questions concerning your extension request or completion of the required materials, please contact Jonathan Unger at (503) 986-0802, or Lisa Juul at (503) 986-0808. Thank you for your cooperation and attention to this matter.

Sincerely,

Lisa J. Juul
Water Rights Specialist

Enclosures: Copy of pending Application for Extension of Time, received March 26, 2003
Copy of Permit #G-12976

cc: Appl #G-13521_ (Permit #G-12976)
Bill Ferber, Watermaster District #16

Application # G-13521 / **Permit #** G-12976

Route Slip ... Extension of Time

per Division 315 Rules... (Extensions received on July 1, 2001 or after)

- **WRIG...**
  Money Receipted: $100.00 on 3-26-03 ~~$100.00 on 10-7-99 (Refund $100)~~
- **Lisa Juul...**
  Extension Completeness: OK
  (If NOT complete, send certified letter requesting add'l information.)

If Extension Appl complete and $100 fee submitted, route to...

- **Jonnine Fuss...**
  Initial 30-day Public Notice: 4/1/02
  Update Extension Database: 4/1/02
  Files back to filing cabinets: Back to Lisa

At the close of the Initial 30-day Comment Period...

- **Lisa Juul...**
  Pull files for Ext PFO review: _____
  Extension PFO completed: _____

Once Extension PFO signed by Dwight French...

- **Jonnine Fuss...**
  Prepare Ext PFO for mailing to applicant: _____
  Mail to those who commented *and* paid copy fee: _____
  Include Ext PFO on weekly Public Notice: _____

Within 60 days after the close of the 45-day PFO Protest Period...

(PFO Protest Period ends 45 days from PFO sign date)...

- **Lisa Juul...**
  Issue an Extension FO: _____

Municipal or Quasi-Municipal

EXTENSION REVIEW CHECKLIST for PFO... *per Div. 315 Rules*

Application #: G-13521 / **Permit #:** G-12976

Permittee's Name: City of Monmouth; Gary Wilson - Public Works Director

Permittee's Mailing Address: 151 West Main St, Monmouth, OR 97361

POD Location: Township 9-S Range 4-W Section 3 ~~¼~~ 10 NWNE SWSE

Stream Basin: _____ **County:** Polk

✓ 1. Has the applicant completely filled out the *updated* Extension Application form? (Yes) / No

***If "No"..... has certified request for the new extension form been sent? ~~Yes~~ / ~~No~~

~~$100.00~~ - Yes - paid twice (Refund due)

__ 2. Shortcomings of Extension Request..... based upon review of updated extension form **Yes / No**

(NOTE:*** *Any missing Extension information that is needed before an Extension PFO can be completed???)*

✓ 3. **Date Permit was issued:** 10-31-96 (priority = 10-1-93)

✓ 4. **Source:** Two Wells in the Duck Slough Basin

✓ 5. **Use:** Municipal

✓ 6. **"Q":** 6.0 cfs

✓ 7. **Original "B" Date:** 10-1-98 **Original "C" Date:** 10-1-99

__ 8. **Conditions of Permit:** Orig. "A" Date: 10-31-97

- ~~Before~~ Water Use Begins ~~to~~ shall install meter or other suitable meas. device
- Shall keep monthly record of water ~~use~~ use & report annually to WRD.
- Within ONE year of permit issuance, develop a plan to monitor & report impact

[redacted] orig. 10-7-99 &

✓ 9. **Extension request received:** amended 3-26-03 **Request Number (...1st 2nd, 3rd):** 1st

✓ 10. **Last Authorized "B" Date:** 10-1-98 **Last Authorized "C" Date:** 10-1-99

✓ 11. **Proposed "B" Date:** 10-1-2005 **Proposed C Date:** 10-1-2014

___12. **Amount Invested to date:** _____ **Estimated Total Cost:** _____

(Estimated Remaining Cost:** _____)*

___13. The water project development made to date has been accomplished in accordance with the terms and conditions contained in the permit. **Yes / No** ****If "No"..... What permit terms and/or conditions have not been met?*

___14. Work on the water development project completed to date includes: _____

___15. The work remaining to be completed consists of: _____

___16. Progress in perfecting the permit is being held up by: _____

___17. Has the applicant pursued perfection of the right in good faith and with reasonable diligence? **Yes / No**

___18. Determination of the market and the present demand for water or power to be supplied: _____

___19. Based on the written record, can the Department make a finding of "Good Cause" to approve the extension request?

Yes... "Good Cause" can be found. ➜ Approval of Extension Request

No ... "Good Cause" *cannot* be found. ➜ Denial of Extension Request

___20. Conditions to be included on Extension PFO: _____

Extension "PFO" Dates *Checklist Last Revised: 1 / 31 / 2003*

Mailing / Issuance Date:_____ **Reviewer's Name:**_____

Protest Deadline Date:_____ **Date:**_____

Issue date Oct. 31, 1996

Municipal Permit Extensions - Remaining Undeveloped Portion of Water

Date: January 13, 2006

To: Application # G-13521 (Permit # 12976)

From: Lisa Jaramillo, Permit Extension of Time Review

Subject: Current remaining undeveloped portion of water under municipal use permit

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Today, I spoke with the City of Monmouth to determine whether or not the quantity of water beneficially used under their municipal use permit has ~~increased from the quantity~~ identified in their pending extension of time application (received on 3-26-2003.)

The permit holder indicated that the quantity of water used for beneficial purposes under this municipal use permit:

☐ **HAS INCREASED** from the quantity identified in their pending extension of time application;

(For permits where beneficial water use has increased, the Department has requested the City to submit a written update identifying the "current" quantity of beneficial water use under this permit in order to maintain official documentation from the City in the file record.)

- OR -

☑ **HAS NOT INCREASED** from the quantity identified in their pending extension of time application.

NOTE: The following information is provided to document "quantity" information obtained during my telephone conversation with the permit holder.

Application # G-13521 / Permit # G-12976

Permitted quantity of water: 6.0 cfs

Maximum quantity of water developed: 0.0 cfs

Date information obtained by telephone from the City: 1-13-2006

Remaining undeveloped portion: 6.0 cfs

Municipal Permit Extensions -
Remaining Undeveloped Portion of Water

Date: Dec. 29, 2005

To: Doug Woodcock, Ground Water Section Manager

From: Lisa Jaramillo, Permit Extension of Time Review

Subject: Remaining undeveloped portion of water under municipal use permit

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For purposes of determining impacts related to streamflow as a result of use of the undeveloped portion of the permit *[OAR 690-315-0080(2)]*, the following information identifies the ***remaining undeveloped portion of water*** under the municipal water use permit described below:

Name of City: City of Monmouth

Application # G-13521 / Permit # G-12976

Permitted quantity of water: 6.0 cfs

Maximum quantity of water developed: 0.0 cfs

- Date this information provided by City: 3-26-2003 (Ext.)

Remaining undeveloped portion: 6.0 cfs

Application # G-13521 / **Permit #** G-12976

Permit Holder: City of Monmouth

Place a (✓) in the box if the item is satisfied	**Division 315 - Municipal/Quasi-Municipal Extension of Time - Completeness Checklist OAR 690-315-0070(3)**
✓	*1. [OAR 690-315-0070(3)]* The appropriate extension of time fee (as specified in ORS 536.050). $100 - applications received by September 30, 2003 $250 - applications received on or after October 1, 2003 ~~duplicate pay~~ ~~PA 5813 100.00~~
✓	** [OAR 690-315-0070(3)(a)]* The name and mailing address of the water right permit holder(s);
✓	** [OAR 690-315-0070(3)(b)]* The application number and the permit number for which an extension is requested;
✓	(2.) *[OAR 690-315-0070(3)(c)]* For quasi-municipal water use permit holders, evidence of the actions taken to begin actual construction on the project, as defined in 690-315-0020(3)(d), if required under the applicable statute; *NOTE:* ORS 537.230(1) [1997 edition] only exempts **surface water** municipal use permits from the "A" Date requirement. If you are reviewing a ground water municipal use permit… they must provide evidence that the "A" Date has been met. • "Actual construction" means physical work performed towards completion of the water system, which demonstrates both the present good faith of the water right permit holder and the water right permit holder's intention to complete the project with reasonable diligence; • "Actual construction" does not include planning a diversion system, formulating a business plan, securing financing, letting contracts, purchasing but not installing equipment, or surveying. see old application
✓	(3.) *[OAR 690-315-0070(3)(d)]* Evidence of actions taken to develop the right within the permitted time period and/or time period of the previous extension; see old app.
✓	(4.) *[OAR 690-315-0070(3)(e)]* Evidence of compliance with conditions contained in the permit and any previous extension(s) or the reason the condition was not satisfied; meter ok → no water used gw monitoring plan? — OK → Submitted a study - have forwarded to Mike Ewart for review 5-11-05.
✓	*5. [OAR 690-315-0070(3)(f)]* Evidence of the maximum rate of diversion, if any, made to date; 0
✓	(6.) *[OAR 690-315-0070(3)(g)]* in 2003 An estimate of the population served and a description of the methodology(ies) used to make the estimate;

Place a (✓) in the box if the item is satisfied	**Division 315 - Municipal/Quasi-Municipal Extension of Time - Completeness Checklist OAR 690-315-0070(3)**
✓	*7. [OAR 690-315-0070(3)(h)]* A description of financial expenditures made toward completion of the water development;
✓	*8. [OAR 690-315-0070(3)(i)]* An estimate of the cost to complete the water development;
✓	*9. [OAR 690-315-0070(3)(j)]* A summary of any events that delayed completion of the water development or application of water to full beneficial use, including other governmental requirements, if any, relating to the project that have significantly delayed completion of construction or perfection of the right; (or non-use)
✓	*10. [OAR 690-315-0070(3)(k)]* OK - provided narrative discussing use of rights An estimated demand projection and a description of the methodology(ies) used for the subject water right permit, considering the other water rights held by the municipal or quasi-municipal water use permit holder, and a date by which the water development is anticipated to be completed and water put to full beneficial use. Extension requests for greater than 50 years must include documentation that the demand projection is consistent with the amount and types of lands and uses proposed to be served by the permit holder. other rights see Master plan pg. 8 See pg 21 → projected water demands
✓	*11. [OAR 690-315-0070(3)(l)]* A summary of the applicant's plan and schedule to complete construction and/or perfect the water right;
✓	*12. [OAR 690-315-0070(3)(m)]* Justification for the time requested to complete the project and/or apply the water to full beneficial use; See
✓	*13. [OAR 690-315-0070(3)(n)]* Any other information the applicant determines is relevant to evaluate the application in accordance with applicable statutes and rules;
✓	* *[OAR 690-315-0070(3)(o)]* Any other information required by the Department that is necessary to evaluate the application in accordance with applicable statutory requirements.
✓	* Signature(s) of the water right permit holder(s).

Name of Reviewer: Ronald L. Ua **Date:** 8/17/04

App G-13521 P# G12976 NOTES for Ext. Review

City of Monmouth (1st EXT REQUEST)

Priority date 10/1/93

2 wells - 6 cfs hyd connected to Rock Sl. > will R
PTO: Rock Slough intermittent - use of water allowed YEAR ROUND

Permit G-12976 issued Oct 31, 1996
complete application of water - oct 1, 1999

Permit Conditions:
- water user to develop a PLAN to monitor & report impact on water levels w/in aquifer - decline
- during July & August - only when Rock Slough does NOT flow into Willamette River
- construction - begin w/in 1 yr & complete by 10/1/98
- application of water - on or before 10/1/99

1st Request - EXTENSION REQUEST - rec'd 10/7/99

7/17/00 - WRD sent letter requesting add'l info
1. Permit conditions
   - measuring/recording/reporting
   - plan to monitor & report impact of water use on water levels - DID NOT submit Plan.
2. Has beneficial use begun? to what extent?
3. Must install meter on wells prior to water use
   - if use began, must have meter & record amt water used monthly & report annually - NO ANNUAL REPORT

4. A monitoring PLAN + monitored report impact of water use on water levels MUST BE SUBMITTED prior to consideration of EXT REQUEST

5. Supply ANALYSIS OF NEED for the permit Complete "MUNICIPAL WATER USES & PROJECTED NEEDS form
- should show when existing wrights will be exhausted & when this permit will be fully utilized

6. Opportunity to hold EXTENSION Request
MONMOUTH did not pursue hold.

SUBMIT Above requested INFO by August 17, 2000.

Extension Request - request extension to 2020

- Production well drilled & developed in 1997.
- Existing sources have reached service limit

City of Monmouth response to Aug 17, 2000 letter req more info.

1. One (permit for 2 wells) production well & 3 monitoring wells installed — no pump in well — no meter installed
2. Monmouth has NOT made beneficial use of water under this permit.
   - construction of pump, system connection & meter scheduled in 2001
   - beneficial use of this permit should occur in late 2001 or 2002

City of Monmouth completed

1. Water Uses, Projected Needs
2. enclosed Monmouth's Water Master Plan - prep. Feb 2000

Water Uses, Projected Needs - dated 8/14/00

Current peak demand (2000): 4550 gallons per hour

$\left\{ \frac{4550 \text{ gals}}{\text{hr}} \times 24 \text{ hr} = 109,200 \text{ GPD} \right\}$

Current water use: Peak Daily Demand: 2.62 MGD

2020 — Peak Daily Demand: 4.94 MGD

$\left\{ \text{use: } \frac{646000 \text{ gpd}}{1 \text{ cfs}} \right\}$

Existing WR's:

P#G-4818, A#G-5706 - 4th st. Well Field	0.88 cfs	568,480 gpd
P#G-8579, A#G-8926 - Manon Co. Well Fd.	5.00 cfs	3,230,000 gpd
This Ext. Req → * P#G-12976, A#G-1352 - Buena Vista Well Fd.	6.00 cfs	3,876,000 gpd

Why Extension is Needed:

- Current max day demands of system exceed max production rate
- Construction of pump, meter, system connection to begin in 2001

Flow rate conversion: 1 cfs = 646,272 gpd

In Application - list several surface water rights
- explain that due to SURFACE WATER TREATMENT requirements - unlikely that Teal Creek & Teal Cr. Springs provide water w/o major improvement - treatment plant & storage reservoir
- on list of existing wr's
note that SURFACE WATER is backup & NO FILTRATION

PFO prepared Aug 2000 - never sent out
↳ "Wilsonville Language" should be used."

Per Extension Request - consider ~~only~~ GW sources (246000 / 1 cfs)

existing wr's

- P#G4818, A#G-5706 4th St. 0.88 cfs → 568,480 gpd
- P#G8579, A#G-8926 Manon Co. 5.00 cfs → 3,230,000 gpd

± 3,798,480 gpd

EXT Req - lists Peak Demand in 2020 at 4.94 MGD → 4,940,000 ~~which is greater~~ > 3,798,480 gpd

∴ Monmouth needs to pursue P#12976.

~~Monmouth~~ Water System Master Plan - reports unaccounted water of

YEAR	"Loss"
1997	12.3%
1998	14.8%
1999	10.6%

Avg 12.6%

Design Value of 10%.

STATE OF OREGON

WATER RESOURCES DEPARTMENT

RECEIPT # 58953

158 12TH ST. N.E.,
SALEM, OR 97301-4172
378-8455 / 378-8130 (FAX)

INVOICE # _____

RECEIVED FROM: City of Monmouth

BY: _____

APPLICATION	G-13521
PERMIT	
TRANSFER	

CASH: ☐ CHECK:# ☒ 12815 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $ 100.00

0401 TREASURY 0417 WRD MISC CASH ACCT

0407	COPIES		$
_____	OTHER:	(IDENTIFY) _____	$
_____	OTHER:	(IDENTIFY) _____	$

RECEIVED OVER THE COUNTER

0427 WRD OPERATING ACCT

MISCELLANEOUS

0407	COPY & TAPE FEES		$
0410	RESEARCH FEES		$
0408	MISC REVENUE: (IDENTIFY)	_____	$
TC162	DEPOSIT LIAB. (IDENTIFY)	_____	$
0240	EXTENSION OF TIME		$ 100.00

WATER RIGHTS:

		EXAM FEE		RECORD FEE
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$		

WELL CONSTRUCTION

		EXAM FEE		LICENSE FEE
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$

_____ OTHER (IDENTIFY) _____

0536 TREASURY 0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	

_____ OTHER (IDENTIFY) _____

0607 TREASURY 0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HYDRO APPLICATION		$

____ TREASURY OTHER / RDX

FUND _____ TITLE _____

OBJ. CODE _____ VENDOR # _____

DESCRIPTION _____ $

RECEIPT: 58953 DATED: 3/26/03 BY: Connie Vance

Distribution – White Copy - Customer, Yellow Copy - Fiscal, Blue Copy - File, Buff Copy - Fiscal

APPLICATION FOR EXTENSION OF TIME

for Quasi-Municipal and Municipal Water Use Permits

TO THE WATER RESOURCES DIRECTOR OF OREGON

I, City of Monmouth (NAME OF ENTITY) Gary A. Wilson, Public Works Director (NAME OF CONTACT)

151 W. Main St (ADDRESS) Monmouth (CITY) OR (STATE) 97361 (ZIP) 503-838-2173 (PHONE)

owner of record, or duly authorized agent, of Application No. G13521, Permit No. G12976, do hereby request that the time in which to:

☑ complete the construction of diversion/appropriation works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 2002, be extended to October 1, 2005,

and/or the time in which to:

☑ accomplish beneficial use of water to the full extent under the terms of the permit, which time now expires on October 1, 2002, be extended to October 1, 2014.

NOTE: **Permit extensions for Quasi-Municipal and Municipal permits are evaluated under OAR Chapter 690, Division 315. Except under limited circumstances, upon issuance of an order approving an extension, you will be required to submit within 3 years a Water Management and Conservation Plan (WMCP) under OAR Chapter 690, Division 86. Diversion of water beyond the maximum rate currently diverted under the permit shall only be authorized upon approval of your WMCP. The rules may be viewed at: *"www.wrd.state.or.us/law/oar1999.shtml"***

Attached are instructions to assist you in completing the information on the permit extension application form. Oregon Water Law and Administrative Rules require this information to be considered by the Water Resources Department when reviewing a Quasi-Municipal or Municipal water use permit extension application. For each permit, a separate extension application must be submitted. All items must be addressed or the application may be returned. Please feel free to provide the Department with any additional information or evidence that will aid us in making our decision. Please use additional sheets of paper as needed to fully respond to the questions.

After reviewing the application form and the instruction sheet, if you have any questions, you may contact the Department at (503) 378-3739, and request assistance from the Water Rights Division, permit extensions personnel.

RECEIVED
MAR 26 2003
WATER RESOURCES DEPT
SALEM, OR

In order for the Department to evaluate your extension of time request for a Quasi-Municipal or Municipal water use permit, please provide the following:

1. The appropriate fee, as specified under ORS 536.050.

   Check for $100 Enclosed

2. For Quasi-Municipal water use permits, evidence of the actions taken to begin actual construction on the project, if required under the applicable statute.

   Consultant retained to design the first phase of improvements needed to utilize this water right. This first phase will consist of a water transmission line and well #1 facilities. Design 80% complete and easement acquisition underway. We are preparing to submit a Land Use Compatibility application to Polk County. Evaluating water quality testing to identify most efficient treatment methods.

3. Evidence of actions taken to develop the right within the permitted time period and/or time period of the previous extension.

   Consultant for design and construction of well #1 and transmission line awarded December 5, 2000. Proceeding through survey, design, and plan preparation. Transmission pipeline alignment identified and easement acquisition is underway.

4. Evidence of compliance with conditions contained in the permit and any previous extension(s). If any of the conditions have not been satisfied, please explain the reason(s) why.

   No beneficial use of water has occurred yet.

5. Evidence of the maximum rate of water diverted to date, if any, for Quasi-Municipal or Municipal purposes.

   No beneficial use of water has occurred yet.

6. An estimate of the population served under this permit and a description of the methodology(ies) used to make this estimate.

   Population estimate and projections contained in Chapter 3, page 12 of the Monmouth Water Master Plan dated February, 2000 (copy attached)

RECEIVED
MAR 26 2003
WATER RESOURCES DEPT
SALEM, OR

7. A description of the financial expenditures made toward completion of the water development.

Approximately $200,000 has been spent to date to improve this water right. Expenditures include land purchase, well drilling, test pumping, and consultant payments for engineering, survey, and right-of-way acquisition assistance.

8. An estimate of the cost necessary to complete the water development.

An additional $1,012,000 is budgeted to be spent on the development of well #1 and the transmission line. Full development of the water right is expected to require construction of future phases, which will consist of two additional wells at an estimated cost of $625,000. The Feb. 2000 Water Master Plan indicates that full development of the water right will be required prior to year 2013. More detail is provided in the Feb. 2000 Water Master Plan Chapter 5 pages 28&29 and Chapter 10 pages 74,75, &76.

9. A summary of any events that delayed completion of the water development or application of water to full beneficial use, including other governmental requirements, if any, relating to the project that have significantly delayed completion of construction or perfection of the right.

Water quality and quantity testing and evaluation have delayed the implementation of Phase 1 of the development of this water right (well #1 and transmission line). The Feb. 2000 Water Master Plan indicated that construction would be completed in 2001.

10. An estimated demand projection and a description of the methodology(ies) used for the subject water right permit, considering the other water rights and contracts held by the municipal or quasi-municipal water use permit holder, and a date by which the water development is anticipated to be completed and water put to full beneficial use.

Extension requests for greater than 50 years must include documentation that the demand projection is consistent with the amount and types of lands and uses proposed to be served by the permit holder.

System demand projections used to anticipate future water needs are contained in the Feb. 2000 Water Master Plan, Chapter 8 pages 52-65.

11. A summary of the plan and schedule to complete construction and/or perfect the water right.

Full development of the water right is expected in year 2013. Full development is expected to occur in three phases with phase 1 being completed in 2004 and phases 2&3 being completed by 2013.

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12. Justification for the time requested to complete the project and/or apply the water to full beneficial use.

Water demand will increase with normal growth of Monmouth. Our Water Master Plan expects that the growth needed to require full benefit from this water right to have occurred by 2014. Due to the cost of the improvements necessary to make full benefit of the water right, development has been phased. A time extension permitting the development of this water right over time provides an economical solution to the community for full development of this water right.

13. Any other information you wish the Department to consider while evaluating the extension of time application.

Concerns over the quantity of water available for pumping have been expressed by neighboring property owners and representatives of the Luckimute Water District. We understand the junior stature of our water right and our obligation to responsibly use this water right in a way that does not interfere with rights more senior to ours. The water quantity testing we have performed on three separate occasions leads us to believe that we will be able to utilize our water right without interference with senior water rights.

I am the permittee, or have authorization from the permittee, to apply for an extension of time under this permit. I certify that the information I have provided in this application is true and correct to the best of my knowledge.

Mary A. Wilson
Signature

3/26/03
Date

MAIL COMPLETED APPLICATION *and* STATUTORY FEE (under ORS 536.050) TO:

WATER RIGHT PERMIT EXTENSIONS
WATER RESOURCES DEPARTMENT
158 - 12th STREET NE
SALEM, OREGON 97301-4172

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151 West Main Street
Monmouth, Oregon 97361-2199
(503) 838-0722
FAX (503) 838-0725

CITY OF MONMOUTH

Promoting pride, progress, and friendly hometown values.

August 14, 2000

Laura Snedaker
Senior Water Rights Specialist
Water Resources Department
Commerce Building
158 12th Street NE
Salem, Oregon 97301-4172

SUBJECT: FILE # G-13521 (Permit G-12976)

The following is in response to your letter dated July 17, 2000 in which you identified additional information needed to process our time extension for the development of the subject permit.

1. COMPLIANCE WITH PERMIT CONDITIONS

Standard Conditions

Well Construction

A production well and three monitoring wells, all with casing, screen, and seal, were installed in conformance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. Sippel Well Drilling, Inc., a licensed well driller, performed this work. This work included the welding of a metal plate, with access port, over the end of the casing. The access port on the production well will be revised to permit water level monitoring once a pump is placed on the well.

Water Use Rotation

Monmouth will work with the Oregon Water Resource Department in the development and implementation of a well rotation program once the pump, system connection, and meter are completed.

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Pump Test Submittal

Monmouth will provide full pump test data to the Water Resources Department once the pump, system connection, and meter are installed.

2. WATER USE CLARIFICATION

Monmouth has not made beneficial use of this permit. This permit will be used to increase Monmouth's municipal water supply to meet the demands of community growth. The construction of a pump, system connection, and meter are scheduled for the summer & fall of 2001. Beneficial use of this permit should occur in late 2001 or early 2002.

3. INSTALLATION OF WATER METER

A meter will be installed to measure the quantity of water being pumped. This meter will be of the type suitable to measure and record water consumption within the accuracy standards required for ground water pumping measurements.

4. IMPACT MONITORING PLAN

A ground water monitoring plan will be developed concurrently with the installation of a pump, system connection, and meter. In addition to the four monitoring wells installed in the well field area, Monmouth will seek the cooperation of neighboring well owner to determine the effect this permit has on the acquifer.

Enclosed is a completed Water Uses, Projected Needs form for the Monmouth's water system.

Also enclosed, is an analysis of Monmouth's projected water needs through the year 2020, as contained in Monmouth's Water Master Plan (prepared by Stettler Company - dated February 2000).

If you have any questions or comments, please don't hesitate to give me a call at (503) 838-2173.

Sincerely,

Gary A. Wilson, P.E.
Public Works Director/Engineer

cc: George White, PW Operations Manager

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WATER USES, PROJECTED NEEDS
City of Monmouth
August 14, 2000

1. POPULATION AND GROWTH

	Current (year 2000)	2020	2030	2040	2050	2060	2070
Population	8,490	15,300	20,600	27,700	37,200	50,000	67,000
Growth Rate	3.0%						

2. EXISTING WATER RIGHTS AND PERMITS

Groundwater:

Permit/Application number	Description	Amount	Priority Date
G-4818 /G-5106	4th Street Well Field	0.88 cfs	February 17, 1970
G-8579 / G-8926	Marion County Well Field	5.00 cfs	August 14, 1978
G -12976 / G 13521	Buena Vista Well Field	6.00 cfs	October 1, 1993

Surface Water:

Permit/Application number	Description	Amount	Priority Date

Pending permits:

Permit/Application number	Description	Amount	Priority Date

3. EXISTING AND FUTURE WATER USE:

	Current (year: 2000)
Current peak demand:	4,550 gallons per hour

Current water use:	Current (year: 2000)	2020
Peak day demand (gallons/capita/day):	313	326
Peak daily demand (MGD):	2..62	4.94
Average daily demand (gallons/capita/day):	125	125
Average summer demand (gallons/capita/day):	187.5	200

4. EXPLANATION FOR PROJECTED GROWTH RATE:

The projected growth rate (3.0%) is based on the historical growth rate experienced by Monmouth between 1880 to 2000. The growth rate experienced by Monmouth 1956 and 2000 was also 3%.

5. EXPLANATION FOR EXTENSION TIME PERIOD:

This water permit is needed to increase water source capacity to meet growing community needs. Current maximum day demands of the system exceed the maximum production rate. Funding for the installation of a pump, meter, and system connection has been included in the current physical years budget. Construction is scheduled to begin in summer 2001.

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Oregon
John A. Kitzhaber, M.D., Governor

Water Resources Department
Commerce Building
158 12th Street NE
Salem, OR 97301-4172
(503) 378-3739
FAX (503) 378-8130

CERTIFIED MAIL
Return Receipt Requested

July 17, 2000

City of Monmouth
Gary Wilson, Public Works Director
151 W. Main St.
Monmouth, Oregon 97361

RE: File # G-13521 (Permit G-12976)

Dear Mr. Wilson:

The Department is currently in the process of evaluating your request for an extension on the above referenced permit. However, based upon continued review, the Department has determined that additional information is necessary in order to evaluate your extension request. The following information must be received:

- Some of the questions on your extension application were not answered or answered completely. Please submit the following:

  1. Please describe how you have complied with each applicable permit condition. I have enclosed a copy of your permit and the instructions for permit extensions for your reference. Applicable permit conditions include your measurement, recording and reporting condition and the condition which requires you to develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted wells. This plan was to have been submitted within one year of the permit being issued.

  These conditions must be met before the Department may further consider your permit extension application.

  2. Please clarify whether you have begun beneficial use of water under this permit. If so, to what extent has beneficial use been accomplished? (Amount of water used)

  3. Before water use begins under this permit, you are required to install a meter on the well. If water use has begun, please identify whether a meter has been installed on the well. Also, if water use has begun, the City is

required to record the amount of water used each month and submit an annual report of water use to the Department. It does not appear from review of Department records, that an annual report of water use has been submitted. If water use has begun under this permit, a report identifying the amount of water used each month since use began must be submitted.

4. Also, under the terms of this permit, the City was required to develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well. This monitoring plan was required to be submitted within one year from the date the permit was issued. The permit was issued in October, 1996. According to Department records, the City has not yet submitted a monitoring plan. Before the Department may consider the Cities extension request further, a monitoring plan must be submitted to the Department. The plan is subject to approval by the Department.

- Please supply an analysis of need for this permit. Please complete the attached Municipal Water Uses and Projected Needs form and supply a graph showing water needs over time. An example of what this graph should look like is attached. This analysis should show when other existing rights will be exhausted and when this permit will a fully utilized source for the City.

- However, if you do not wish to pursue an extension at this time, under the current extension rules, the holder of a municipal permit may elect to hold their extension requests. The new rules provide an opportunity for holders of permits for municipal use to delay action on permit extensions through June 30, 2001. This temporary exemption of municipal use permit holders included in the new permit extension rules was included to provide time for the Department to convene a work group to review issues relating to community water supply, and recommend changes, if appropriate, to current laws and rules. If you wish to take advantage of the temporary exemption for municipal use permit holders, please submit a written request to the Department to hold your extension request until June 30, 2001. If you wish to pursue the extension request now, you will need to submit the information described above.

Please submit this information by **August 17, 2000**. Failure to submit the requested information by this deadline **may** result in the proposed rejection of your extension request.

If you need to request additional time to submit the information requested above, a written request must be received in the Salem office of the Department by the deadline above. The Department will evaluate timely requests and determine whether or not the request may be granted.

Should you have any questions regarding your extension request or the required materials listed above, please call me at (503) 378-8455, extension 331, or toll free within Oregon at 1-800-624-3199.

Sincerely,

Laura K. Snedaker
Senior Water Rights Specialist

Enclosures: Municipal Water Uses and Projected Needs Form

cc: Bill Ferber, Watermaster District #16

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # 33670

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE #_____

RECEIVED FROM: City Of Monmouth
BY: _____

APPLICATION	G-13521
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☑ 24-22 OTHER: (IDENTIFY) ☐ _____

TOTAL REC'D $ 100.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS	$
	PUBLICATIONS / MAPS	$
_____	OTHER: (IDENTIFY) _____	$
_____	OTHER: (IDENTIFY) _____	$

REDUCTION OF EXPENSE

_____ CASH ACCT. $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

MISCELLANEOUS

0407	COPY & TAPE FEES	PCA#66111	$
0410	RESEARCH FEES		$
0408	MISC REVENUE: (IDENTIFY)	_____	$
lew) TC162	DEPOSIT LIAB. (IDENTIFY)	_____	$

WATER RIGHTS:

		EXAM FEE		RECORD FEE
0201	SURFACE WATER	$	0202	$
0203	GROUND WATER	$	0204	$
0205	TRANSFER	$	0206	$

WELL CONSTRUCTION

		EXAM FEE		LICENSE FEE
0218	WELL DRILL CONSTRUCTOR	$	0219	$
	LANDOWNER'S PERMIT		0220	$

0240 OTHER (IDENTIFY) EXT. OF TIME $100.00

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	

_____ OTHER (IDENTIFY) _____

0539 LOTTERY PROCEEDS

1302 LOTTERY PROCEEDS $

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION	_____	$

RECEIPT # 33670 DATED: 10-7-99 BY: Roger Wright

Distribution: White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

STATE OF OREGON
WATER RESOURCES DEPARTMENT

RECEIPT # 33670

158 12TH ST. N.E.
SALEM, OR 97310-0210
378-8455 / 378-8130 (FAX)

INVOICE # _____

RECEIVED FROM: City Of Monmouth
BY: _____

APPLICATION	G-13521
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # ☑ 24-22 OTHER: (IDENTIFY) ☐ _ —

TOTAL REC'D $ 100.00

0417 WRD MISC CASH ACCT

	ADJUDICATIONS		$
	PUBLICATIONS / MAPS		$
_____	OTHER: (IDENTIFY)	_____	$
_____	OTHER: (IDENTIFY)	_____	$

REDUCTION OF EXPENSE

_____ CASH ACCT. $

_____ PCA AND OBJECT CLASS _____ VOUCHER #

0427 WRD OPERATING ACCT

PCA#66111

	MISCELLANEOUS				
0407	COPY & TAPE FEES				$
0410	RESEARCH FEES				$
0408	MISC REVENUE: (IDENTIFY)	_____			$
TC162	DEPOSIT LIAB. (IDENTIFY)	_____			$
	WATER RIGHTS:	**EXAM FEE**		**RECORD FEE**	
0201	SURFACE WATER	$	0202		$
0203	GROUND WATER	$	0204		$
0205	TRANSFER	$	0206		$
	WELL CONSTRUCTION	**EXAM FEE**		**LICENSE FEE**	
0218	WELL DRILL CONSTRUCTOR	$	0219		$
	LANDOWNER'S PERMIT		0220		$
0240	OTHER (IDENTIFY)	EXT. OF TIME			$100.00

0437 WELL CONST. START FEE

0211	WELL CONST START FEE	$	CARD #	
0210	MONITORING WELLS	$	CARD #	
_____	OTHER (IDENTIFY)	_____		

0539 LOTTERY PROCEEDS

1302	LOTTERY PROCEEDS	$

0467 HYDRO ACTIVITY

		LIC NUMBER	
0233	POWER LICENSE FEE (FW/WRD)		$
0231	HYDRO LICENSE FEE (FW/WRD)		$
_____	HRDRO APPLICATION	_____	$

RECEIPT # 33670 DATED: 10-7-99 BY: Roger Wright

Distribution-White Copy-Customer. Yellow Copy-Fiscal. Blue Copy-File. Buff Copy-Fiscal

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SALEM, OREGON

APPLICATION FOR EXTENSION OF TIME
TO THE WATER RESOURCES DIRECTOR OF OREGON

I, City of Monmouth by Gary Wilson/Public Works Director
NAME

151 W. Main St Monmouth OR 97361 503-838-2173
ADDRESS CITY STATE ZIP PHONE

owner of record, or duly authorized agent, of Application No. _____, Permit No. G-12976 do hereby request that the time in which to:

☑ complete the construction of diversion/appropriation works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 1999, be extended to October 1, 2002,

and/or the time in which to:

☑ accomplish beneficial use of water to the full extent under the terms of the permit, which time now expires on October 1, 1999, be extended to October 1, 2002.

NOTE: The extension of time requested should be long enough to finish the project. Should this request be approved, it will be the Department's expectation that you will complete your project within the new time period allowed. Future extensions may not be granted.

Attached is an instruction sheet to assist you in completing the information on the permit extensions application form. Oregon Water Law and Administrative Rules requires this information to be considered by the Water Resources Department when reviewing a permit extension. All items must be completed or the application will be returned. Please feel free to provide the Department with any additional information that would aid us in making our decision. Please use additional sheets of paper as needed to fully respond to the questions.

After reviewing the application form and the instruction sheet, if you have any questions, please contact the Department at 1-800-624-3199, or locally in the Salem vicinity at (503) 378-3739, and request assistance from the Water Rights Division, permit extensions personnel.

1-Did water system construction/well drilling begin within the time specified in the permit [yes/no]?
Yes

2-Has construction of diversion/appropriation works, distribution system, and use of water, if any, been accomplished consistent with the limitations and conditions of this permit [yes/no]? Yes

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Population and Land Use

Population Increase Projection

As indicated in Table 3-1, the population in Polk County, during the years 1990-1999, increased greater than the overall state average. Several independent projections were consulted during preparation of this study to obtain a realistic and objective estimate of population growth over the next 20 years. These sources include: Mid-Willamette Council of Governments, Portland State University Center for Population Research and Census, State Office of Economic Analysis, and other local municipalities of similar size. All of these sources project an increase of population within Polk County and Monmouth over the next 20 years. This is due to the influx of new residents as well as an expected shift of urban population.

Table 3-1
1990 U.S. CENSUS

	Polk County	Oregon State Average
1990 Population	49,541	2,842,321
1999 Population	60,100	3,300,800
% of Change, 1990-1999	21.3% (2.5%/year)	16.1%
Estimated 2,010 Population	69,402	3,773,678
Expected % of Change - 1999-2010	15.5%	14.3%

1999 Revised Projections
Polk County (1)

Year	Polk County (Total)	% Increase
1999	60,100	21.3% (from 1990)
2000	65,040	8.2%
2010	69,402	6.7%
2015	73,940	6.5%
2020	78,502	6.2%

The period of 1999-2020 represents a net county projected population growth of 18,402 or 1.3% per year. In the case of Monmouth, this value is felt to be somewhat low due to the current rate of growth seen in the communities of Independence and Monmouth and available land for additional residential development. A recent population update for Monmouth between 1990-1999 indicated a net growth of 2022 residents, an increase of 3.2% per year.

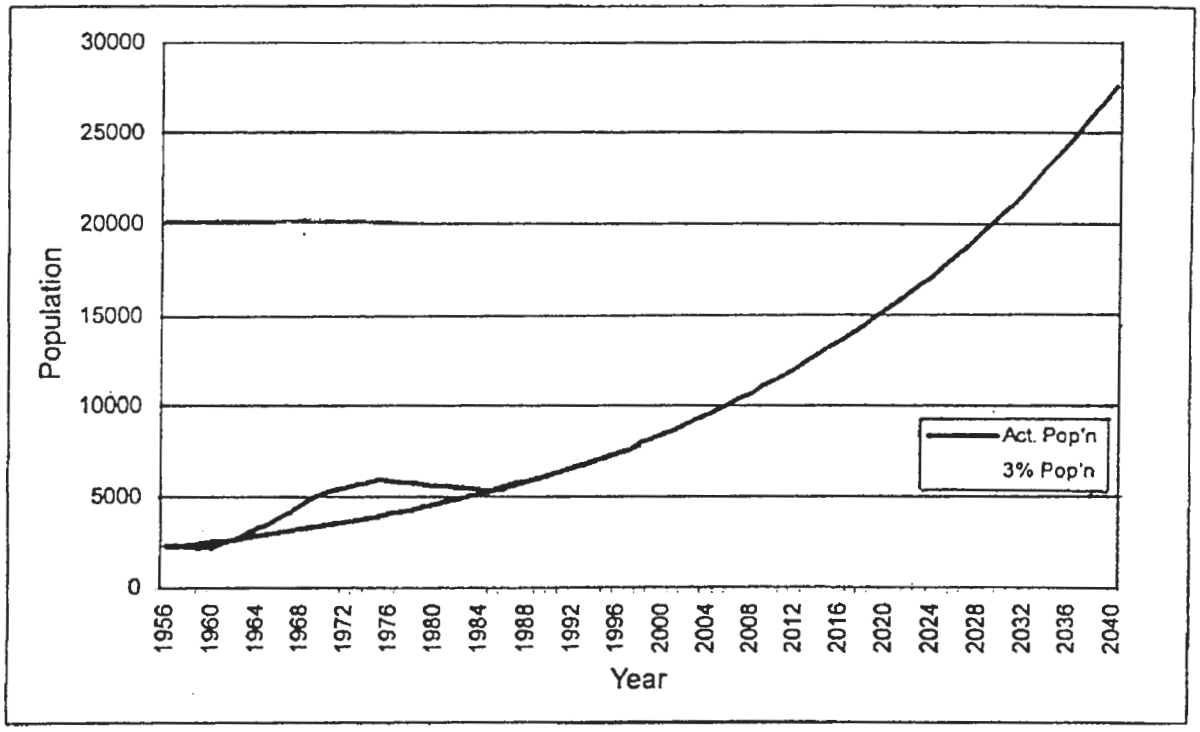
(1) Source: PSU Center for Population Research- State Office of Economic Analysis

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Historic and projected populations for the City of Monmouth

Historic Population			Projected Population		
Year	Population	Growth Rate	Year	Population	Growth Rate
1956	2,282	---	2000	8,376	3.0%
1960	2,229	-0.55%	2005	9,710	3.0%
1965	3,487	9.55%	2010	11,256	3.0%
1970	5,237	8.52%	2015	13,049	3.0%
1975	5,970	2.68%	2020	15,128	3.0%
1980	5,600	-1.18%	2025	17,537	3.0%
1985	5,390	-0.74%	2030	20,330	3.0%
1990	6,288	3.14%	2035	23,568	3.0%
1995	7,225	2.82%	**2040 (UBO)**	**27,322**	3.0%
1998	7,980	3.48%	**2019 (20-yr)**	**14,845**	—



Historic and projected population for the City of Monmouth from 1956 to 2040 (UBO).

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Historic and Projected Population for the City of Monmouth

Figure 3-1

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Population Increase Projection-Statewide and Marion County

Between 1980 and 1997, the population of Oregon increased from 2.64 million to 3.22 million, an increase of 21.9%. Based on current projections, the population of Oregon is expected to continue to grow faster than the United States as a whole over the next fifty years. Several forces will affect the future demographics of Oregon's population:

1. During the next 5-10 years, rapid growth is expected for age groups 18-24 years old, 45-64 year olds, and those over 75.

2. After Year 2010, the population of retirement eligible people will rise rapidly.

3. Migration of residents from other states is expected to continue at a rapid pace.

4. Slower growth is expected for those of school age population (5-17 year olds), 25-44 year olds, and 65-74 year old people over the next 5-10 years.

Table 3-1 summarizes United States census data and projected populations for both Polk County and the State of Oregon.

To analyze the specific population projection for Monmouth in the Year 2020, several additional sources were consulted. These included a previous Water Supply Master Plan for Independence (Stettler, 1997), Monmouth Sewer System Master Plan (1999-HBH Consulting Engineers), and 1983 Water Master Plan (CH2MHill). For the purposes of this study, the following population projections will be used:

Table 3-2
City of Monmouth
Projected Population Equivalent

Year	Population	% Increase/Year	Residential Units (EDU)
1990	6,288 (actual)	- - -	1,600
1999	8,310 (estimate)	3.2%	2,078
2000	8,376	3.0%	2,094
2005	9,710	3.0%	2,428
2010	11,256	3.0%	2,814
2015	13,049	3.0%	3,263
2020	15,128	3.0%	3,782

Impact of Western Oregon University

Due to the high level of yearly water consumption, the impact of Western Oregon University on water usage and future growth must be considered in this report. Information provided by the University indicates a reasonably stable campus population since 1970. Recent information obtained, from the University projects an expansion of the university and substantial growth over the next decade. Table 3-3 illustrates the student enrollment at WOU between 1960-1999.

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Table 3-3
Western Oregon University
Student Population History

Year	Equivalent Full Time Students
1960	1,102
1965	2,073
1970	3,946
1975	3,494
1980	3,129
1985	3,042
1990	4,017
1995	3,908
1997	4,088
1999	4,515

For planning purposes, a full time student population of 6,500 will be assumed at the end of the study period (2020). This represents an increase of approximately 2000 students above the current population, an increase of 44% over current levels.

Future Service and Study Area

The City currently operates within established geographical and political boundaries that comprise the City limits and the Urban Growth Boundary (UGB) (Figure 3-2). The City is bounded on the east by the City of Independence, and the UGB to the north, west, and south. Most of the land presently available for future development is in the northern and southern sections of the City with a smaller percentage available in the western area. The total area within the UGB is 1,923 acres of which approximately 1315 acres (68%) is listed as net developable area for residential use.

Although a potential exists for expansion of the UGB or a future water-use agreement with a nearby community, for the purposes of this study, only the area within the UGB shall be considered. The total population assumed at ultimate build out in Year 2040 is calculated to be as high as 27,322 residents which is 45% greater than the projected 2020 population.

Land Use

General: Land use within the City of Monmouth is defined in four basic categories: Residential, Public, Commercial, and Industrial. These land uses are further categorized as follows:

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Residential

RS- Single Family Residential (0-6 dwellings per acre)
RM- Limited Multi-Family Residential (up to 12 dwellings per acre)
RH- Multi-Family Residential (up to 20 dwellings per acre)

Public

PS- Public Service (parks and other public facilities)
PSC- Public Services College (land occupied by Western Oregon University and the Oregon Police Academy)

Commercial

CO- Commercial Office
CH- Commercial Highway
CR- Commercial Retail
CRT- Commercial Retail Transitional

Industrial

IP- Industrial Park

Existing Land Uses and Growth Potential

Existing Land Use

The existing land use for the City of Monmouth is shown in Figure 3-3 and in Table 3-4. Currently, there are 1,239 acres of land within the City Limits. A total of 684 acres is held as urban reserve (within the Urban Growth Boundary, but outside the City Limits). Thus, the total land available within the Urban Growth Boundary is 1,923 acres.

Future Land Use

As shown in Table 3-4, there are 684 acres of land currently within the Urban Growth Boundary, but outside the City Limits. This land is comprised largely of future residential land. The 524 acres of future residential land has not been further classified as RS, RM, or RH. For the purpose of this Master Plan, it is assumed that this residential land will develop with the same percentages of RS, RM, and RH as currently exist. Table 3-5 details the assumed growth distribution for the residential land outside of the City Limits.

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Table 3-4
Status of Land Use in Monmouth

	Current Status (as of 9-1-98)	
Land Use	In City (Acres)	Urban Growth Reserve (Acres)
Residential		
RS-Single Family Residential	531	
RM- Limited Multi-Family Residential	163	
RH- Multi-Family Residential	97	
SUBTOTAL	*791*	*524*
Public		
PS- Public Service	188	
PSC- Public Service College	128	18
SUBTOTAL	*316*	*18*
Commercial		
CO- Commercial Office	20	
CH- Commercial Highway	26	
CR- Commercial Retail	36	
CRT-Commercial Retail Transitional	13	
SUBTOTAL	*95*	*0*
Industrial		
IP- Industrial Park	37	142
TOTAL	**1,239**	**684**
TOTAL LAND IN UGB (acres)	**1,923**	

Table 3-5
Development Distribution of Residential Land Currently Outside the City Limits

Land Use	Development Percentage	Predicted Acreage
RS- Single Family Residential	67	351
RM- Limited Multi-Family Residential	21	110
RH- Multi-Family Residential	12	63
TOTAL		**524.0**

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Water Requirement

The City of Monmouth has utilized groundwater sources exclusively since the early 1980's. The current wells in use are Well #1 (Marion County Well) and Wells #4 and 5 (Independence 4th Street Wells). Water production and sales (metered consumption) for the period of 1995-1996 is summarized in Table 4-1.

Table 4-1
Yearly Water Production and Metered Sales (in Gallons)
1995-1996

Year and Well Number	Total Production	Metered Sales	Percentage of Unaccounted Water
1995- Population: 7,225			
Well #1	283,989,808 g		
Well #4	3,540,000 g		
Well #5	7,567,500 g		
1995 Total	**295,097,308 g**	272,036,664 g	7.8 %

Average Daily Demand: 808,486GPD- Average Per Capita Usage: 112 GPCD
Maximum Day Demand: 1,959,412 GPD (August 2, 1995)
Maximum Day/Average Day: 2.42
Maximum Day Per Capita Usage: 271 GPCD

1996- Population: 7,385			
Well #1	300,344,200 g		
Well #4	4,995,000 g		
Well #5	2,683,100 g		
1996 Total	**338,022,300 g**	**Not Available**	**NA**

Average Daily Demand: 926,088 GPD- Average Per Capita Usage: 125 GPCD
Maximum Day Demand: 2,353,180 GPD (August 23, 1996
Maximum Day/Average Day: 2.54
Maximum Day Per Capita Usage: 319 GPCD

Average Daily Per Capita Water demands for 1995 and 1996 average 118 GPCD, a typical value for communities with primarily residential water demands.

Data for the three years 1997, 1998, and 1999 were tabulated and evaluated separately to reflect the most recent actual water consumption. Table 4-2 indicates monthly production and billing for Years 1997-1999. Monthly values of billed water may be higher than production values for the same month due to timing differences in summary of data.

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Table 4-2
Monthly Water Production and Metered Sales (in Gallons)
1997-1999

Month/Year	Well #1	Well #4	Well #5	Total Production	Metered Sales	Unaccounted Water (Percent)
January, 1997	23,810,200	0	0	23,810,200	17,554,886	
February, 1997	21,549,300	0	0	21,549,300	19,243,123	
March, 1997	21,637,400	0	0	21,637,400	18,153,137	
April, 1997	22,632,300	0	0	22,632,300	20,665,976	
May, 1997	29,834,400	0	0	29,834,400	22,351,138	
June, 1997	30,048,800	15,000	0	30,063,800	25,851,305	
July, 1997	38,063,100	6,394,000	2,064,100	46,521,200	32,455,496	
August, 1997	38,174,700	5,944,000	3,102,600	47,221,300	47,248,894	
September, 1997	26,735,800	0	0	26,735,800	32,946,595	
October, 1997	24,104,600	0	0	24,104,600	20,683,928	
November, 1997	22,492,700	0	0	22,492,700	19,536,167	
December, 1997	21,298,700	0	0	21,298,700	19,864,456	
1997 TOTALS	**320,582,00**	**12,353,000**	**5,166,700**	**338,101,700**	**296,561,101**	**12.3%**
January, 1998	22,837,400	0	0	22,837,400	17,599,872	
February, 1998	22,788,500	0	0	22,788,500	20,547,934	
March, 1998	22,264,600	0	0	22,264,600	17,068,395	
April, 1998	23,192,300	0	0	23,192,300	21,649,147	
May, 1998	27,782,900	0	0	27,782,900	21,451,802	
June, 1998	29,903,400	0	0	29,903,400	23,538,086	
July, 1998	48,330,900	2,675,000	1,422,100	52,428,000	33,234,897	
August, 1998	49,765,900	1,287,000	683,000	51,735,900	46,833,918	
September, 1998	40,072,600	0	0	40,072,600	45,301,176	
October, 1998	27,030,600	0	0	27,030,600	25,653,056	
November, 1998	25,173,900	0	0	25,173,900	20,383,972	
December, 1998	23,134,600	0	0	23,134,600	20,780,861	
1998 TOTALS	**362,277,600**	**3,962,000**	**2,105,100**	**368,344,700**	**314,043,118**	**14.8%**
January, 1999	24,917,800	0	0	24,917,800	18,851,769	
February, 1999	24,182,200	0	0	24,182,200	21,424,889	
March, 1999	24,859,100	0	0	24,859,100	17,236,209	
April, 1999	26,250,200	0	0	26,250,200	18,561,351	
May, 1999	28,462,600	0	0	28,462,600	21,451,802	
June, 1999	32,280,000	0	0	32,280,000	23,538,086	
July, 1999	45,703,000	0	0	45,703,000	33,234,897	
August, 1999	43,162,800	0	0	43,162,800	41,374,393	
September, 1999	40,321,200	0	0	40,321,200	48,650,264	
October, 1999	28,218,000	621,000	0	28,839,000	30,536,509	
November, 1999	20,159,000	369,000	0	20,528,000	22,791,889	
December, 1999	19,983,700	0	0	19,983,700	20,920,954	
1999 TOTALS	**358,499,600**	**990,000**	**0**	**359,489,600**	**321,380,534**	**10.7%**

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Since water demands within a city vary from year to year due to seasonal, climatic, and economic factors, it is not uncommon to see substantial yearly differences in water consumption. In order to provide more statistically accurate future projections, water use demand and consumption data have been evaluated for the 3 Years 1997-1999. The values from these three years have been averaged and adjusted for population variances. These average values are used for water system projections for Years 2000-2020:

Table 4-3
1997-1999 Water System Statistics

Parameter	1997	1998	1999	3 Year Average	Design Values
Population	7,590	7,980	8,310	7,960	
Average Daily Demand (Sources)	926,306 GPD	1,009,164 GPD	984,884 GPD	973,451 GPD (676 GPM)	
Average Daily Demand (Sales)	812,496 GPD	860,392 GPD	880,495 GPD	851,128 GPD	
Average Yearly Unaccounted Water (Percent)	12.3%	14.8%	10.6%	12.6%	10%
Maximum Month	August	August	July	July-August	
Average Day during Maximum Month	1,523,268 GPD (1058 GPM)	1,668,900 GPD (1159 GPM)	1,474,290 GPD (1024 GPM)	1,555,486 GPD (1080 GPM)	
Maximum Day	2,271,000 g (8-15-97)	2,528,561 g (8-11-98)	2,223,280 g (7-16-99)	2,340,947 Gal (1,626 GPM)	
Maximum Day/Average Day	2.45	2.51	2.26	2.41	2.5
Minimum Month	December	March	December	NA	
Well #1-Average Operation Hrs/Day	16 (66%)	18.9 (78.8%)	17.7 (73.4%)	17.5 (73%)	
Well #1-Maximum Operation Hrs/Month	717.5 (July)	719.25 (August)	676.5 (July)	704 hrs/month	
Well #1- Average Maximum Operation Hrs/Day	23.15 (96%)	23.18 (96.6%)	21.8 (90.9%)	22.7 (94.6%)	
Average Summer Day	1,345,721 GPD (935 GPM)	1,567,788 GPD (1089 GPM)	1,404,270 GPD (975 GPM)	1,439,239 GPD (1000 GPM)	
Maximum Day/Average Summer Day	1.69	1.61	1.58	1.63	1.65
Average Summer Day/Average Day	1.45	1.55	1.43	1.48	1.5
Average Winter Day	744,410 GPD	754,339 GPD	821,768 GPD	773,506 GPD (537 GPM)	
Average Winter Day/Average Day	.80	.75	.83	.795	.80
Average Per Capita Day	122 GPCD	126 GPCD	119 GPCD	122 GPCD	125 GPCD
Per Capita Usage: Average Day During Maximum Month	200 GPCD	290 GPCD	177 GPCD	195 GPCD	200 GPCD
Maximum Per Capita Day	299 GPCD	316 GPCD	269 GPCD	295 GPCD	313 GPCD

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Table 4-4 illustrates the distribution of water users in the City of Monmouth.

Table 4-4
Water Service Distribution (As of April, 1999)

Type of Account	Number of Services	Percent of Total
Single Family Residential	1,601	81.8%
Multi-Family Residential	213	10.9%
Commercial	80	4%
Institutional	45 (Western Oregon University)	2.3%
Irrigation	2	1%
City Services	5	.3%
Fire Protection	12	.6%
	Total: 1,958 Services	100%

Western Oregon University- Impact on Water Usage

Western Oregon University is the single largest consumer of water in the City of Monmouth. According to university officials, the current (2000) student enrollment of 4,515 is expected to rise significantly over the next ten years. Information received from the university projects Year 2010 student enrollment to be between 6,500-7,000. The following water usage data was obtained for Years 1998-1999 and reflect the most current data available:

Table 4-5
Western Oregon University
1998-1999 Water Consumption

Month/Year	Water Consumption (in Gallons)
January, 1999	1,753,536 g
February, 1999	3,393,751 g
March, 1999	2,879,351 g
April, 1999	2,618,898 g
May, 1999	3,593,242 g
June, 1998	3,535,272 g
July, 1998	5,403,702 g
August, 1998	9,430,186 g
September, 1998	8,513,512 g
October, 1998	4,814,427 g
November, 1998	3,653,905 g
December, 1998	3,127,014 g
TOTAL	52,716,796 gallons

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Based on individual meter readings, the yearly irrigation demand by the university is approximately 14,400,000 gallons (27.3% of the total). This volume is typically consumed through the summer months of June, July, and August. The university has recently purchased 34 acres of additional land in anticipation of the projected 10 year growth. For planning purposes, the following criteria will be used:

Current Yearly Water Demand: 52,716,796 gallons
(-) Irrigation and landscape watering: <14,400,000 gallons>

Yearly Water Consumption: 38,316,796 gallons
38,316,796 gallons/4,500 students= 8,515 gallons/year/student
8515/365 days per year= 23.3 gallons per day/student-Use 25

In addition, irrigation demands are projected to double to accommodate the 15-20 acres planned to be added to the campus in the future. Based on current daily demands, future irrigation demands are projected to ultimately rise to 300,000 GPD (Year 2010).

Table 4-6
Western Oregon University
Maximum Projected Daily Water Use (in Gallons)

Year	Student Enrollment	Daily Water Use/Student	Total Domestic Use	Irrigation	Total
2000	4,500	25	112,500 GPD	160,000 GPD	272,500 GPD
2005	6,000	25	150,000 GPD	200,000 GPD	350,000 GPD
2010	6,500	25	162,500 GPD	300,000 GPD	462,500 GPD
2015	6,800	25	170,000 GPD	300,000 GPD	470,000 GPD
2020	7,000	25	175,000 GPD	300,000 GPD	475,000 GPD

Commercial/Industrial Water Use

As previously indicated, Western Oregon University is the largest single user of water in Monmouth. Review of meter reads and customer billings indicate a total of 80 commercial/industrial accounts currently exist in Monmouth. This amounts to 4% of the total connections. The actual water consumption from the commercial accounts averages 6%-7% of the total monthly consumption. This amount is fairly consistent and does not significantly vary through the year. This amount is negligible to the total and will therefore by included within the per capita usage. The average commercial account water consumption is also very close to a typical dwelling unit. Even though there is dedicated industrial zoned land available for future growth, at this time no industrial facility that consumes appreciable amounts of water is proposed or contemplated in Monmouth. In the absence of specific criteria, future commercial and industrial water usage will be included within the projected per capita demands. The city is advised that any future industrial concern that may use over 1000 gallons per day per developed acre will need to be addressed individually. For the proposed 142 acres of Industrially zoned land in the northeast area of the city, this value equates to a population equivalent of 454 (based on Maximum Day Demand). Each acre, therefore, of industrial water usage (@ 1000 GPD/Acre) will equal 3.2 residents of equivalent maximum water use.

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Based on previously stated population and Western Oregon University projections, the following values will be used for planning purposes:

Table 4-7
Projected Water Demands: 2000-2020

	2000	2005 (1)	2010 (1)	2015 (1)	2020 (1)
Design Population	8,376	9,710	11,256	13,049	15,128
Average Daily Demand (3)	1,047,000 GPD	1,253,750 GPD	1,457,000 GPD	1,691,125 GPD	1,954,000 GPD
Average Summer Demand	1,570,500 GPD	1,900,625 GPD	2,300,500 GPD	2,644,688 GPD	3,039,500 GPD
Maximum Daily Demand (2)	2,621,688 GPD	3,116,730 GPD	3,713,128 GPD	4,282,337 GPD	4,938,064 GPD
Peak Hour (4)	4,550 GPM	5,413 GPM	6,450 GPM	7,440 GPM	8,600 GPM

(1) Years 2005-2020 reflect increased daily demand to accommodate projected Western Oregon University (WOU) and city growth
(2) Maximum Daily Demand is based on 313 gallons per capita/day plus the WOU growth factor
(3) Average Daily Demand is based on 125 gallons per capita/day
(4) Peak Hour Demand is assumed to be 2.5 x Maximum Day Demands

Required Source Capacity

Future required capacity is dependent on several factors. Among these are: duration of consecutive maximum days, source reliability, type of water use, and available storage. In the case of Monmouth, historical records indicate few incidents of consecutive or long term maximum day demands. Typically, maximum yearly water demands are incurred for a maximum of 3-4 consecutive days followed by a period of more typical summer demands. Source reliability has generally been excellent with few power or equipment failures. The city's current active storage of 5,000,000 gallons is adequate to accommodate up to two days of current maximum day demands. Future planning, however, must consider the existing common transmission pipeline (and possible failure) used by all wells and the fact that only three wells are available for all needed demands. For example, a prolonged failure or severe contamination of the Marion County well would result in a catastrophic event. To lessen this potential, new sources should be adequately spaced so that contamination of one source will have little or no impact on the others. The new Buena Vista well is located in the American Bottom region of Polk County, approximately three miles from the Marion County and Independence wells. This spacing provides a good measure of source reliability. Another area of concern is related to the use of only 2-3 high capacity wells to provide all of the needed capacity. To alleviate this concern, minimum well capacities will be based on any three of the future total of five wells (excluding the Fourth Street wells) providing an average summer day demand. The distribution of flow between the wells is also sufficient to provide maximum day demands with 24 hour a day pumping even with the loss of any single 700-800 GPM well. This design criteria fits well with available well capacities from new wells in the Buena Vista well field. If a coincidental failure of the Marion County Well occurs on a maximum day, the differential will be drawn from current and proposed future water storage.

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Given the above conditions, for the purposes of this report, the following values will govern:

Table 4-8
Required Total Source Capacity: 2000-2020

	2000	2005	2010	2015	2020
24 Hrs/Day Pumping	1,820 GPM	2,165 GPM	2,580 GPM	2,775 GPM	3,430 GPM
20 Hrs/Day Pumping (recommended)	2,200 GPM	2,600 GPM	3,100 GPM	3,570 GPM	4,115 GPM

From Table 4-8, the value shown at 20 hours per day of source pumping provides reserve flow necessary for possible pump failure or coincidental fire demand and will be used for forecasting purposes.

Fire Flow

The City of Monmouth is located within the Polk County Fire District No. 1 for fire protection and is served from the main station located between Independence and Monmouth. Table 4-9 indicates needed and available fire flows for various locations within the city. These flows are based on normal fire flow requirements for specific structure or development classifications and are based on testing performed by ISO in March, 1998.

Table 4-9
Required Fire Flows

Location	Required Fire Flow (GPM)	Available Fire Flow (GPM)	Classification
Bentley and Martin Way	1250	2300	Residential
West Orchard Drive	750	7000	Residential
South Pacific and Madrona	750	1350	Commercial
Sacre Lane and Church St (WOU)	3500	2100	Institutional
Monmouth and Church St	3000	2400	Commercial/Institutional
West Church Street	3500	2000	Commercial/Instructional
East Church Street	3500	2600	Institutional

As seen in Table 4-9, past fire hydrant flow testing performed by ISO(March, 1998) indicated a maximum deliverable flow rate of 2,600 GPM @ 20 psi residual pressure in the Church Street Area. The minimum required flow in this area is 3,500-4,000 GPM. Due to the high exposure of a potentially large fire at the WOU campus, this area of the city is regarded as the most serious current fire flow deficient area in the city. After careful analysis and computer modeling, however, it is believed that this deficiency in flow is a function of the distribution system and undersized pipe to this area.

Discussions with Mark Stevens of Polk County Fire District indicated that Monmouth has been included with Independence, Rickreall, and the rural Luckiamute Water Cooperative to create an aggregate classification. Much of the criteria used to classify the Polk County Fire District is based on response time, dispatch methods, and available fire fighting equipment as well as water supply. During this discussion, the Fire District expressed the desire for up to 3,500-4,000 GPM supply in Monmouth, particularly in the downtown core area and Western Oregon University. Since ISO does not improve the rating of a city for fire flow above 3,500 GPM, this flow was felt to be the highest practical flow currently required in Monmouth.

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For hydraulic modeling analysis, this value will be used during Year 2000 analyses. Year 2020 fire demand is assumed to be 4,000 GPM, reflecting the actual population requirement. Actual flow based on ISO population equivalents and storage requirements are calculated below and will be used for storage requirements.

The City currently has a Class 3 Fire Protection Rating as established by the Insurance Services Office (ISO). This rating is regarded as an excellent rating for a community such as Monmouth. This level of rating provides the same insurance premium to homeowners of residential property for all Class 3, 4, and 5 ratings (the lower the number relates to a better class rating). Class 1 and 2 ratings are difficult to obtain and unrealistic for this location. Drastic improvements to the water system to further lower the City's Fire Protection Rating, therefore, will not result in an appreciable reduction in fire insurance premiums and is most likely not feasible due to the current limitations associated with non-water supply issues, i.e. fire department response time, available equipment, etc. During evaluation of the system, the highest projected instantaneous fire flow demand would most likely occur within the downtown core area or at Western Oregon University. Since many of the existing structures in these areas are older wood or brick frame buildings with close spacing between structures, a very high fire flow (> 3000 GPM) could feasibly be required to fight a large conflagration in this area. Fortunately, most of the campus buildings within Western Oregon University are reportedly sprinkled and the likelihood of a very large and sustained fire at this institution is considerably less than with unsprinkled buildings.

Assumed fire flow demands, in the absence of specific criteria, is based upon population numbers. For planning and hydraulic modeling purposes, the following equation will be used to approximate the present and future fire flows (values will be used for both present and future population equivalents).

$$Q(GPM) = 1020 \sqrt{P} (1 - .01\sqrt{P}) \quad (1)$$

Where P = Population in Thousands

For 2020 Projected Population of 15,000

$$Q(GPM) = 1020 \sqrt{15} (1 - .01\sqrt{15}) = 3800 \text{ GPM}$$

Monmouth Fire Flow duration: 4 hrs - Total Volume: 4000 GPM X 60 mins/hr X4 hrs = 912,000 gallons.

For planning purposes, a Year 2020 fire flow of 4000 GPM will be assumed over a 4 hour duration ≅ 1,000,000 gallons.

(1) American Insurance Association

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Future Water Sources

Groundwater

The current total permitted capacity under valid permits (5,328 GPM) is adequate to supply all projected water demands through the Year 2020, however, the existing source capacity (1,600 GPM) does not fulfill this requirement. Currently, the wells are operated continuously or as needed to maintain water in the reservoirs. A new control system, proposed in the first phase of improvements will allow automatic operation of all wells, optimizing source capacity and reliability.

The Marion County Well produces the highest quality of water of all existing sources, with low levels of iron, manganese, and hardness. The risk at this site associated with the river crossing, nitrates, and proximity to agricultural activity, however, necessitates the implementation of redundant source capacity.

For planning purposes, each existing well in the Independence Field will be limited to an average flow of 150 GPM (300 GPM total). Wells #4 and #5 each have levels of iron as well as past detections of regulated and unregulated organic contaminants (1). The only other current ground water source available to the city is the Marion County well. This shallow well has good yield (over 1,000 GPM), but contains elevated levels of carbon dioxide requiring treatment and periodic elevated Nitrate levels.

The recently drilled Buena Vista Well #1, located in the American Bottom region, has good yield (1000 GPM) and acceptable water quality. The major concern associated with the use of this site is the presence of iron and manganese. As outlined in other sections of this report, the iron and manganese levels from this well is considerably higher than the suggested limit. Nearby wells utilized by the Luckiamute Water Cooperative, however, do not contain the same high level of these elements. It is anticipated that continuous or long term pumping will allow water with higher aesthetic quality to be induced to the new well field. The author of this report has observed this phenomenon occur at other wells and believes this may also occur at this site. To avoid the initial expense of complicated iron removal equipment, the Buena Vista well should be equipped with sequestering injection equipment for the first 2-3 years of operation. The city's reliance on this well will be minimal for the first 3-5 years of operation which will afford the opportunity to pump the well as necessary to hopefully lower iron levels. If iron and manganese levels do not fall to acceptable levels within this time span, the city may opt to install filtration equipment for permanent removal of these elements.

Based on the criteria established in Table 4-8, the current recommendation is to immediately pursue development of the Buena Vista well field. This is felt to be the highest priority as additional source capacity is presently needed as well as a back-up source to the Marion County Well. Later phases of the study periods include development of additional wells in the Buena Vista well field to accommodate projected growth. For planning purposes, the following schedule is recommended:

(1) In 1994, traceable levels of Petachlorophenol (PCP) were detected in Well #4.

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Table 5-1
Recommended Groundwater Source Development Schedule

	2000	2001	2005	2010	2015	2020
Marion County Well #1	1400 GPM	1200 GPM	1200 GPM	1300 GPM	1200 GPM	1200 GPM
Well #4	250 GPM	150 GPM	-----	-----	-----	-----
Well #5	150 GPM	150 GPM	150 GPM	150 GPM	-----	-----
Buena Vista #1	----	900 GPM	900 GPM	900 GPM	800 GPM	700 GPM
Buena Vista #2	----	----	700 GPM	700 GPM	700 GPM	700 GPM
Buena Vista #3	-----	-----	-----	-----	700 GPM	700 GPM
Marion County #2	----	----	----	----	----	800 GPM
Total Available Capacity (1)	1600 GPM	2400 GPM	2950 GPM	3050 GPM	3550 GPM	4100 GPM
Total Required Capacity (2)	2200 GPM	2300 GPM	2600 GPM	3100 GPM	3570 GPM	4115 GPM
Net Reserve (+) Deficit (<>)	<400 GPM>	+100 GPM	+350 GPM	<50 GPM>	<20 GPM>	<15 GPM>

(1) Based on 20 Hour per day of pumping
(2) Based on Maximum Day Demand

The above schedule reflects a progressive implementation of new wells from the Buena Vista well field and little or no changes in flow from the Marion County Well. Due to the known water quality concerns from this well, as well as constraints on space and well limitations, an increase in flow from this site is not feasible. A program to optimize the capacity of the Buena Vista well field and transmission pipeline, resulting in progressive expansion of this source is recommended. The later years of the study period also include development of a second Marion County Well. This well, to be located adjacent to the existing well, will provide an additional measure of source and well field redundancy. As previously outlined, Wells #4 and 5 are not planned in future projections due to the relatively low capacities and uncertain water quality from these wells. To avoid well interference between wells in the Buena Vista well field, a reduction in flow from each well is anticipated as additional wells are developed. This results in a total well field capacity of 2100 GPM, 588 GPM less than permitted.

Given the hydrogeology of this area, however, it is believed that lowering the yield from each well and combining more wells to produce the total water required, will provide long-term advantages to the wells and well pumps. A discussion of local hydrogeologic characteristics and recommended well construction standards can be found in later sections of this chapter.

Water Right Implications

To satisfy the proposed groundwater development schedule, the City will not need to obtain and secure additional water rights, only application to modify existing rights will be required. The city currently holds valid permits for 5 CFS (2240 GPM) for the Marion County well and 6 CFS (2688 GPM) for the Buena Vista wells. Both of these permits are for year round use. These permitted flows are far in excess of the required capacity and only the points of diversion will need to be modified. The existing Marion County permit allows withdrawl from two wells, which is the planned maximum number from this well field. The Buena Vista permit, however, projects total withdrawl from 2 wells also. The total permitted flow cannot realistically be obtained from two wells and the permit will need to be modified for the ultimate use of three wells. The city may also wish to pursue the transfer of existing Teal Creek surface water rights to the Buena Vista well field.

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Since the Teal Creek source is not anticipated to be utilized anymore, transfer to groundwater rights may be the most logical use of these unused water rights. In all cases, the City should endeavor to retain any and all previous priority dates on pre-existing permits.

Surface Water Development

According to information obtained from the Water Resources Department and the Willamette Basin Plan (Nov. 1994), surface water for municipal use is available from the Willamette River at Independence and from the Teal Creek source. The amount of water available via water rights allocation from the Willamette River is far in excess of the projected water demands for Monmouth through the study period. The feasibility of re-developing the Teal Creek water source, however, is very limited. Historical data from the city and the Water Resources Department indicates a seasonal depletion of available water from this source, particularly during the summer. The Teal Creek springs are known to substantially dry up or endure severe depletion during late summer months. In addition, this source has severe turbidity events that often occur during periods of sustained precipitation and runoff. Further reliance on the Teal Creek source will require some method of storage to protect against periods of low water availability. The cost associated with treatment, storage, and transmission of this source to the city is felt to be economically excessive. Given the high cost of development and treatment of surface water, public resistance, the possible risk of contaminants due to local agricultural practices and upstream wastewater discharges, and the availability of adequate groundwater; development or use of any surface water source is not recommended at this time. During the past 10 years, several discussions have occurred in which the feasibility of a regional water authority supplying the Willamette River water to the cities of Dallas, Monmouth, and Independence has been explored. At this time, the political and economic limitations of this possibility are great and future planning utilizing this potential is not felt to be justifiable.

Local Hydrogeology

The City of Monmouth is located in a broad synclinal trough (valley) known as the Willamette Valley. The Willamette Valley was formed 30-60 million years ago through a downward folding of the subsurface layered rock formation. The material at the surface over much of the valley is a sandy to clayey silt that settled from ponded water. This silt, known as Willamette Silt, is comprised of a permeable fine-grained deposit that transmits water readily to the underlying alluvium (sand and gravel) formation. The alluvial deposits and silts underlying the Monmouth area were largely derived due to erosion and runoff from surrounding mountains. These deposits consist of layers of clay, silt, and sand and gravel. This alluvium material, chiefly consisting of sand and gravel, is also referred to as an unconsolidated material and provides the available groundwater for Monmouth, Independence, and nearby agricultural wells. Water percolates through the pores of sand and gravel by head created from the recharge point. Sand and gravel, due to its available pore spacing, is a much better conveyor of water to a well than clay or sandstone which does not permit water to transmit as easily.

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Marion County and Independence Wells

Near Corvallis Road, the sand and gravel beds are hydraulically continuous and can exceed a saturated thickness of 10 - 45 feet covering tens of square miles, generally within the Willamette River floodplain. Properly constructed wells in these deposits can typically obtain yields of 100 to over 500 gallons per minute. The yield of an individual well, however, can vary significantly depending on the distance from the Willamette River, thickness of aquifer, and amount of cementation (binding together) that occurs within the formation. The alluvium in the Monmouth/Independence area is often referred to as "younger or older alluvium". The terms "younger" or "older" alluvium refer to the relative geologic age of deposition of each of these types of alluvium. Younger alluvium has been more recently deposited and is constantly subject to washing and regrading of material due to the action of the Willamette River during floods. The older alluvium is established alluvium that underlies the younger alluvium and/or Willamette silt.

The younger alluvium bounds the Willamette River to the east and extends roughly to Corvallis and Buena Vista Roads to the west. This type of alluvium is characterized by high production wells due to good hydraulic connection with the Willamette River and lack of cementation. Water from the younger alluvium, however, also generally has higher levels of iron, manganese, and hardness and is more susceptible to Nitrates and contamination due to the shallow depth and lack of overlying sealing material. Annual recharge to the younger alluvium is established to be between 8"-15". The Marion County Well is an example of a well constructed in the younger alluvium. Information obtained from the draft report, "Monmouth-Independence Drinking Water Protection Area Delineation Report," OAWU, 1998; indicates recharge to the Marion County well occurs from the south-southeast. This area is heavily agricultural in practice and elevated nitrate levels periodically observed at the Marion County well may be the result of the application of nitrogen fertilizers often used in agricultural practices. Completion of this report is strongly recommended and the city should begin a recharge area inventory and delineation as soon as possible to assist in long-term protection of this specific well. The older alluvium is located generally west of Corvallis and Buena Vista Roads and underlies virtually all of the city including Wells #4 and 5. This type of alluvium does not yield the high flows common to the younger and shallower alluvium but it does generally have a higher degree of aquifer protection. The older alluvium is dependent on direct precipitation and inter-zonal leakage from the younger alluvium for recharge. The older alluvium is known to be at its thickest and most extensive point in the vicinity of the Independence South Well Field which accounts for the higher proportional yield from these wells as opposed to other wells in the older alluvium. In the area around Independence, sand-and-gravel beds in younger alluvium are continuous and hydraulically connected with sand-and-gravel beds in the adjacent older alluvium. When pumping is applied, the two units respond as a continuous aquifer. Discontinuity, cementation, and hydraulic losses, however, account for the difference in yield between these two formations. The older alluvium is typically overlain by 15 to 45 feet of clay and silt that provides good wellhead protection when proper well construction practices are employed.

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Underlying the younger and older alluvium is semi-consolidated and consolidated shale (claystone), sandstone, and basalt materials. Wells in these formations are not productive (≤ 50 GPM) in this area for municipal purposes and encountering salt water is a definite potential, particularly in wells below 120' in depth. For these reasons, exploration of groundwater below 100' in depth is not recommended.

Buena Vista Well Field

Due to the anticipated high reliance on the Buena Vista well field, a separate discussion of the available capacity and limitations of this field is warranted. As evidenced on Figure 5-1, the Buena Vista well, constructed in 1997, is on the fringe of the younger alluvium. The younger alluvium (Qyal), indicated by the lighter shade of yellow, is the most productive and permeable of the two alluvial aquifers in the area. Since the well is located in such close proximity to the older alluvium, it is possible that the elevated iron and manganese levels are due to the influence of water from the older alluvium as well as the underlying consolidated formations. Due to the relatively low levels of sodium and chloride, the actual amount of influence from the underlying shale and sandstone formations is not considered to be significant at this time. Additional development of wells at the Buena Vista site must be planned and executed carefully to avoid well interference, excessive iron, manganese, and nitrate/nitrite levels, and overpumping. After activation of the Buena Vista well #1, the city should embark on a 1-2 year monitoring program (Table 5-3) to provide needed background data for proper selection and design of the additional well sites. A competent hydrogeologist should be consulted to optimize the site selection and design capacity of future wells. Upon receipt of the hydrogeologist's report the city should proceed towards the acquisition of additional land (preferably to the east of the existing well) as soon as possible. This acquisition is vital to insure adequate well spacing to prevent well to well interference or interference between the Buena Vista well and nearby irrigation or Luckiamute wells.

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- The following schedule is suggested to optimize development of the Buena Vista well field:

Table 5-2
Buena Vista Well Field Development Schedule

Year	Task or Milestone	Purpose	Total Well Field Capacity
2000-2001	Install pumping and chlorination equipment and iron/ manganese sequestering equipment at Buena Vista #1	Satisfy immediate need for additional source capacity	900 GPM
2001-2003	Perform static and pumping level tests on production and test wells and nearby wells as outlined in monitoring program.	Provide data necessary for optimum selection of new well sites	900 GPM
2001-2003	Perform water quality tests for iron, manganese, and nitrates	Provide data necessary to determine need for water treatment	900 GPM
2002-2003	Select Buena Vista Well Sites #2 and 3 based on data collection and recommendations from hydrogeologist	Secure new well sites	900 GPM
2001-2002	Purchase additional land and/or water rights from nearby landowners or farmers	Secure needed land for additional wells in future years	900 GPM
2004-2005	Install iron/manganese removal equipment, if required	Implement if water quality does not improve with pumping	900-1600 GPM
2004	Drill and develop Buena Vista #2 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	1600 GPM
2005-2013	Continue monitoring program-Modify flows from wells, if necessary, to avoid interference between wells	Optimize available well capacity and Buena Vista #3 site selection	1600 GPM
2012-2013	Drill and develop Buena Vista #3 Preliminary Design Capacity: 700-800 GPM	Satisfy need for additional source capacity	2100 GPM
2015-2020	Continue monitoring water quality and well pumping conditions- Modify frequency as required	Optimize available well capacities	2100 GPM

Table 5-3
Recommended Buena Vista Well Field Monitoring Program

Parameter	Type of Unit	Frequency
1. Well Static Water Level (after full recovery)	Feet from surface	Weekly
2. Pumping Rate	GPM	Monthly
3. Pumping water level (obtained with pumping rate)	Feet from surface	Monthly
4. Iron	mg/L	Monthly
5. Manganese	mg/L	Monthly
6. Nitrate/Nitrite-First Year of Use	mg/L	Monthly
7. Nitrate/Nitrite-After First Year of Use	mg/L	Quarterly
8. Daily Production	Gallons	Daily
9. Static Water levels from Nearby Wells	Feet from surface	Quarterly
10. Pumping water levels from Nearby Wells	Feet from surface	Quarterly
11. Sodium	mg/L	Yearly
12. Chloride	mg/L	Yearly
13. Static Water Level (1) (Observation wells)	Feet from surface	Monthly
14. Inorganics, VOL, SOC, Gross Alpha, etc.	Frequency as Determined by OHD	

(1) These observations should be made during Tests #2 and 3, after the production well has stabilized during normal conditions.

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Well Interference Potential

Given the close proximity of the City of Independence's South Well Field and the City of Monmouth's Fourth Street Well Field, the possibility of well interference between these wells certainly exists. Fortunately, the Fourth Street wells are not frequently used, but if an emergency at Monmouth's Marion County well occurred, the potential exists for prolonged pumping from the Fourth Street Wells. If this occurred for an extended period of time, Wells #4 and 5 would most likely incur a drop in production of up to 10% - 50%. The high variable in drop of production would be related to the time of year of use (summer greater than winter), available water stored in the aquifer from recent recharge, and the rate and duration of pumping from both well fields.

The potential for drawing the known pentachlorophenol plume at a faster rate toward both well fields would also present a concern. Both cities would be well advised to discuss these scenarios and prepare an operational plan in the event both well fields would need to be used for an extended period of time. Well interference between Wells #4 and 5 and Monmouth's Marion County Well is not believed to be of concern given the different aquifers and distance between these sites. Even though the potential exists for interference between the Buena Vista Well and nearby agricultural and Luckiamute wells, the possibility of direct interference to nearby irrigation wells is low when considering the actual capacity of the Buena Vista Well versus the available yield and distance to actively used irrigation wells. Since most of the future water sources are projected to originate from the Buena Vista well field, the city must insure that adequate land is available for future well development and spacing. Each well site should be dedicated to 1-2 acres minimum of city owned land for adequate sanitary control as well as necessary well spacing. To prevent interference between existing Luckiamute Water Cooperative wells and the Buena Vista wells, the city should embark on a well level monitoring program (Table 5-3). This program should include both static and pumping water levels obtained throughout the year. A competent hydrogeologist should be consulted before siting and drilling Buena Vista wells #2 and 3 to optimize site selection. The City of Monmouth and Luckiamute Water Cooperative are advised to develop a monitoring and interuse agreement as soon as possible. Excessive aquifer draft or well interference may require purchase of available irrigation water rights or possibly re-consideration of extensive development of Buena Vista well field.

The greatest potential for well interference actually occurs within the Buena Vista Well Field itself. It is believed that with proper balancing of flows from each of the three proposed wells and normal pumping hours of less than 18 - 20 hours per day, the wells can operate together with minimal interference.

Alternate Water Sources

Recent discussions and investigation have been performed regarding the feasibility of securing (purchasing) municipal water rights from existing irrigation water rights. The primary irrigation rights under consideration are located approximately 4-5 miles northeast of the city. This source, although high in capacity, is vulnerable to iron, manganese, corrosion, and nitrate concerns. Use of these wells may also conflict with

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other quasi-municipal and irrigation water rights now present in the same general area. In addition, the cost to develop and transmit this source would be prohibitive for one single entity to incur at this time. In the case of Monmouth, the high incremental cost associated with the development and transmission of water from the Buena Vista field necessitates complete utilization of this site. For the purposes of this study, procurement of this alternate water source is not presently recommended, although reconsideration in the future may occur if sufficient cooperative interest is expressed by Dallas or Independence. The city should continue to pursue this potential with Dallas and Independence for water demands beyond 2020.

Recommended Well Construction Standards

In order to optimize future well production, the following recommendations should be considered when constructing new wells:

1. New wells should be a minimum of 12" diameter, with a 12" diameter well recommended at the Buena Vista well sites to allow well screen installation, if feasible.

2. New wells shall be cement grout sealed to a minimum depth of 25', 5' into an impervious layer such as clay, if possible.

3. Formation sampling shall occur at no more than 5' intervals and at every change in formation to facilitate well screen selection.

4. New wells shall be drilled through the water-bearing formation to a minimum of five feet below the bottom of the aquifer. This five foot extension below the aquifer shall remain and be used for accumulation of sand.

5. New wells shall be test pumped for a minimum of twelve hours. During this period, any existing wells within ¼ mile should also be operated and monitored to determine the interference potential.

6. Generally, the well construction shall comply with Water Well Construction standards as issued by the State of Oregon Water Resources Department

7. To optimize the full extent of the aquifer, a stainless steel well screen, properly sized to retain approximately 40% of the formation, should be specified.

Well Pump Selection Criteria

Based on hydraulic modeling results, specific criteria for the selection of well pumps at the Buena Vista and Marion County well fields can be established. Based on projections and data within this report, the following guidelines can be used for selection of well pumps for both well fields.

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MEMORANDUM

Date: May 11, 2005

To: Mike Zwart, Ground Water Section

From: Lisa Juul, Water Rights Section

Subject: Ground Water Monitoring Plan

CC: Application #G-13521 (Permit #G-12976)

Hello Mike,

The attached was recently submitted on behalf of the City of Monmouth in order to comply with a condition of their Permit #G-12976 (Application #G-13521). It is being forwarded to you for plan review.

Thanks,

Lisa

2 Wells
"A" and "B"

Oregon
Theodore R. Kulongoski, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
FAX 503-986-0904

May 17, 2005

(503) 986-0844

Mr. Gary Wilson, PE
City Engineer/Public Works Director
City of Monmouth
151 West Main Street
Monmouth, OR 97361

Re: Water Level Monitoring Plan – Permit G-12976, file G-13521

Dear Gary:

I have received a copy of "Technical Report on the Buena Vista Well 1, Well Test #2" by Edward Butts. This was provided to Lisa Juul of our Water Rights Section as the necessary plan to measure and report water levels to satisfy a condition in the above permit. Unfortunately, I find none of the necessary elements in the report which would satisfy the permit condition. Please review the enclosed cover letter and two example plans. As you can see, there are eight elements that your plan should address, all of which can usually be satisfied by a one or two sentence statement.

Please call me at the above number if you have any questions. I look forward to receiving your revised draft plan soon.

Sincerely,

Michael J. Zwart
Hydrogeologist

ENGINEERING & CONSULTING, LLC

3000 Market Street NE Suite 528
Salem, Oregon 97301
www.4bengineering.com

Phone: (503) 589-1115
Fax: (503) 589-1118

May 26, 2005

Michael Zwart, Hydrogeologist
Oregon Water Resources Department
North Mall Office Bldg.
725 Summer Street NE, Suite A
Salem, OR 97301-1271
FAX: 503-986-0902

RE: City of Monmouth—Permit G-12976; File G-13521
Water Level Monitoring Plan

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SALEM, OREGON

Dear Mr. Zwart,

I am in receipt of a letter from you to Gary Wilson (former Public Works Director, City of Monmouth), dated May 17, 2005, in which you request a specific water level monitoring plan for the referenced permit. In addition to the cover letter, you also enclosed a protocol and two sample monitoring plans for use as possible templates. In order to comply with your request, we are submitting the following proposed monitoring plan for your review and approval:

1) The water level measurements will be taken during September of each calendar year.
2) The reference water level will be the initial water level measurement that will be obtained in September, 2005. This will be the first water level measurement and will coincide with local irrigation demands and result in the most accurate measurement of a "typical" low water level.
3) The name applied to the measurements will be the Well Identification number assigned by the WRD. In this case, the identifier will be: Well ID #14134.
4) Water level measurements will be obtained using a Powers electronic water level indicator, taken through a 1" access port in the welded steel well cap.
5) The proposed instrument is designed specifically to measure water well levels. The cable is marked with permanent footage tags at five (5) foot increments. Measurements will be obtained between the marked intervals to the nearest one-quarter (1/4") inch.
6) There is no pump currently installed in the well or in service, therefore, the reading will be taken during a static condition without any previous pumping occurring from the subject well.
7) The measurement will be taken and certified by myself: I am a Registered Professional Engineer and Certified Water Rights Examiner with over 30 years of water well experience, or by Russ Cooper, Public Works Superintendent for the Owner who is also experienced with well levels.
8) The water level will be reported, in writing, to the WRD no later than October 10th, during each calendar year, or within 30 days following the date of the water level measurement, whichever is less.

I trust that I have adequately responded to your request for a water level monitoring plan, but would be happy to provide any further information you may need. Thank you for your consideration.

Respectfully,

Edward Butts, PE, DEE, CWRE

Oregon
Theodore R. Kulongoski, Governor

Water Resources Department
North Mall Office Building
725 Summer Street NE, Suite A
Salem, OR 97301-1271
503-986-0900
FAX 503-986-0904

July 5, 2005

(503) 986-0844

Mr. Edward Butts
4B Engineering and Consulting
3000 Market St. NE
Salem, OR 97301

Re: Monitoring Plan, file G-13521, Permit G-12976

Dear Ed:

I have received and reviewed your water-level measurement plan. I can approve the plan. Please note that the plan may be amended upon request or as directed, if appropriate. I will place a copy of the plan and this letter in the water rights file.

Please contact me at the above number if you have any questions.

Sincerely,

Michael J. Zwart
Hydrogeologist

Oregon
Theodore R. Kulongoski, Governor

Water Resources Department
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725 Summer Street NE, Suite A
Salem, OR 97301-1271
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May 26, 2005

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Oregon Water Resources Department
North Mall Office Bldg.
725 Summer Street NE, Suite A
Salem, OR 97301-1271
FAX: 503-986-0902

RE: City of Monmouth—Permit G-12976; File G-13521
Water Level Monitoring Plan

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WATER RESOURCES DEPT
SALEM, OREGON

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Respectfully,

Edward Butts, PE, DEE, CWRE

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503-986-0900
FAX 503-986-0904

May 17, 2005

(503) 986-0844

Mr. Gary Wilson, PE
City Engineer/Public Works Director
City of Monmouth
151 West Main Street
Monmouth, OR 97361

Re: Water Level Monitoring Plan – Permit G-12976, file G-13521

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Sincerely,

Michael J. Zwart
Hydrogeologist

MEMORANDUM

Date: May 11, 2005

To: Mike Zwart, Ground Water Section

From: Lisa Juul, Water Rights Section

Subject: Ground Water Monitoring Plan

CC: Application #G-13521 (Permit #G-12976)

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Thanks,

Lisa

2 Wells
"A" and "B"

CITY OF MONMOUTH OREGON

TECHNICAL REPORT ON THE BUENA VISTA WELL 1 WELL TEST #2

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JANUARY 2004

PREPARED BY:
STETTLER COMPANY
SALEM OREGON

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Since 1948

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ERVICES
civil
environmental
rical
ontrol systems

CCB# 33228
WWC# 633

January 16, 2004

Gary Wilson, PE
City Engineer/Public Works Director
City of Monmouth
151 West Main Street
Monmouth, OR 97361

RE: Buena Vista Well Field Testing Round #2-Summary Results and Recommendations

Dear Mr. Wilson,

This letter will serve to summarize the results from the almost 3 months of well testing performed on the Buena Vista Well #1 and my recommendations for future planning. The assumptions and recommendations from my report should be evaluated along with the pending report due to be issued by Newton Consultants Inc., which were hired to represent the interests of the Luckiamute Domestic Water Cooperative, by Howard Pope, Chairman.

Background

In 1999, a Water System Master Plan, written for the City of Monmouth (City) stressed the need for supplemental well capacity on the Polk County side of the Willamette River in order to protect the City against a possible failure of the City's primary source and conveyance means of potable water: the Marion County Well and Willamette River pipeline crossing. This need had been known for many years previous to the Master Plan, however, the issuance of a formal edict created a desire to expedite development of this required additional well source capacity. Two years before completion of the Master Plan, in 1997, the City of Monmouth contracted with Sippel Well Drilling of Salem to construct a series of production and observation wells in a leased section of land in the American Bottom region of Polk County, south of Independence. The primary production well that was drilled is a 12" diameter well, drilled to a depth of 57'. The well is screened with a 12" telescope stainless steel well screen with 250 slots (.250") between 34'-44'. Upon completion, the well was test pumped at a flow rate of 950 GPM from a pumping level of 32' after 24 hours of continuous pumping. The first sustained well testing was performed on the City's new Buena Vista Well #1 between April 9, 2001-April 11, 2001, which consisted of a total of 26 hours, 19 minutes of total pumping time. The flow rate exhibited during this test was 900 GPM from a pumping level of 34'2". Following this initial test, and upon the recommendation of Edward Butts, engineer for the City, a sustained pumping test was conducted between April 11, 2001 until June 18, 2001, a total of 67 days, 17 hours, and 48 minutes. Although the test was suspended due to equipment failure, the

duration was believed to be sufficient to generate a summary report. The total volume of water removed during the entire testing period was estimated at 108,000,000 gallons. A combination of water quality testing and water level measurements obtained during the test period provided the data that formed the conclusions released in a summary report issued by the author of this letter in October, 2001, titled: *Technical Summary Report for the Buena Vista Well #1 Well Test.* The report concluded that a 67 day period of pumping of the Buena Vista Well #1 resulted in marginal interference between the Monmouth and Luckiamute wells at the maximum rate of 900 GPM. The report went on to say that lowering the continuous rate to 750-800 GPM would dramatically lessen the impact of interference between the two well fields but that the actual long-term impact would need to be evaluated following 2-3 years of cycle testing of the new well. The report further indicated that the sustained pumping did not have an appreciable effect on lowering the high levels of iron and manganese originally observed during the initial test pumping. The final conclusions of the original report were that the maximum pumping rate for the Buena Vista Well Field should be limited to 750-800 GPM and that significant water treatment would most likely be permanently required to provide drinkable water to the City. Additionally the report also suggested consultation with a hydrogeologist was recommended for further expansion of the well field and that a longer duration of test pumping from the well to ascertain the actual long-term well field capacity and water quality may be a feasible alternative to current development of the well for potable uses.

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Genesis of the Second Testing Round

During the approximate period of May 1-15, 2001, the Luckiamute Domestic Water Cooperative (LDWC) experienced a situation of air entrainment in its water system at various times, which the Cooperative traced back to their wells. Although there was ample evidence to suggest that the air event could have been caused by an operation anomaly within the LDWC system itself, the LDWC nonetheless expressed a concern that the event was caused by the coincidental test pumping of the Buena Vista Well 1 by the City of Monmouth. Authorization to investigate and ascertain the probable cause of the air problem was issued by Gary Wilson, Monmouth Public Works Director, to Edward Butts (Butts) of Stettler Company on May 20, 2003. One of the first acts performed by Butts was a site visit and meeting with Howard Pope, LDWC Chairman, held on May 21, 2003. Following that meeting and after review of all available data, the primary recommendation reached by Butts was that additional test pumping was needed. A letter from Howard Pope, LDWC Chairman, to Edward Butts (attached), was received on June 6, 2003, which raised a series of issues and concerns that LDWC had in regard to the planned well test. Ultimately, these concerns resulted in a meeting, held on June 13, 2003 at Monmouth City Hall, between representatives of the City (Gary Wilson, Public Works Director) and LDWC (Howard Pope, Chairman), in addition to David Newton, PE, retained as a technical advisor by LDWC, and Edward Butts, PE, retained by the City of Monmouth. During this meeting it was again suggested by Butts that a second, and longer, period of test pumping should be performed on the Buena Vista Well, along with the installation of several strategically placed monitoring wells to determine the exact impact and degree of interference between the well fields. Butts further stated that since monitoring wells between the two well fields were not available during the first round of test pumping, many of the conclusions in the summary report were based on

extrapolated and assumptive data. After a short discussion, the group consensus was to pursue the additional testing. Next, following a series of technical discussions between Dave Newton and Ed Butts, a total of five (5) new monitoring wells were planned for installation at various locations between the two well fields (Figure 1). Automatic recording data loggers would be placed in all of the new and existing monitoring and pumping wells (including LDWC Well #2) to provide accurate well level data. The data loggers were to be set up for continuous operation (24 hour/day) but to record water levels at 15 minute intervals and be battery operated to avoid the need for an exterior power source. The monitoring wells were installed by Environmental West Exploration Inc. of Spokane Washington between the dates of August 26-30, 2003 and readied for pumping between the dates of September 1-11, 2003. Static level readings were obtained from all wells between the dates of September 5-12, 2003. The actual start of pumping began on September 12, 2003. The time lapse between the dates of June 13-September 12 was due to permitting issues, scheduling of the monitoring well contractor, and inclimate weather. Although starting the tests during mid-late July was the preferred time period, all technical parties were in agreement that performing the test during late summer-early fall, along with the nearby agricultural demands and high capacity pumping common to rural water systems during the same period would still provide meaningful data. All parameters and testing criteria were shared and approved through mutual agreement between David Newton and Edward Butts to insure absolute impartiality.

Well Testing Equipment and Monitoring Well Data

The five proposed new monitoring wells, identified as MW-1—MW-5 (Figure 2), varied in final depth between 31'-55' and consisted of 2" PVC monitoring tubes attached to a 2" PVC well screen in the aquifer. The wells were sealed using bentonite clay and filter packed with .010 sand throughout the screen interval. Final construction logs and a typical construction section for the wells are found in the Appendix. Due to the fact that the monitoring wells were installed in Polk County Public Works Department's Right-Of-Way, adjacent to Davidson and Buena Vista Roads, all of the well's top terminations were performed below grade, in a water-tight vault and cover. Unfortunately, due to the absence of a feasible aquifer, one of the planned monitoring wells (MW-8, MW-3-Proposed) was abandoned and never used for data collection. In addition to the four new monitoring wells actually constructed (MW-4—MW-7), data loggers were also placed in the Luckiamute Well #2, Buena Vista Production Well #1, and an existing 6" observation well, drilled adjacent to the Buena Vista well during the original well construction in 1997 that is referred to as M.W. #2. See Figures 3 and 4 for the final well layout and nomenclature. The data loggers used were all manufactured by Global Water Instruments Inc., model WL15-060, and calibrated for a depth and water level range of 0-60'. Four (4) of the seven (7) data loggers were equipped with an LCD display for on-site reading and verification, while the balance were "blind" instruments. The data loggers used a submersible strain gauge style of transmitter that utilized a 4-20 ma DC analog signal which matched the range of the unit. Water level readings were taken every 15 minutes and stored in a logger stored within the upper vault for periodic download into a laptop computer. On average, download of data occurred every 2-3 weeks during the testing period or during any shutdown. The test pump used in the Buena Vista Well #1 was a Berkeley model 8T-900, 15 HP, submersible pump, capable of

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pumping between 200 GPM up to over 1000 GPM, dependent on head. The well pump was powered by a portable 25 KW generator rental unit that was refueled and maintained by City forces. A permanent power source was considered, and even designed, however, due to the cost and delay associated with the installation of three-phase power, in addition to the uncertainty of the long-term viability of the Buena Vista Well Field, use of an on-site generator was determined to be the best course of action. Discharge from the well was routed to a distance of approximately 180 feet from the well head to a local conveyance ditch using a 10" aluminum pipeline. Two (2) separate propeller style flowmeters were used to gauge and totalize flow from the well. Verification and calibration of the data loggers was performed through the use of manual water level indicators (Powers). All of the testing protocol was established by Edward Butts and approved by the City of Monmouth, Luckiamute Domestic Water Cooperative, and David Newton (Exhibit 1).

Round 2 Test Results-Well Yield

Following 5 days of data logger operation to obtain static water level readings for calibration and background data, the well test for the Buena Vista Well #1 was started on September 12, 2003 at 11:00 AM at an initial flow rate of 500 GPM. The water level in the production well rapidly dropped from the initial static water level (SWL) of 19'2" to a 22' pumping water level (PWL), but quickly stabilized. Although the data loggers collected water level readings at 15-minute intervals, in order to prevent an unnecessary and excessive collection of paper charts, whenever water levels were fairly stable, print-outs of water levels were performed at intervals ranging between 30 minutes up to 2-3 hours. This provided the needed data for analysis without an excessively high volume of paper print-outs. Pumping of the Buena Vista Well #1 continued without incident between September 12 until November 10, 2003, when the flow rate was increased to 800 GPM, consistent with the original protocol. At the time of stepping up of flow from 500 to 800 GPM, the pumping level in the Buena Vista #1 well was reasonably stable at 34' below ground surface, which equated to a total drawdown of approximately 15'. Within a week, it was apparent that the increase of flow from 500 GPM to 800 GPM was more than the well and local aquifer could sustain on a continual basis and air was soon observed to be present in the pumped water, indicating cascading water or overpumping of the well was occurring. The test was suspended on November 17, 2003 and the pump removed from the well for examination. Following less than 2 days of removal of the pump to evaluate the condition of the well and test pump, the test pump was reinstalled and the test resumed at a lower rate of 600 GPM on November 18, 2003 at 2:30 PM. The test continued from that date until the ultimate shutdown on December 5, 2003 at 12:00 PM. By this date, the well had been pumped for a total of 82 days, with a total discharge of approximately 65,300,000 gallons, or an average flow rate of 553 GPM. Data collected from the data loggers indicated that the water levels in the production and monitoring wells never fully stabilized. A progressive drawdown was observed in all wells, including MW-7, which was the monitoring well at the furthest distance from both pumped wells, LDWC #2 and Buena Vista #1. The widespread influence that pumping of the Buena Vista Well 1 exhibited indicates that the aquifer is common to both well fields, Luckiamute Wells 1, 2, and 4 and the City of Monmouth Buena Vista Well 1. The fact that the pumping and monitoring well levels never stabilized after almost 90 days of pumping, even at flows as low as 500 GPM, raises a concern as to the long-term viability of the Buena Vista Well

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Field without incurring significant interference to the Luckiamute wells. In addition, the constant rate of withdrawal of water from the Buena Vista well had an obvious effect on the static level of the Luckiamute wells, up to 2-3 feet. In a shallow aquifer, such as the one under both well fields, a drop of available head of even just a few feet can have a severe consequence on the available capacity of both well fields. In this case, I estimate that, under normal operation, the Luckiamute wells could be depleted up to 300 GPM of their combined capacity due to the impact of a fully developed Buena Vista Well Field, and even more during the higher demand months of July-September. Although the impact from sustained pumping of the Buena Vista Well 1 on the Luckiamute wells was apparent, of equal or greater concern, was the slow recovery of the aquifer water levels observed after shutdown of the well test. Immediately upon shutdown of the well test, the water level in the Buena Vista Well 1 recovered from the pumping level of 36'7" to 30'10", which is indicative of local well losses and an expected event. Recovery beyond the initial shutdown, however, was very slow, somewhere on the order of 1-3 feet per day, in fact, recovery of the water level in Buena Vista Well 1 after 4 full days of shutdown was only 3.13 feet not including the initial recovery associated with the localized well losses. Recovery of the monitoring wells was also slower than expected, around .5-1 foot per day. This uniform slow rate of aquifer recovery indicates a limited aquifer storage that along with the obvious uniformity of aquifer between the well fields, severely limits development of the Buena Vista Well Field, most likely in an ultimate yield not to exceed 175-250 GPM.

Water Quality

Although the available capacity for the Buena Vista Well Field represents a limiting factor, of equal concern are the water quality aspects of the water pumped from the well. During the initial test pumping, performed in 2001, several elements of aesthetic water quality, specifically iron, manganese, and pH, were noted to be unacceptable for potable uses, even after 67 days of pumping. The report issued after the first round of testing noted that a second round of longer duration pumping could possibly have a beneficial effect on the water quality by removing the local water surrounding the well that could be stagnate and oxidized due to an interface with the atmosphere through the open well casing. The author has personally witnessed examples of wells in which iron and manganese levels lowered substantially following a period of sustained pumping and wished to explore the possibility of this occurrence in the Buena Vista Well #1. During the second pumping period, water samples were drawn from the well head and delivered to Waterlab Corporation in Salem Oregon for laboratory analysis. Samples were taken at 3 intervals within the pumping period to determine any change, beneficial or detrimental, to the water quality. The samples were taken on October 3, 2003 which was approximately 3 weeks (21 days) following the start of test pumping; on October 24, 2003, 42 days or 6 weeks following the start of test pumping, and December 5, 2003, 82 days following the start of pumping and the last day of test pumping. Unfortunately, the lab analyses performed on the 3 samples indicated very little improvement of water quality over time and pumping, and in the case of iron and manganese, an actual increase of the elements. Iron levels increased from 1.99 mg/l on the October 3rd test to 2.56 mg/l on the December 5th test, Manganese increased from .464 mg/l on October 3rd to .79 mg/l on December 5th. The maximum contaminant level (MCL) for Iron and Manganese is .30 mg/l and .05 mg/l, respectively; therefore, it is obvious that the levels of both constituents are much higher than acceptable. Although other water quality parameters, such as

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pH and hardness, settled within acceptable limits, the degree of the high levels of iron and manganese would preclude the inexpensive use of sequestering chemicals alone and require an actual filtration facility. The estimated cost of this type of water treatment plant for 200 GPM would be between $200,000-$300,000, depending on the technology and final design. In any event, it is apparent that use of water from the Buena Vista Well Field could not be performed without a high degree of treatment.

Conclusions

Based on the second series of well testing performed on the City of Monmouth's Buena Vista Well Number 1, between the dates of September 12—December 5, 2003, the following conclusions can be reached:

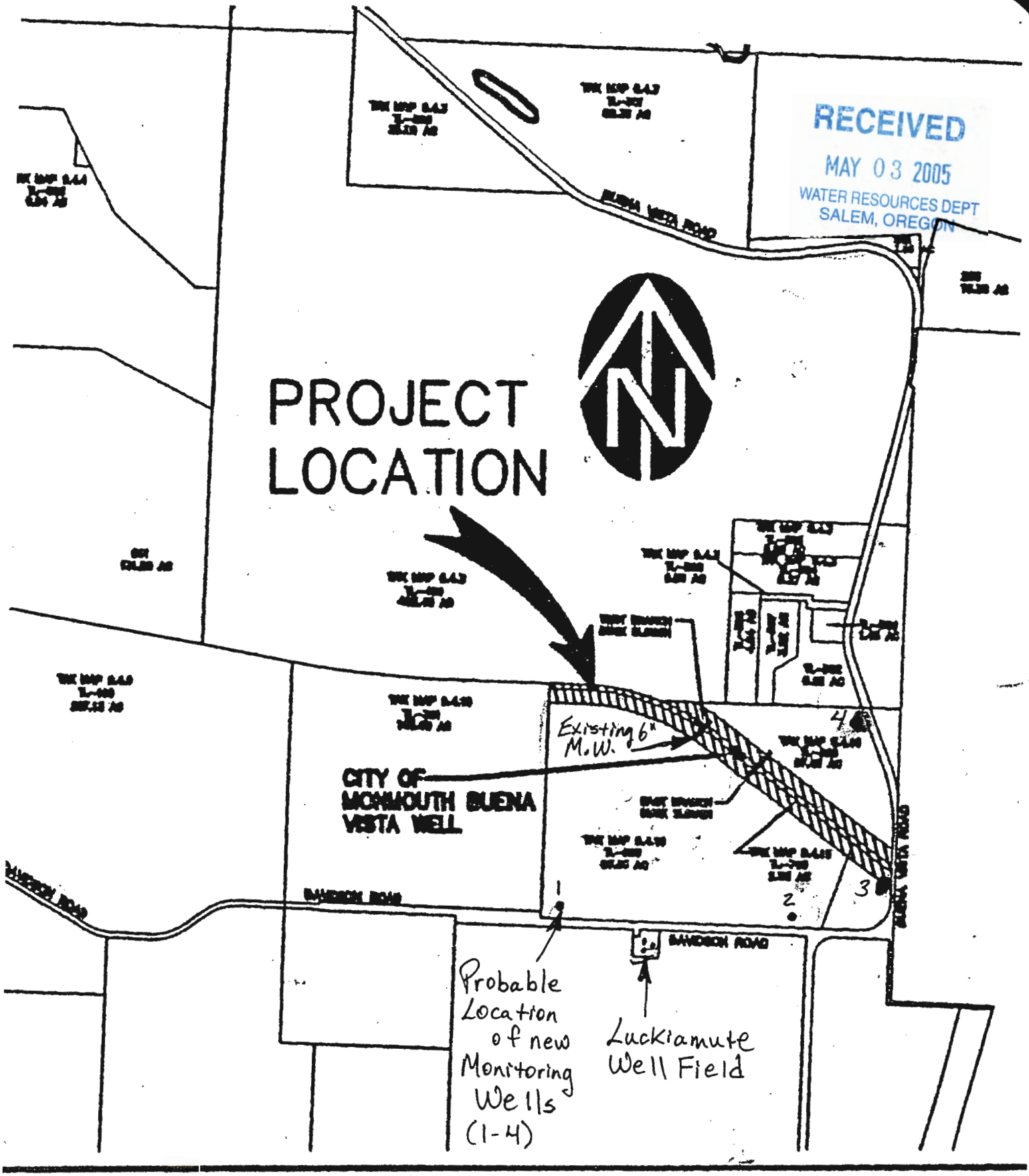
1) The maximum safe capacity of the Buena Vista Well #1 is approximately 200 GPM, however, this volume is applicable to the development of only one well within the well field, negating the original concept of a multiple well field. The primary limitation on the use of this well field is due to the interference observed between the Buena Vista Well and the Luckiamute Wells #1, 2, and 4. Due to the fact that Luckiamute's water rights predate the priority date of the Monmouth Buena Vista Wells, it is highly likely that sustained pumping would eventually result in an enforcement restriction or perhaps a complete ban of pumping water from the Buena Vista wells from the Water Resources Department.
2) The water quality, specifically Iron and Manganese, from water delivered from the Buena Vista Well #1 even after 82 days of pumping is still unacceptable. This would require the design and installation of an oxidation/filtration plant to remove both contaminants. The estimated cost of this type of facility is between $200,000-$300,000, which, in the author's opinion, is a prohibitive cost for the volume of water that is available.
3) To summarize, the dual limitations of available yield and water quality from wells in the Buena Vista Well Field render development of this well field on any level an unacceptable alternative. Development and use of the well field would likely lead to future regulatory restrictions from the Water Resources Department and possible litigation from Luckiamute Domestic Water Cooperative due to perceived or real harm and damage to their wells. Due to a favorable priority date and permit conditions and capacity, the water rights permit obtained for this well field should be retained and transferred to a different location within the American Bottom region. All other aspects of the Buena Vista site, including lease of the land, the production and monitoring wells, and all remaining facilities should be fully abandoned to prevent future liability on the part of the City of Monmouth.

Please refer to the enclosures for supplementary information and data related to this test and the conclusions that I reached as a result of the test. I trust that I have provided adequate information to render a decision as to the future course of action for this well field, but would be pleased to discuss any element of this letter in further detail if you desire. As always, thank you for the opportunity to be of service.

Respectfully,

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Edward Butts, PE, DEE, CWRE



VICINITY MAP

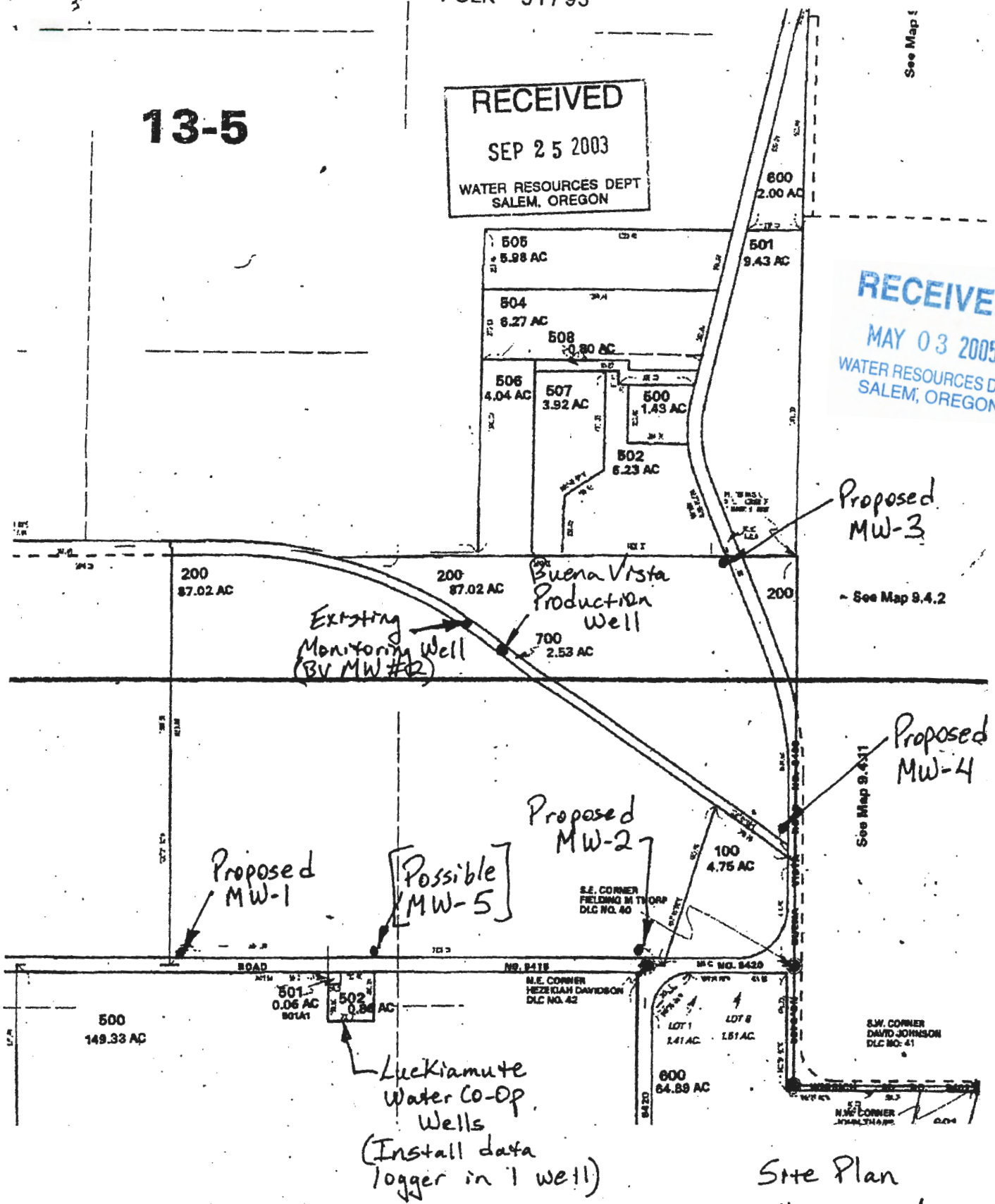
Figure 1

POLK 51793

13-5

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Site Plan
1" = 500'

Figure 2

City of Monmouth/Luckiamute Water Co-Op

Buena Vista Wellfield Aquifer Testing Program

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Site Descriptions

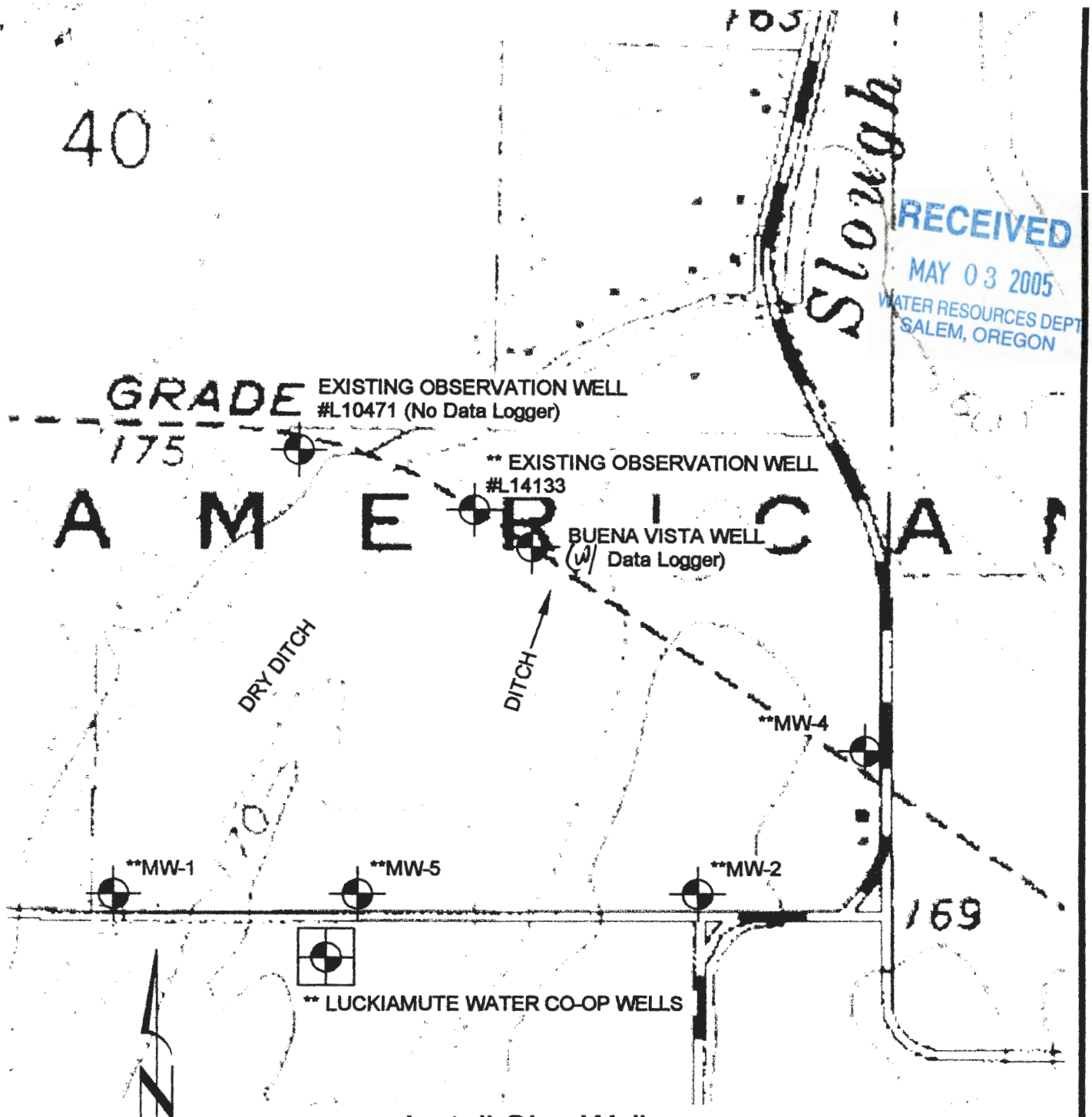
Well Description & Location	Well #	Site ID	Data Logger Length
Monmouth Buena Vista Well 1 (Production Well)	B.V. #1	30869	59'
Monmouth Buena Vista M.W. 1	M.W.#2	30866-2	60'
Luckiamute Well #2	L.W # 2	30876-3	56'
M. W. @ Gate To B.V. Wells	M.W. #4	30862-4	43'
M.W. @ Intersection of Davidson And Buena Vista Roads	M.W. #5	30864-5	42'
M.W. Across From Luckiamute Wells	M.W. #6	30865-6	40'9"
M.W. West of Luckiamute Wells (on Davidson Road)	M.W. #7	30863-7	38'

Data Logger Procedure

1) Use Microsoft Excel or Wordpad to read figures (Wordpad provides date and time of readings)
2) Data logger readouts reflect submergence over well sensor
3) Subtract individual readings from data logger length to calculate pumping or static levels
   I.E. Data logger readout shows 22.9' in Luckiamute Well #2

56' (Length of data logger in L.W. #2)
- 22.9'
33.1' Water Level in L.W. #2

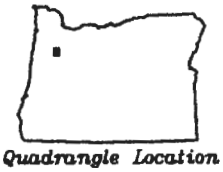
Figure 3



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Install Obs. Wells

(WELL LOCATIONS ARE APPROXIMATE)
MW-1
MW-5
MW-2 (Relocated)
MW-4
** DATA LOGGER INSTALLED



Quadrangle Location
U.S. Geological Survey
Monmouth 44123-G2

NEWTON CONSULTANTS INC.
Earth, Water and Rock Specialists
Ph: 503 228-7718 Fax: 503 228-7761

Observation Wells
Luckiamute Domestic Water Cooperative
Luckiamute Water Company

DESIGNED BY:	DRAWN BY:	DATE:	PROJECT NO.	FIGURE
J.Newton	S.Schenck	MARCH 2003	973 – 101	4

G:\973...J\Cad\Water\W973101_F4 17:27 09/19/2003 SS

City of Monmouth------Luckiamute Water Cooperative
Buena Vista Well Field/Luckiamute Wells #1 &2

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Long-Term Aquifer Testing Protocol

Scope: To determine the short (1-2 months) and long (2-6 months) term effect on possible well interference, water quality issues, and availability of adequate groundwater for all current and future users within the American Bottom aquifer, specifically the Buena Vista and Davidson Road area.

Specific Testing—Quantity: The testing program will consist of the installation of up to 5- new monitoring wells in strategic locations equipped with data loggers to track water levels during static and dynamic well conditions. The Monmouth Buena Vista Well #1 will be equipped with a 15 HP submersible pump capable of a flow range between 200-1000 GPM. Water levels in one operating Luckiamute well, the Buena Vista Well #1, and the monitoring wells will also be monitored throughout the Summer and Fall of 2003. Any apparent interference between the Buena Vista well and a Luckiamute well will result in lowering flow from the Buena Vista well until stabilization is reached. Data logger information will be downloaded and analyzed each month during the test period.

Quality: Sufficient concern regarding iron, manganese, hardness, and nitrate contaminants exist to warrant monthly observation of these water quality parameters. Samples will be extracted each month, coincidental with data logger downloading, from each monitoring well, one Luckiamute operating well, and the Buena Vista Well #1 to track any increase or decrease of contaminant levels that may occur with sustained pumping. Any migration of a contaminant towards a Luckiamute well will result in immediate cessation or lowering of well pumping from the Buena Vista well until adequate proof exists that the increase of contamination is not due to the pumping of the Buena Vista well.

Summary: This testing program has been recommended by Edward Butts of Stettler Supply Company and initiated by the City of Monmouth to verify long term water availability as well as water quality after a sustained period of aquifer withdrawal. The program may be modified at any time during the testing period if it is determined that a modification of well capacity will benefit either party.

Contact Persons

City of Monmouth----------Gary Wilson----------503-838-2173
Luckiamute Water Cooperative------Howard Pope----------503-838-2075
Bob Young
Stettler Supply Company----------Edward Butts----------503-585-5550

Exhibit 1

Stettler Supply Company

1810 Lana Avenue N.E.
Salem, Oregon 97303
(503) 585-5550 • FAX: (503) 581-6799

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IRRIGATION SYSTEMS
- pivots/linears
- travelers
- turf systems
- drip systems

WATER SYSTEMS
- municipal
- industrial
- commercial
- domestic

ENGINEERING SERVICES
- civil
- environmental
- electrical
- control systems

CCB# 33228
OWWC# 633

Authorization To Proceed:

May 16, 2003

Gary Wilson, PE
Public Works Director/City Engineer
City of Monmouth
151 W Main Street
Monmouth, OR 97361

RE: Buena Vista Well Field
Long-Term Aquifer & Well Test Cost Estimate

Dear Mr. Wilson,

In accordance with our recent meetings and discussions, I am pleased to submit the estimated costs to provide and install the equipment needed to perform a long-term (up to 6-8 months) well and aquifer test on the Buena Vista Production Well #1. As we discussed, Stettler Supply Company is prepared to provide the test pumping equipment required to perform the well test at a nominal rental fee for as long as necessary to obtain the information needed to make informed decisions regarding the development of the well field. The following cost estimates are presented for your review:

Item	Cost
1) Assemble and install steel platform to elevate well head	$ 2660.00
2) Assemble and install 15 HP submersible test pump equipment	$ 1750.00
3) Provide and install 100 AMP, 480 Volt, 3 phase electrical service	$ 1685.00
4) Provide and layout approx. 160' of 10" alum. Pipe	$ 450.00
5) Engineering and coordination	$ 1300.00
6) Labor to disassemble and remove rental equip. at end of test	$ 1060.00
Stettler Sub-Total:	$ 8905.00

First month of rental included in above price. Monthly rental after 1st = $350/month

(+)

Estimated quantity of 4- 55'- 2" Monitoring wells @ $1620.00 each---------$ 6480.00
Note: Monitoring wells to be drilled by GeoTech Explorations who provided the lowest cost estimate from two solicited companies and will be invoiced directly to the City of Monmouth

(+)

Estimated quantity of a total of seven (7)- 60' data loggers to be installed
5- Global Water Level Loggers w/o display----------$ 5338.00
2- Global Water Level Loggers with display---------- $ 3390.00
1 Stettler Labor to install and calibrate data loggers---------- $ 1250.00
Data Logger Total: $ 9978.00

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Based on the estimated quantities of material and labor, the total estimated cost for the Buena Vista Well Field Test Program is $ 25,363.00 (excluding any related costs for Westech Engineering, PP&L costs to run 3 phase power to site, utility pole, and installation costs for underground primary power feeder). The total cost outlined above includes the cost for 4 new monitoring wells I plan to be installed by GeoTech Explorations and billed directly to the city to avoid any unnecessary mark-up from Stettler. This reduction corrects the expected total billing from Stettler to be: $ 18,883.00, plus any monthly rental beyond the first 30 days (1 month) of rental. Assuming a total of 150 days (4 months) of testing, the total rental charges will be: $350.00/month x 4 months = $ 1400.00. This rental includes all pumping equipment, flow metering equipment, and discharge pipe, it does not include the power costs needed to operate the pump. I trust that I have provided the information you requested, however, I would be pleased to provide any further information you may need. Thank you for the opportunity to be of service.

Respectfully,

Edward Butts, PE, DEE

Authorization To Proceed:

5/20/03

Luckiamute DOMESTIC WATER COOPERATIVE

P. O. BOX 367
8585 SUVER ROAD
MONMOUTH, OREGON 97361
PHONE (503) 838-2075

June 5, 2003

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Ed Butts
Stettler Supply Co., Inc.
1810 Lana Avenue
Salem, OR 97303

Dear Ed:

I would like to thank you again for taking time to meet with me, and present your well testing program. Luckiamute Domestic Water Cooperative will be glad to cooperate in your testing program. Our people have requested that the following step's be taken in addition to your written proposal:

1. The test schedule needs to be identified. When it will begin and how long it will run. The test schedule should also identify the pumping rate.... the initial pumping rate and if the rate will be continuous until some effect is noticed, then reduced? The pumping rate, duration and how test will be conducted to verify that the reduced rate, if necessary to avoid interference, is adequate. The time of recovery at monitoring wells (including Luckiamute well) could be relatively long.

2. Monitoring wells include pumping wells. How will pumping of monitoring wells be accounted for in determining interference effects, or interference potential on a monitoring well, such as Luckiamute well? Will the test include monitoring wells that will not be pumped during the test period? Well pumping in the area could mask effects of the test on Luckiamute wells.

3. How will water levels be measured in the Luckiamute well(s) during the test? Also, the Luckiamute wells could be pumping water at various times. How will these events be accounted for?

4. Data logger use is a good idea. Luckiamute should get a set of the data logger data each time it is downloaded to see results as the test is being conducted.

5. Will a report summarizing the test procedure, the findings, conclusions and recommendations are prepared when the test is done? Luckiamute should also be provided a report.

6. Luckiamute should be given copies of the water quality data each time tests are conducted, during the test.

Again, thank you, and we will be looking forward to further information.

Sincerely,

Howard Pope

Howard Pope
Chairman
Luckiamute Domestic Water Cooperative

Appendix

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Proposed agenda

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JOINT LUCKIAMUTE/MONMOUTH MEETING
June 13, 2003 - 10:00 am
Volunteer Hall
144 S. Warren
Monmouth, OR 97361

1. Introductions
2. Review Hydrology Report
3. Identify Luckiamute's concerns
4. Discuss test pumping and data accumulation
5. Determine course of action
6. Adjourn

IRRIGATION
AGRICULTURAL
NURSERIES
VINEYARDS

WATER/WASTEWATER ENGINEERING SPECIALISTS
WATER WELL DRILLING
ELECTRICAL, TELEMETRY, & CONTROLS
PUMPS & SYSTEMS

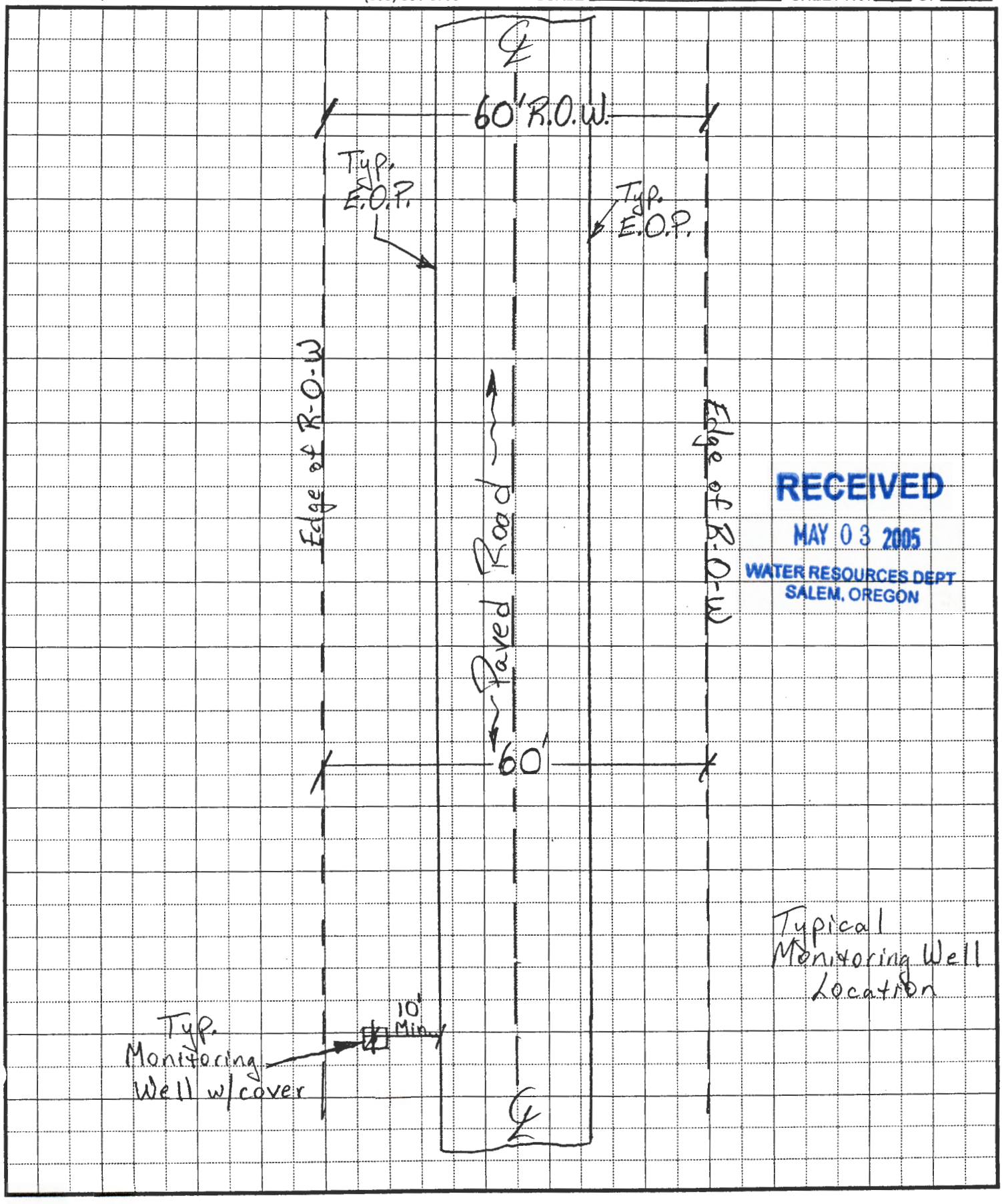
WATER SYSTEMS
DOMESTIC
INDUSTRIAL
MUNICIPAL

STETTLER SUPPLY COMPANY
STETTLER COMPANY

1810 LANA AVE. N.E.
SALEM, OR 97303-3116

(503) 585-5550
FAX (503) 581-6799

CLIENT City of Monmouth
JOB / PROJECT NAME Buena Vista Well
W.O. # _____ DEPARTMENT Engineering
CALCULATED BY E. Butts DATE 7-
CHECKED BY E. Butts DATE _____
SCALE 1" = 20' SHEET NO. 1 OF 1



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POLK COUNTY

Public Works

820 S.W. ASH STREET ★ DALLAS, OREGON 97338-2151 ★ (503) 623-9287/FAX (503) 623-0897

Utility Permit Number: **2003-U-0062**

Wednesday, July 30, 2003

Water Utility Permit

Issued to:	Stettler Supply Co. 1810 Lana Av. NE Salem OR 97303
	Ed Butts, PE 503 585-5550
Subcontractor:	***GeoTech Explorations*** 503-692-6400

Road Name:	DAvidson Rd			
Number:	9415			
M.P.	1.13	**T**	**R**	**SECTION**
Side:	LEFT	9	4	10

Work Order #

Utility Installed: **Monitoring Wells**

This permit is issued to Stettler Supply Co. of 1810 Lana Av. NE, Salem, OR, 97303 for utility construction on DAvidson Rd from milepost 1.13 to milepost 1.5. The utility construction shall be performed in accordance with the following:

1) Department of Public Works General Provisions.
2) Submitted plans with changes required by the Engineer.
3) Special Provisions **SEE ATTACHED SPECIAL PROVISIONS**
4) Notify the Department of Public Works at 623-9287
   a) 24 hours prior to commencing work.
   b) 48 hours after completion of work.
5) Traffic control shall conform to the requirement of the Manual on Uniform Traffic Control Devices.
6) All work must conform to the current Polk County Public Works Road Standards available at: http://www.co.polk.or.us/PublicWorks/Engineering.htm
7) A copy of this permit and a set of construction plans shall be at the site during construction.
8) Call for utility location at 1-800-332-2344 before you dig.

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Brenda James

Brenda James
Survey/Engineering Technician

Utility Permit Special Provisions

Construction in public Right of Way

1) Location of Work: Davidson Rd. (#9415), left side of road at approx. MP 1.13 and MP 1.5 as measured from Corvallis Rd.

2) Scope of work: Install monitoring wells.

3) Location of work: 10' from EOP.

4) Cutting a portion of Davidson Rd. **is not** permitted.

5) If excavation is required:

a. Comply with Oregon excavation laws as set forth in ORS 757.541 through 757.571. Remember to notify all utilities before excavating (see para 7 of your permit application)!

b. Within the roadway, backfill material shall be 1"-0 crushed aggregate. **River rock is not acceptable backfill material**. Outside the roadway, native material is permitted as backfill material. The roadway includes traffic lanes and shoulders.

c. Compact backfill of excavated areas according to Oregon Standard Specifications for Highway Construction, paragraph 00405.41 (c). Rule of thumb: There should be no yielding under the compaction equipment. All backfill shall be guaranteed against settlement for **one** year.

6) ROW width within the proposed work area is **60'**.

7) Remove all waste or extraneous material produced by the project from within the Right of Way or as directed by Public Works.

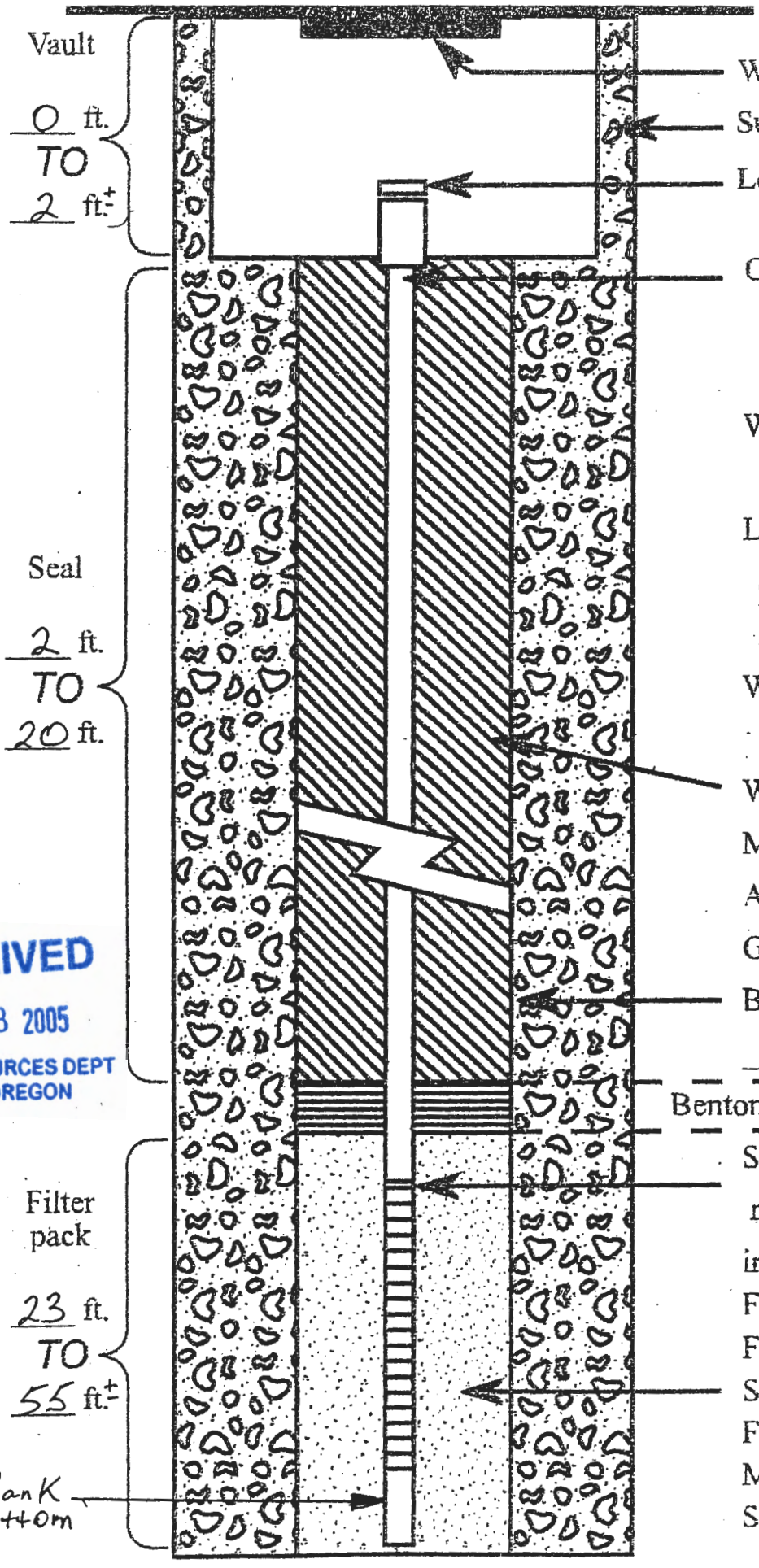
8) Please notify public works upon completion. Public Works shall inspect the project within 1 month of completion. The applicant shall be notified of any deficiencies and shall make appropriate corrections.

9) Contact Public Works (623-9287) if you have a problem with achieving any of the above listed Special Provisions.

F:\PUBWORKS\ENGINEER\PERMITS\UTILITY\Telephone\construction.doc

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Depth of completed well 55 ft. ±



Vault
0 ft.
TO
2 ft.±

Seal
2 ft.
TO
20 ft.

Filter pack
23 ft.
TO
55 ft.±

5' Blank at bottom

Water-tight Cover
Surface flush vault
Locking cap

Casing
diameter 2 in
material Sch. 40 PVC
Welded ☐ Threaded ☒ Glued ☐

Liner
diameter _____ in
material _____
Welded ☐ Threaded ☐ Glued ☐

Well Seal:
Material Cement
Amount ± .4 yd³ (11 ft³)
Grout Weight As Spec.

Borehole diameter
10 in.

Bentonite Plug at least 3 ft. thic

Screen
material sch. 40 PVC
interval(s):
From 25' To 50'
From 50 To 55' (Bl
Slot size 10 slot in.

Filter Pack:
Material 10/20 Silica S
Size _____ in.

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Polk
50392

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SALEM, OREGON

WELL I.D. #134

(START CARD) # 095448

STATE OF OREGON
WATER SUPPLY WELL REPORT
(as required by ORS 537.765)

Instructions for completing this report are on the last page of this form.

1) OWNER: Well Number P-1
Name City of Monmouth
Address 151 W Main St.
City Monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New Well ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) DRILL METHOD:
☐ Rotary Air ☐ Rotary Mud ☒ Cable ☐ Auger
☐ Other

(4) PROPOSED USE:
☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation
☐ Thermal ☐ Injection ☐ Livestock ☐ Other

(5) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Well 57 ft.
Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
16	0	57	Cement	0	25	39+ bent

How was seal placed: Method ☐ A ☐ B ☒ C ☐ D ☐ E
☐ Other
Backfill placed from 25 ft. to 27 ft. Material 3/8 Crushed
Gravel placed from 57 ft. to 27 ft. Size of gravel P-gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	12in	+3	34	.250	☒	☐	☒	☐
	12in	44	57	.250	☒	☐	☒	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Liner:					☐	☐	☐	☐
					☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:
☐ Perforations Method
☒ Screens Type V-Slot Material Stainless Steel

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
34	44	250		12in		☐	☐
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour
☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
			1 hr.
1000	22 ft		5 1/2
950	22 ft.		18 1/2 hr

Temperature of water 54 Depth Artesian Flow Found
Was a water analysis done? ☐ Yes By whom
Did any strata contain water not suitable for intended use? ☐ Too little
☐ Salty ☐ Muddy ☐ Odor ☐ Colored ☐ Other

(9) LOCATION OF WELL by legal description:
County Polk Latitude Longitude
Township 9-S N or S Range 4-W E or W. WM.
Section 3 SW 1/4 SE 1/4
Tax Lot 700 Lot Block Subdivision
Street Address of Well (or nearest address) North of Intersec of Buena Vista Rd + Davidson Rd on W-Sic

(10) STATIC WATER LEVEL:
10 ft ft. below land surface. Date 6-2-9
Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:
Depth at which water was first found 19

From	To	Estimated Flow Rate	SWL
19	25	Cased off	
25	45.5	950	10

(12) WELL LOG:
Ground Elevation

Material	From	To	SWL
Fill	0	4	
Sticky brown clay	4	19	
Fine Sand + Gray Clay	19	25	
Fine to Med Gray Sand	25	30	
Coarse water Sand	30	32	
Coarse Sand + Gravel mostly gravel	32	34	
Coarse Gravel + Small amount of Sand	34	45.5	
Brown Clay	45.5	48	
Red Sticky Clay	48	57	

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Date started 5-13-97 Completed 6-4-97

(unbonded) Water Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonmer of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
WWC Number 1629
Signed Date 6-10-9

(bonded) Water Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

Monmouth P-1
50B/05-4W24

UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

WATER RESOURCES DEPARTMENT
158 12TH STREET NE
SALEM, OR 97301-4172



SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

CITY OF MONMOUTH
GARY WILSON, PUBLIC WORKS DIR
151 W MAIN ST
MONMOUTH OR 97361

File# G-13521

COMPLETE THIS SECTION ON DELIVERY

A. Received by *(Please Print Clearly)* | B. Date of Deliver

C. Signature

X

☐ Agent
☐ Addressee

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Copy from service label)* P56 401

PS Form 3811, July 1999 Domestic Return Receipt 102595-99-M-1789

ER, SALEM, OREGON 97310
0 days from the date
of well completion.

(Please type or p...
(Do not write above this line)
STATE ENG...
SALEM, OREGON
G 6216

OWNER:
BOATWRIGHT ENGINEERING Assoc.
2613 12th St SE
SALEM, OREGON

TYPE OF WORK (check):
Well ☑ Deepening ☐ Reconditioning ☐ Abandon ☐
andonment, describe material and procedure in Item 12.

TYPE OF WELL:
Rotary ☐ Driven ☐
Cable ☐ Jetted ☐
Bored ☐

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☑
Irrigation ☐ Test Well ☐ Other ☐

CASING INSTALLED: Threaded ☐ Welded ☑
4.0" Diam. from +42 ft. to 46 ft. Gage .250
Diam. from ..... ft. to ..... ft. Gage .....
Diam. from ..... ft. to ..... ft. Gage .....

PERFORATIONS: Perforated? ☑ Yes ☐ No
Type of perforator used MILLS
Size of perforations 1/2 in. by 2 in.
240 perforations from 35 ft. to 45 ft.
perforations from ..... ft. to ..... ft.
perforations from ..... ft. to ..... ft.

7) SCREENS: Well screen installed? ☐ Yes ☑ No
Manufacturer's Name .....
Type ..... Model No. .....
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.
Diam. ..... Slot size ..... Set from ..... ft. to ..... ft.

(8) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " "
" " "
Bailer test 50 gal./min. with 10 ft. drawdown after 2 hrs.
Artesian flow g.p.m.
Temperature of water 54 Depth artesian flow encountered ..... ft.

(9) CONSTRUCTION:
Well seal—Material used Cement & Sand
Well sealed from land surface to 25 ft.
Diameter of well bore to bottom of seal 15 in.
Diameter of well bore below seal 12 in.
Number of sacks of cement used in well seal 13½ sacks
Number of sacks of bentonite used in well seal - sacks
Brand name of bentonite -
Number of pounds of bentonite per 100 gallons of water - lbs./100 gals.
Was a drive shoe used? ☑ Yes ☐ No Plugs ..... Size: location ..... ft.
Did any strata contain unusable water? ☐ Yes ☑ No
Type of water? depth of strata
Method of sealing strata off
Was well gravel packed? ☐ Yes ☑ No Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

(10) LOCATION OF WELL: WELL #2 Buckmaster #2
County Polk Driller's well number
SE ¼ NW ¼ Section 10 T. 9S R. 4W W.M.
Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well.
Depth at which water was first found 18 ft.
Static level 13 ft. below land surface. Date 10-8-7
Artesian pressure lbs. per square inch. Date

(12) WELL LOG: Diameter of well below casing 6"
Depth drilled 55 ft. Depth of completed well 55 ft.

Formation: Describe color, texture, grain size and structure of materials, and show thickness and nature of each stratum and aquifer penetrated with at least one entry for each change of formation. *Report each change in position of Static Water Level and indicate principal water-bearing strata.*

MATERIAL	From	To	SWL
Top Soil	0	2	-
CLAY - GRAY	0	X	-
CLAY - BROWN	4	13	-
CLAY - GREEN	13	18	-
GRAVEL - MED COARSE	18	45	13
CLAY - BLUE	45	55	13

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Work started 9-30 19 7X Completed 10-8 19 7
Date well drilling machine moved off of well 10-8 19 7

Drilling Machine Operator's Certification:
This well was constructed under my direct supervision. Materials used and information reported above are true to my best knowledge and belief.
[Signed] O K Todd (Drilling Machine Operator) Date 10-9, 19 7
Drilling Machine Operator's License No. 451

Water Well Contractor's Certification:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Name TODD'S DRILLING SERVICE (Person, firm or corporation) (Type or print)
Address RT 1 Box 144 MONMOUTH, ORE
[Signed] O K Todd (Water Well Contractor)
Contractor's License No. 450 Date 10-9

(USE ADDITIONAL SHEETS IF NECESSARY)

Q: Well #2

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SALEM, OREGON

STATE OF OREGON
GEOTECHNICAL HOLE REPORT
(as required by OAR 690-240-035)

Hole Number mw-3

(1) OWNER/PROJECT:
Name city of monmouth
Address 151 W main
City monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New ☐ Deepening ☐ Alteration (repair/recondition) ☐ Abandonment

(3) CONSTRUCTION:
☐ Rotary Air ☐ Hand Auger ☒ Hollow Stem Auger
☐ Rotary Mud ☐ Cable Tool ☐ Push Probe ☐ Other

(4) TYPE OF HOLE:
☒ Uncased Temporary ☐ Cased Permanent
☐ Uncased Permanent ☐ Slope Stability ☐ Other

(5) USE OF HOLE:
was going to be a Piezometer

(6) BORE HOLE CONSTRUCTION:
Special Construction approval ☐ Yes ☒ No Depth of Completed Hole 31 ft.

HOLE Diameter	From	To	SEAL Material	From	To	Sacks or pounds
10"	0	31	concrete	0	1	25 lbs
			3/8 bentonite	1	31	950 lbs

Backfill placed from ____ ft. to ____ ft. Material ____
Filter Pack placed from ____ ft. to ____ ft. Size of pack ____

(7) CASING/SCREEN:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
Screen:					☐	☐	☐	☐
					☐	☐	☐	☐

Slot size ____

(8) WELL TEST:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian
Permeability ____ Yield ____ GPM ____
Conductivity ____ PH ____
Temperature of water ____ °F Depth artesian flow found ____ ft.
Was water analysis done? ☐ Yes ☐ No
By whom? ____
Depth of strata analyzed. From ____ ft. to ____ ft.
Remarks: ____

(9) LOCATION OF HOLE by legal description:
County Polk Latitude ____ Longitude ____
Township 9S Range 4W WM.
Section 3 SE 1/4 SE 1/4
Tax Lot 200 Lot ____ Block ____ Subdivision ____
Street Address of Well (or nearest address) Buena Vista Rd Davidson Rd

Map with location indentified must be attached

(10) STATIC WATER LEVEL:
15.2 ft. below land surface. Date 8-30-03
Artesian pressure ____ lb. per square inch. Date ____

(11) SUBSURFACE LOG:
Ground Elevation ____

Material Description	From	To	SWL
Asphalt	0	4"	
Road base	4"	1'	
Clay	1'	12'	
Silt	12'	18'	15.2
Clay	18'	31'	

Date Started 8-30-03 Date Completed 8-30-03

(12) ABANDONMENT LOG:

Material Description	From	To	Sacks or Pounds
Concrete	0	1	25 lbs
3/8 Bentonite	1	31	950 lbs

Date started 8-30-03 Date Completed 8-30-03

Professional Certification
(to be signed by a licensed water supply or monitoring well constructor, or registered geologist or civil engineer).

I accept responsibility for the construction, alteration, or abandonment work performed on during the construction dates reported above. All work performed during this time is in compliance with Oregon geotechnical hole construction standards. This report is true to the best of my knowledge and belief.

License or Registration Number 10516
Signed ____ Date 9-21-03
Affiliation ____

THIS REPORT MUST BE SUBMITTED TO THE WATER RESOURCES DEPARTMENT WITHIN 30 DAYS OF COMPLETION OF WORK

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MAY 03 2005
WATER RESOURCES DEPT
SALEM, OREGON

POLK 51791

STATE OF OREGON

MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-095)

Instructions for completing this report are on the last page of this form.

Well ID# L63863

Start Card # 158225

(1) OWNER/PROJECT WELL NO. MW1

Name City of Monmouth

Address 151 W Main

City Monmouth State OR Zip 97361

(2) TYPE OF WORK

☒ New construction ☐ Alteration (Repair/Recondition)

☐ Conversion ☐ Deepening ☐ Abandonment

(3) DRILLING METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☒ Hollow Stem Auger ☐ Other

(4) BORE HOLE CONSTRUCTION:

Special Standards ☐ Yes ☒ No Depth of Completed Well 50 ft.

Land surface

Vault 0 ft. TO 1 ft.

Water-tight cover

Surface flush vault

Locking cap

Casing diameter 2 in. material PVC

Welded ☐ Threaded ☒ Glued ☐

Liner diameter ____ in. material ____

Welded ☐ Threaded ☐ Glued ☐

Seal 1 ft. TO 18 ft.

Well seal: Material 3/8 Bentonite Amount 600 lbs

Grout weight ____

Borehole diameter 10 in.

Bentonite plug at least 3 ft. thick

Filter pack 18 ft. TO 51 ft.

Screen material PVC

interval(s): From 20 To 45

From 45 To 50 Blank

Slot size 010 in.

Filter pack: Material Sand

Size 10/20 in.

(5) WELL TESTS:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability ____ Yield ____ GPM

Conductivity ____ PH ____

Temperature of water ____ °F/C Depth artesian flow found ____ ft.

Was water analysis done? ☐ Yes ☒ No

By whom? ____

Depth of strata to be analyzed. From ____ ft. to ____ ft.

Remarks: ____

Name of supervising Geologist/Engineer Stoller Supply

(6) LOCATION OF WELL By legal description:

County Polk Latitude ____ Longitude ____

Township 9S (N or S) Range 4W (E or W) Section 10

NE 1/4 of NW 1/4 of above section.

Street address of well location Buena Vista Rd + Davidson Rd

Tax lot number of well location 200

ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

18.2 Ft. below land surface. Date 8-28-03

Artesian Pressure ____ lb/sq. in. Date ____

(8) WATER BEARING ZONES:

Depth at which water was first found 20

From	To	Est. Flow Rate	SWL
17	48	7	18.2

(9) WELL LOG:

Ground Elevation ____

Material	From	To	SWL
Clay	0	12	
Sandy Clay	12	17	
Gravel with Silt	17	48	18.2
Clay	48	51	

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RECEIVED MAY 03 2005 WATER RESOURCES DEPT SALEM, OREGON

Date started 8-28-03 Completed 8-28-03

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

Signed ____ MWC Number 1056 Date 9-21-03

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

Signed ____ MWC Number 10054 Date 9/22/03

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OREGON
WATER RESOURCES DEPT
MAY 03 2002
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POLK 51794

STATE OF OREGON

MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-095)

Instructions for completing this report are on the last page of this form.

Well ID# L63862

Start Card # W158226

(1) OWNER/PROJECT WELL NO. MW 2

Name City of Monmouth

Address 151 W Main

City Monmouth State OR Zip 97361

(2) TYPE OF WORK

☒ New construction ☐ Alteration (Repair/Recondition)

☐ Conversion ☐ Deepening ☐ Abandonment

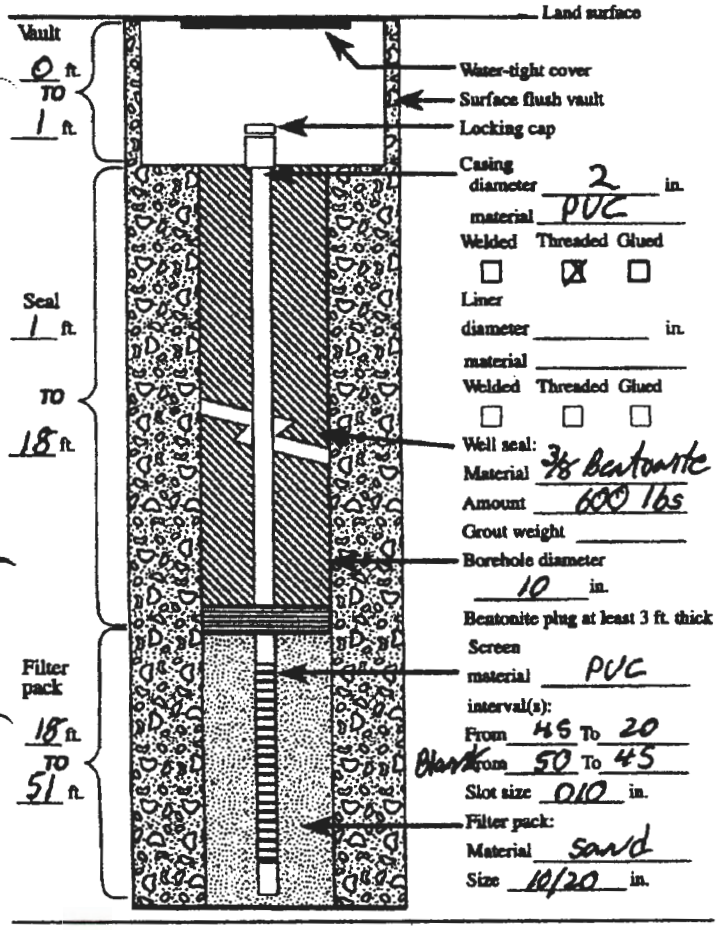
(3) DRILLING METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☒ Hollow Stem Auger ☐ Other

(4) BORE HOLE CONSTRUCTION:

Special Standards ☐ Yes ☒ No Depth of Completed Well 50 ft.



(5) WELL TESTS:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability Yield GPM

Conductivity PH

Temperature of water °F/C Depth artesian flow found ft.

Was water analysis done? ☐ Yes ☒ No

By whom?

Depth of strata to be analyzed. From ft. to ft.

Remarks:

Name of supervising Geologist/Engineer Stettler Supply

(6) LOCATION OF WELL By legal description:

County Polk Latitude Longitude

Township 9S (N or S) Range 4W (E or W) Section

NW 1/4 of NE 1/4 of above section.

Street address of well location Buena Vista Rd + Davidson Rd

Tax lot number of well location 200

ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

19.8 Ft. below land surface. Date 8-27-03

Artesian Pressure lb/sq. in. Date

(8) WATER BEARING ZONES:

Depth at which water was first found 20

From	To	Est. Flow Rate	SWL
20	47	6	19.8

(9) WELL LOG:

Ground Elevation

Material	From	To	SWL
Silty Clay	0	7	
Clay	7	20	19.8
Gravel with silt	20	47	
Clay	47	55	
Backfilled with 3/8 bent	51	55	

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SEP 25 2003
WATER RESOURCES DEPT
SALEM, OREGON

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MAY 03 2005
WATER RESOURCES DEPT
SALEM, OREGON

Date started 8-27-03 Completed 8-27-03

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

Signed MWC Number 10516 Date 9-21-03

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

Signed MWC Number 10054 Date 9/22/03

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POLK 51793

STATE OF OREGON
MONITORING WELL REPORT
(as required by ORS 537.765 & OAR 690-240-095)
Instructions for completing this report are on the last page of this form.

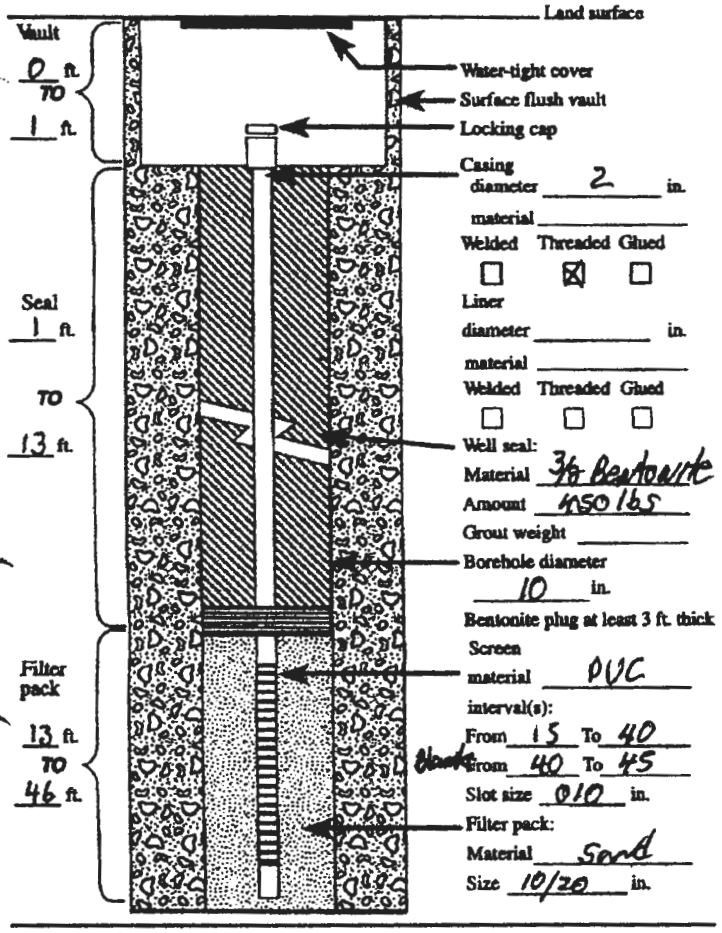
Well ID# L63864
Start Card # 158228

(1) OWNER/PROJECT WELL NO. MW4
Name City of Monmouth
Address 151 W Main
City Monmouth State OR Zip 97361

(2) TYPE OF WORK
☒ New construction ☐ Alteration (Repair/Recondition)
☐ Conversion ☐ Deepening ☐ Abandonment

(3) DRILLING METHOD
☐ Rotary Air ☐ Rotary Mud ☐ Cable
☒ Hollow Stem Auger ☐ Other

(4) BORE HOLE CONSTRUCTION:
Special Standards ☐ Yes ☒ No Depth of Completed Well 45 ft.



(5) WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian
Permeability Yield GPM
Conductivity PH
Temperature of water °F/C Depth artesian flow found ft.
Was water analysis done? ☐ Yes ☒ No
By whom?
Depth of strata to be analyzed. From ft. to ft.
Remarks:
Name of supervising Geologist/Engineer Stettler Supply

(6) LOCATION OF WELL By legal description:
County Polk Latitude Longitude
Township 9S (N or S) Range 4W (E or W) Section 10
NE 1/4 of NE 1/4 of above section.
Street address of well location Buena Vista Rd + Davidson, Monmouth
Tax lot number of well location 200
ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:
13.6 Ft. below land surface. Date 9-28-03
Artesian Pressure lb/sq. in. Date

(8) WATER BEARING ZONES:
Depth at which water was first found 15

From	To	Est. Flow Rate	SWL
12	39	6	13.6

(9) WELL LOG:
Ground Elevation

Material	From	To	SWL
silty sand + Gravel	0	2	
Clay	2	12	
wet brown Sand	12	16	13.6
Gravel with silt	16	39	
Clay	39	46	

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SEP 25 2003
WATER RESOURCES DEPT
SALEM, OREGON

Date started 9-28-03 Completed 9-29-03

(unbonded) Monitor Well Constructor Certification:
I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.
Signed MWC Number 10516 Date 9-21-03

(bonded) Monitor Well Constructor Certification:
I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.
Signed MWC Number 10054 Date 9/22/03

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WATER RESOURCES DEPT
SALEM, OREGON

POLK 51792

STATE OF OREGON

MONITORING WELL REPORT

(as required by ORS 537.765 & OAR 690-240-095)

Instructions for completing this report are on the last page of this form.

Well ID# L63865

Start Card # 158229

(1) OWNER/PROJECT WELL NO. mw5

Name City of Monmouth

Address 151 W Main

City Monmouth State OR Zip 97361

(2) TYPE OF WORK

☒ New construction ☐ Alteration (Repair/Recondition)

☐ Conversion ☐ Deepening ☐ Abandonment

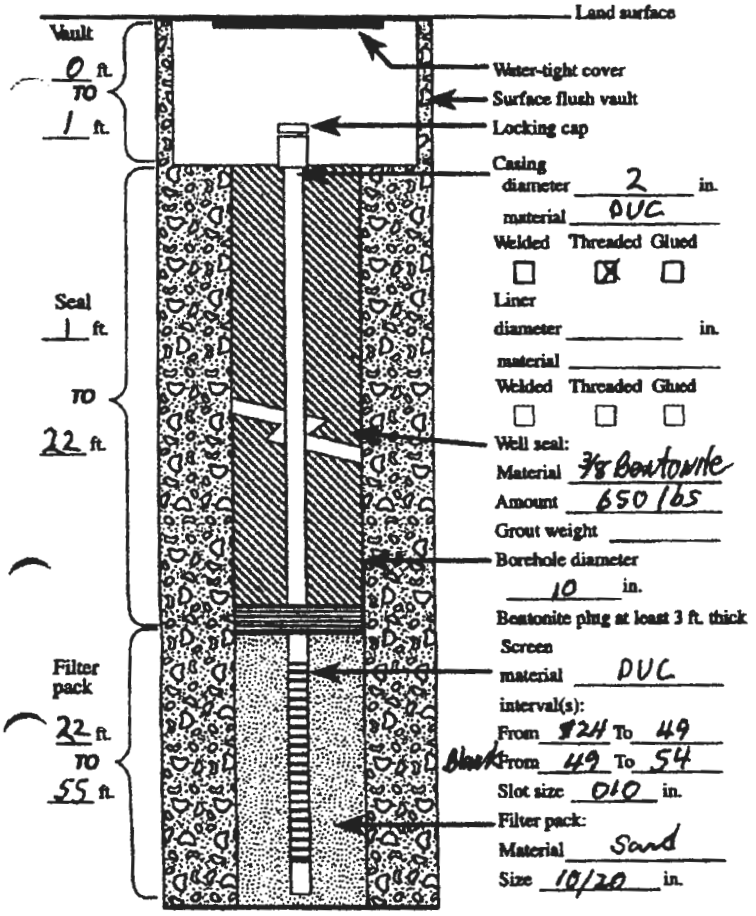
(3) DRILLING METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☒ Hollow Stem Auger ☐ Other

(4) BORE HOLE CONSTRUCTION:

Special Standards Yes ☐ No ☒ Depth of Completed Well 54 ft.



(5) WELL TESTS:

☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Permeability Yield GPM

Conductivity PH

Temperature of water °F/C Depth artesian flow found ft.

Was water analysis done? ☐ Yes ☒ No

By whom?

Depth of strata to be analyzed. From ft. to ft.

Remarks:

Name of supervising Geologist/Engineer Stettler Supply

(6) LOCATION OF WELL By legal description:

County Polk Latitude Longitude

Township 9S (N or S) Range 4W (E or W) Section 10

NE 1/4 of NW 1/4 of above section.

Street address of well location Oregon Vista Rd + Davidson Rd

Tax lot number of well location 200

ATTACH MAP WITH LOCATION IDENTIFIED. Map shall include approximate scale and north arrow.

(7) STATIC WATER LEVEL:

17.8 Ft. below land surface. Date 8-29-03

Artesian Pressure lb/sq. in. Date

(8) WATER BEARING ZONES:

Depth at which water was first found 20

From	To	Est. Flow Rate	SWL
18	51	7	

(9) WELL LOG:

Ground Elevation

Material	From	To	SWL
Clay	0	13	
Sand Clay	13	18	
Gravel with silt	18	51	17.8
Clay	51	55	

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Date started 8-29-03 Completed 8-29-03

(unbonded) Monitor Well Constructor Certification:

I certify that the work I performed on the construction, alteration, or abandonment of this well is in compliance with Oregon water supply well construction standards. Materials used and information reported above are true to the best of my knowledge and belief.

Signed MWC Number 10516 Date 9-21-03

(bonded) Monitor Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonment work performed on this well during the construction dates reported above. All work performed during this time is in compliance with Oregon water supply well construction standards. This report is true to the best of my knowledge and belief.

Signed MWC Number 10054 Date 9/22/03

ORIGINAL COPY – WATER RESOURCES DEPARTMENT FIRST COPY – CONSTRUCTOR SECOND COPY – CUSTOMER

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Monmouth — 9113

Bonne Vista Well

11/17/03

Depth of well measured at 53'6" (ground level

Pumping level at 10:15 AM was 42 ft 0"

Shut pump off at 10:16 AM

water level was 34½' after 1 min

34' after 2 min

33'9" after 20 min averged 640 gpm

33' after 90 min

Observation well data Logger placed 55 ft ground level

11/18/03 data Logger set at 30'6" ground level

Static Water Level at 10:15 AM 31 ft

Set pump to a total depth of 52'6" ground level

Started pump at ~~10:15 AM~~

1:30 PM

pumping level at 2:30 PM was 39'10"

39'10"

666.6 gpm averge after 1 hr

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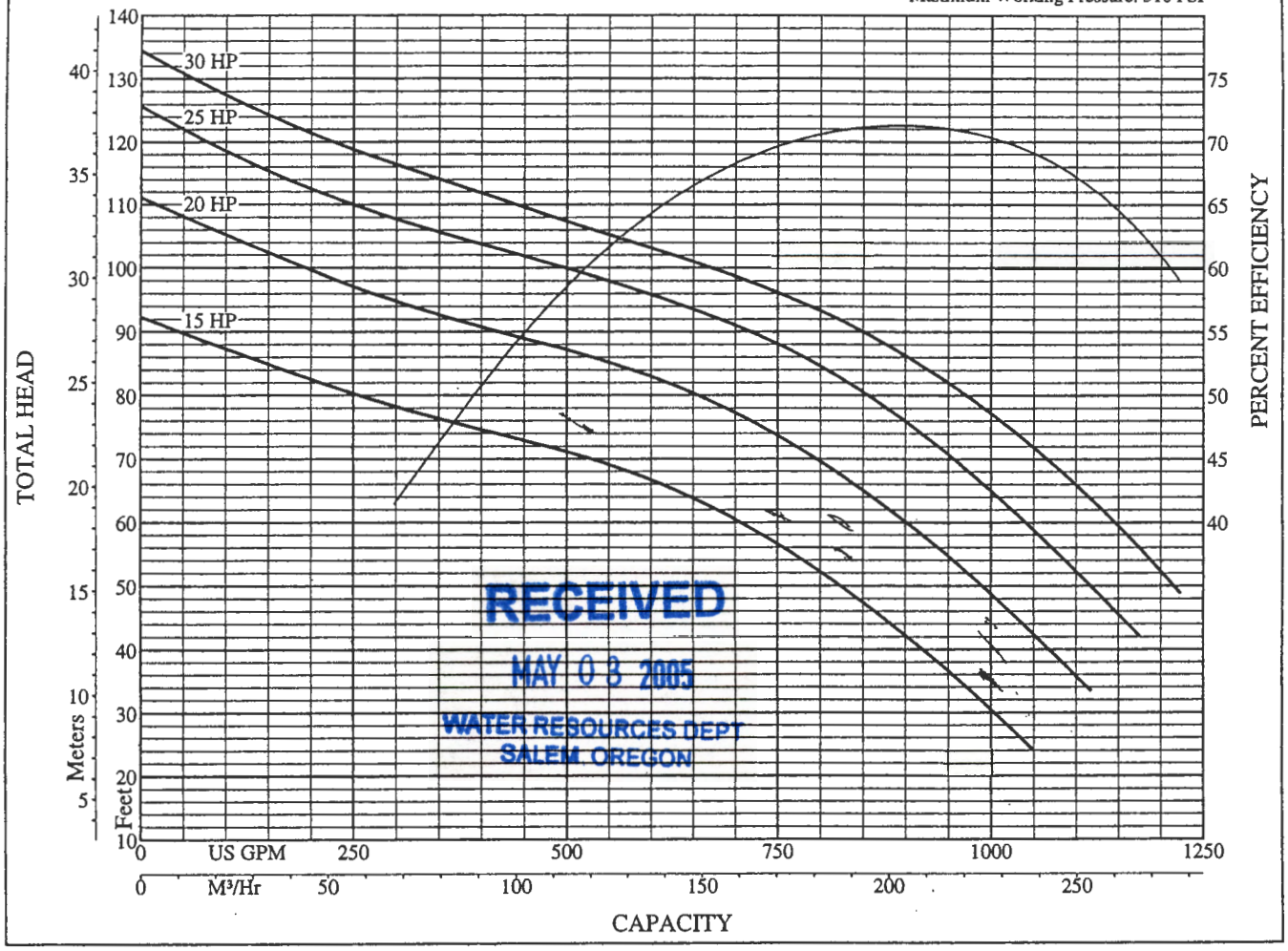
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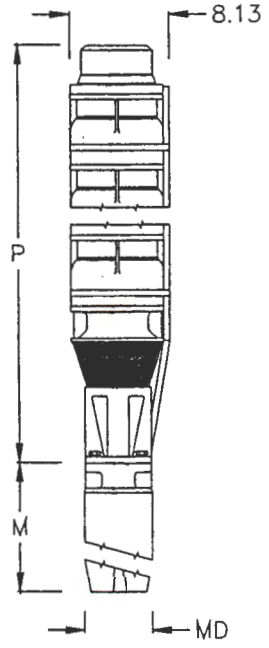
SUBMERSIBLE TURBINE

8T-900

Nominal RPM: 3450
Based on Fresh Water @ 68° F.
Maximum Working Pressure: 510 PSI



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OUTLINE DIMENSIONS / WEIGHTS

HP	stages	Motor size	P length	M* length	MD* dia.	Mtr. wt.	Pump wt.
15	1	6"	29.50	33.10	5.44	154	87
20	1	6"	29.50	30.60	5.44	146	87
25	1	6"	29.50	33.10	5.44	158	87
30	1	6"	29.50	35.70	5.44	172	87

Note: dimensions = inches; weight = U.S. lbs.

M* Maximum length (Franklin Electric Motor)
MD* Motor diameter (Franklin Electric Motor)

Trim
5.284" x 4.28" 4.78
5.690" x 4.78" 5.23
41.90"
5.
5.40" x 4.40

SPECIFICATIONS

Minimum Well I.D.	10.0 Inches
Minimum Submergence @ BEP (above inlet)	15.0 Feet
Capacity Range	227 – 1250 GPM
Discharge	6" F NPT
See manufacturer's data for motor cooling requirements	

SUPERSEDES
All Previous

Date 04/15/98
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Buena Vista Production Well # 1

Well 30869

Date/Time	Water Level	Rain
9/5/2003 13:21	19'	1.73
9/5/2003 15:51	18' 11"	0
9/5/2003 21:21	19' 2"	0
9/6/2003 3:21	18' 11"	0
9/6/2003 3:36	19' 2"	0
9/6/2003 4:06	18' 11"	0
9/6/2003 4:51	19' 2"	0
9/6/2003 20:06	18' 11"	0
9/6/2003 20:21	19' 2"	0
9/8/2003 1:21	19' 1"	0
9/8/2003 1:36	19' 2"	0
9/9/2003 11:51	19' 1"	0
9/10/2003 1:36	19' 3"	0
9/10/2003 1:51	19' 2"	0
9/10/2003 5:51	19' 3"	0
9/10/2003 10:06	19' 2"	0
9/10/2003 12:21	19' 3"	0
9/10/2003 12:51	19' 2"	0
9/11/2003 8:21	19' 3"	0
9/11/2003 8:51	19' 2"	0
9/11/2003 20:06	19' 3"	0
9/12/2003 11:51	22' 3"	0
9/12/2003 12:06	22' 5"	0
9/12/2003 12:36	22' 9"	0
9/12/2003 13:06	22' 10"	0
9/12/2003 13:36	22' 11"	0
9/12/2003 13:51	23' 11"	0
9/12/2003 14:06	24"	0
9/12/2003 14:21	24' 1"	0
9/12/2003 15:36	25' 5"	0
9/12/2003 16:06	25' 9"	0
9/12/2003 16:51	25' 10"	0
9/12/2003 17:36	25' 11"	0
9/12/2003 19:06	26"	0
9/12/2003 21:36	26' 3'	0
9/13/2003 1:21	26' 4"	0
9/13/2003 3:21	26' 5"	0
9/13/2003 8:51	26' 7"	0
9/13/2003 12:06	26' 9"	0
9/13/2003 14:51	26' 10"	0
9/13/2003 19:06	26' 11"	0
9/13/2003 21:51	27"	0
9/13/2003 22:36	26' 11"	0
9/13/2003 23:06	27"	0
9/14/2003 2:36	27' 2"	0
9/14/2003 5:51	27' 3"	0
9/14/2003 9:06	27' 4"	0
9/14/2003 9:21	27' 5"	0
9/14/2003 17:36	27' 6"	0

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9/14/2003 21:21	27' 7"	0
9/15/2003 3:36	27' 9"	0
9/15/2003 7:06	27' 10"	0
9/15/2003 8:06	29'	0
9/15/2003 9:06	27' 2"	0
9/16/2003 2:06	27' 3"	0
9/16/2003 8:51	27' 4"	0
9/16/2003 10:21	27' 3"	0
9/16/2003 11:21	27' 4"	0
9/16/2003 18:06	27' 5"	0
9/17/2003 7:21	27' 6'	0
9/17/2003 17:21	27' 8"	0
9/18/2003 1:51	27' 9"	0
9/18/2003 9:36	27' 10"	0
9/18/2003 14:06	27' 9"	0
9/18/2003 15:06	27' 10"	0
9/18/2003 15:36	27' 9"	0
9/18/2003 16:06	27' 10"	0
9/18/2003 17:06	27' 9"	0
9/18/2003 18:06	27' 10"	0
9/18/2003 21:36	27' 11"	0
9/19/2003 5:06	28"	0
9/20/2003 0:06	28' 2"	0
9/20/2003 9:21	28' 3"	0
9/20/2003 20:51	28' 4"	0
9/24/2003 5:21	28' 11"	0
9/24/2003 20:06	29'	0
9/25/2003 5:36	29' 2"	0
9/25/2003 22:06	29' 3"	0
9/26/2003 20:36	29' 4"	0
9/27/2003 8:51	29' 5"	0
9/30/2003 9:36	29' 11"	0
9/30/2003 9:51	29' 10"	0
9/30/2003 18:36	29' 11"	0
9/30/2003 19:21	29' 10"	0
9/30/2003 21:51	29' 11"	0
10/1/2003 0:36	29' 10"	0
10/4/2003 7:36	26' 2"	0
10/4/2003 7:51	25' 11"	0
10/4/2003 8:06	25' 10"	0
10/4/2003 8:36	25' 9"	0
10/4/2003 8:51	29' 11"	0
10/4/2003 9:06	30'	0
10/9/2003 23:06	30' 11"	0
10/9/2003 23:21	30' 10"	0
10/10/2003 2:51	30' 11"	0
10/10/2003 6:36	30' 10"	0
10/10/2003 6:51	30' 11"	0
10/10/2003 19:36	31'	0
10/10/2003 19:51	30' 11"	0
10/10/2003 20:36	31'	0
10/10/2003 21:21	30' 11"	0

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10/10/2003 22:06	31'	0
10/10/2003 22:21	30' 11"	0
10/10/2003 23:06	31'	0
10/10/2003 23:51	30' 11"	0
10/11/2003 0:06	31'	0
10/11/2003 0:21	30' 11"	0
10/11/2003 0:36	31'	0
10/13/2003 8:51	27' 5"	0
10/13/2003 12:36	31' 3"	0
10/18/2003 19:06	31'	0
10/20/2003 18:21	32' 2"	0
10/26/2003 21:36	32' 11"	0
10/28/2003 10:21	33'	0
10/31/2003 3:09	30' 7"	0
10/31/2003 8:24	28' 11"	0
10/31/2003 14:54	32' 4"	0
10/31/2003 23:09	32' 11"	0
11/6/2003 4:09	33' 11"	0
11/6/2003 23:54	34'	0
11/10/2003 12:40	37' 7"	0
11/10/2003 13:40	38' 2"	0
11/10/2003 17:40	38' 8"	0
11/10/2003 18:40	38' 9"	0
11/10/2003 19:40	38' 11"	0
11/11/2003 0:25	39' 3"	0
11/11/2003 6:10	39' 6"	0
11/11/2003 10:55	39' 9"	0
11/11/2003 18:25	39' 11"	0
11/12/2003 9:25	32' 4"	0
11/12/2003 9:40	40' 7"	0
11/12/2003 9:55	39' 8"	0
11/12/2003 10:10	39' 9"	0
11/12/2003 10:25	39' 11"	0
11/14/2003 15:56	40' 4"	0
11/14/2003 21:26	40' 10"	0
11/15/2003 3:26	41' 2"	0
11/16/2003 20:11	41'	0.01
11/17/2003 11:41	33' 5"	0
11/17/2003 12:26	0	0
11/18/2003 14:26	30' 7"	0
11/18/2003 14:41	38' 3"	0
11/18/2003 19:11	38'	0
11/18/2003 22:41	38' 11"	0
11/19/2003 4:41	39' 4"	0
11/19/2003 7:26	40'	0
11/19/2003 9:56	40' 2"	0
11/20/2003 1:11	39' 9"	0
11/20/2003 1:26	43' 5"	0
11/20/2003 1:41	40' 5"	0
11/20/2003 4:41	41'	0
11/20/2003 4:56	43' 5"	0
11/20/2003 5:11	40'	0

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11/20/2003 5:56	35' 10"	0
11/20/2003 6:11	32.81'	0
11/20/2003 10:26	29.92'	0
11/20/2003 11:11	29' 10"	0
11/20/2003 22:11	29'	0
11/21/2003 0:11	28' 11"	0
11/21/2003 2:11	28" 10"	0
11/21/2003 4:26	28' 9"	0
11/21/2003 6:26	28' 7'	0
11/21/2003 9:11	28' 8"	0
11/21/2003 12:11	28' 6"	0
11/21/2003 13:41	36' 3"	0
11/21/2003 17:26	37' 8"	0
11/21/2003 19:11	38' 2"	0
11/21/2003 19:26	38' 5"	0
11/21/2003 19:56	38' 7"	0
11/21/2003 23:11	40' 11"	0
11/22/2003 0:26	41'	0
11/22/2003 0:41	41' 1"	0
11/22/2003 2:26	41' 2"	0
11/22/2003 2:41	41' 5"	0
11/22/2003 4:56	41' 5"	0
11/22/2003 5:11	41' 5"	0
11/22/2003 8:11	41' 7"	0
11/22/2003 8:41	41' 8"	0
11/22/2003 9:26	41' 11"	0
11/22/2003 11:26	41'	0
11/22/2003 12:41	40' 11"	0
11/22/2003 13:56	40' 2"	0
11/22/2003 18:56	40' 3"	0
11/23/2003 0:11	40' 7"	0
11/23/2003 0:26	40' 9"	0
11/23/2003 1:56	40' 10"	0
11/23/2003 5:26	39"	0
11/23/2003 5:41	40' 11"	0
11/23/2003 7:11	39' 6"	0
11/23/2003 7:26	38' 11"	0
11/23/2003 11:11	41' 11"	0
11/23/2003 11:26	40'	0
11/23/2003 14:26	39' 8"	0
11/23/2003 14:41	39' 6"	0
11/23/2003 18:11	38' 11"	0
11/23/2003 18:26	39' 8"	0
11/23/2003 22:41	39' 4"	0
11/23/2003 22:56	39' 5"	0
11/24/2003 5:41	40' 3"	0
11/24/2003 5:56	39' 9"	0
11/24/2003 10:26	37' 2"	0
11/24/2003 10:41	37'	0
11/24/2003 12:11	36' 11"	0
11/24/2003 16:11	36' 9"	0
11/24/2003 16:26	36' 11"	0

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11/25/2003 0:56	37' 10"	0
11/25/2003 1:11	37' 11"	0
11/25/2003 9:56	38'	0
11/25/2003 19:26	38' 2"	0
11/26/2003 3:56	38' 3":	0
11/26/2003 14:11	36' 5"	0
11/27/2003 2:11	36' 3"	0
11/30/2003 0:41	36' 6"	0
12/2/2003 3:56	36' 4"	0
12/3/2003 7:41	36' 2"	0
12/4/2003 16:26	36' 11"	0
12/5/2003	36' 6"	0
12/5/2003 12:12	36' 7"	0
12/5/2003 17:12	30' 10"	0
12/5/2003 23:12	30' 3"	0
12/6/2003 4:27	29' 11"	0
12/6/2003 9:57	29' 7"	0
12/6/2003 14:42	29' 5"	0
12/6/2003 18:42	29' 6"	0
12/6/2003 23:57	29' 5"	0
12/7/2003 5:12	29' 4"	0
12/7/2003 9:57	28' 10"	0
12/7/2003 15:12	28' 9"	0
12/7/2003 20:42	28' 3"	0
12/8/2003 2:12	28' 6"	0
12/8/2003 7:27	28' 5"	0
12/8/2003 13:42	28' 4"	0
12/8/2003 19:27	28'	0
12/9/2003 0:57	27' 11"	0
12/9/2003 6:12	27' 10"	0
12/9/2003 11:57	27' 9"	0
12/9/2003 16:42	27' 7"	0
12/9/2003 22:12	27' 6"	0

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Luckiamute Well #2

Well 30876

Date / Time	feet	rainfall
9/3/2003 10:06	0'	0
9/3/2003 17:06	0'	0
9/4/2003 11:51	0'	0
9/10/2003 15:42	39' 2"	0.96
9/10/2003 16:12	38' 6"	0
9/10/2003 17:27	39"	0
9/10/2003 18:12	38' 4"	0
9/10/2003 22:42	39' 2"	0
9/11/2003 0:12	38' 4"	0
9/11/2003 4:27	39' 2"	0
9/11/2003 8:57	38' 4"	0
9/11/2003 12:57	38' 4"	0
9/11/2003 18:27	39' 4"	0
9/11/2003 23:57	38' 10"	0
9/12/2003 4:57	38' 2"	0
9/12/2003 8:57	38' 9"	0
9/12/2003 12:42	38' 5"	0
9/12/2003 18:42	38' 9"	0
9/12/2003 23:57	39' 2"	0
9/13/2003 4:27	38' 7"	0
9/13/2003 8:42	39' 11"	0
9/13/2003 12:42	38' 8"	0
9/13/2003 16:27	38' 4"	0
9/13/2003 20:42	37' 9"	0
9/14/2003 0:12	37' 9"	0
9/14/2003 4:42	37' 5"	0
9/14/2003 8:42	37' 7"	0
9/14/2003 12:42	37' 6"	0
9/14/2003 16:42	37' 9"	0
9/14/2003 20:27	38' 3"	0
9/14/2003 23:57	38' 6"	0
9/15/2003 4:12	37' 11"	0
9/15/2003 8:27	39' 9"	0
9/15/2003 12:12	39' 9"	0
9/15/2003 16:42	40'	0
9/15/2003 20:27	38' 4"	0
9/16/2003 0:12	38' 3"	0
9/16/2003 4:27	38'	0
9/16/2003 8:12	38' 10"	0
9/16/2003 12:12	38' 8"	0
9/16/2003 16:27	38' 5"	0
9/16/2003 21:12	38' 8"	0
9/16/2003 23:57	38' 10"	0
9/17/2003 4:27	38' 5"	0
9/17/2003 8:12	39'	0
9/17/2003 12:27	38' 5"	0
9/17/2003 14:42	38' 5"	0
9/17/2003 18:27	38' 7"	0
9/17/2003 21:42	39' 9"	0

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9/18/2003 0:12	39' 3"	0
9/18/2003 4:57	38' 6"	0
9/18/2003 8:42	38' 8"	0
9/18/2003 12:27	39' 5"	0
9/18/2003 18:12	38' 6"	0
9/18/2003 21:57	38' 7"	0
9/19/2003 0:42	39' 5"	0
9/19/2003 4:27	38' 10"	0
9/19/2003 8:12	39' 7"	0
9/19/2003 12:12	38' 8"	0
9/19/2003 16:12	39' 5"	0
9/19/2003 20:12	39' 9"	0
9/19/2003 23:57	38' 9"	0
9/20/2003 4:42	38' 9"	0
9/20/2003 8:42	39' 6"	0
9/20/2003 12:12	40' 4"	0
9/20/2003 16:57	40' 8"	0
9/20/2003 21:27	39'	0
9/21/2003 0:57	38' 9"	0
9/21/2003 4:12	39' 7"	0
9/21/2003 8:27	39' 9"	0
9/21/2003 12:27	39' 9"	0
9/21/2003 16:12	39' 3"	0
9/21/2003 20:42	39' 5"	0
9/21/2003 23:57	39' 3"	0
9/22/2003 4:27	39'	0
9/22/2003 8:27	39' 10"	0
9/22/2003 12:27	41'	0
9/22/2003 17:12	39' 7"	0
9/22/2003 21:57	40' 10"	0
9/23/2003 2:42	39' 7"	0
9/23/2003 4:42	39' 6"	0
9/23/2003 8:27	40'	0
9/23/2003 12:12	40' 3"	0
9/23/2003 16:27	40' 11"	0
9/23/2003 18:57	41' 4"	0
9/23/2003 23:27	39' 8"	0
9/24/2003 2:12	39' 4"	0
9/24/2003 5:27	39' 7"	0
9/24/2003 8:27	39' 9"	0
9/24/2003 12:12	39" 7"	0
9/24/2003 16:12	40' 11"	0
9/24/2003 20:27	40' 7"	0
9/25/2003 0:57	39' 8"	0
9/25/2003 4:12	39' 9"	0
9/25/2003 8:27	41' 7"	0
9/25/2003 12:12	40'	0
9/25/2003 16:27	41' 7"	0
9/25/2003 20:27	40' 5"	0
9/25/2003 23:57	40' 4"	0
9/26/2003 4:12	40' 7"	0
9/26/2003 8:27	40' 8"	0

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9/26/2003 12:12	41' 9"	0
9/26/2003 14:57	40"	0
9/26/2003 18:42	41' 9"	0
9/26/2003 22:12	39' 5"	0
9/27/2003 1:42	40'	0
9/27/2003 5:57	39' 9"	0
9/27/2003 9:27	41' 10"	0
9/27/2003 13:12	41' 11"	0
9/27/2003 17:12	42'	0
9/27/2003 20:42	40' 9"	0
9/27/2003 23:57	40' 4"	0
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9/28/2003 8:27	42' 2"	0
9/28/2003 12:57	40' 8"	0
9/28/2003 16:42	40' 3"	0
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9/28/2003 23:57	42'	0
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10/5/2003 1:12	42' 2"	0

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11/9/2003 7:12	44' 5"	0

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11/12/2003 9:58	43' 6"	0
11/12/2003 14:13	43' 6"	0
11/12/2003 19:13	43' 4"	0
11/12/2003 23:58	43' 11"	0
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11/14/2003 17:44	53'	0
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11/14/2003 22:44	42' 8"	0
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11/17/2003 1:44	51'	0
11/17/2003 1:59	51'	0
11/17/2003 6:29	43' 10"	0

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11/17/2003 12:29	58'	0
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11/21/2003 22:59	51' 1"	0
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11/25/2003 18:14	58' 3"	0
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11/26/2003 5:44	53' 1"	0
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11/28/2003 16:29	44' 2"	0

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11/28/2003 17:59	52' 6"	0
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12/5/2003 8:44	44' 4"	0

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WATER RESOURCES DEPT
SALEM, OREGON

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12/5/2003 11:44	42' 2"	0
12/5/2003 15:29	42' 10"	0
12/5/2003 19:44	42' 3"	0
12/5/2003 22:29	43' 6"	0
12/6/2003 4:14	33' 5"	0
12/6/2003 9:14	58' 4"	0
12/6/2003 10:29	58' 4"	0
12/6/2003 11:59	58' 4"	0
12/6/2003 12:29	38' 11"	0
12/6/2003 14:14	58' 4"	0
12/7/2003 4:59	58' 4"	0
12/7/2003 3:59	33' 3"	0
12/7/2003 9:44	33' 4"	0
12/7/2003 15:14	33' 5"	0
12/7/2003 19:14	58' 5"	0
12/7/2003 20:59	33' 4"	0
12/7/2003 22:59	58' 3"	0
12/8/2003 4:59	57' 11"	0
12/8/2003 5:14	58'	0
12/8/2003 6:44	32' 2"	0
12/8/2003 7:29	58' 5"	0
12/8/2003 7:59	58' 3"	0
12/8/2003 11:29	33' 10"	0
12/8/2003 16:59	32' 10"	0
12/8/2003 20:29	58' 6"	0
12/8/2003 20:44	58' 3"	0
12/8/2003 23:14	47' 3"	0
12/9/2003 3:59	32' 9"	0
12/9/2003 9:29	45' 4"	0
12/9/2003 14:29	45' 3"	0
12/9/2003 19:29	52' 2"	0
12/9/2003 19:44	51' 11"	0
12/9/2003 20:44	32' 11"	0
12/9/2003 21:29	33' 7"	0

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MW #2 (Buena Vista M.W #1)

Well 30866

Date / Time	feet	rainfall
9/5/2003 13:24	19'	1.56
9/6/2003 9:09	18' 11"	0
9/6/2003 10:54	19' 1"	0
9/6/2003 15:54	18' 10"	0
9/6/2003 20:09	19'	0
9/7/2003 0:24	18' 10"	0
9/7/2003 5:09	18' 11"	0
9/7/2003 10:09	18' 10"	0
9/7/2003 19:39	18' 11"	0
9/8/2003 0:09	18' 10"	0
9/8/2003 5:54	18' 11"	0
9/8/2003 15:09	18' 10"	0
9/9/2003 3:54	18' 11"	0
9/9/2003 12:24	18' 10"	0
9/9/2003 22:24	18' 11"	0
9/10/2003 10:09	18' 11"	0
9/10/2003 21:39	19' 3"	0
9/11/2003 21:09	18' 11"	0
9/12/2003 11:54	20' 6"	0
9/12/2003 17:09	22' 3"	0
9/13/2003 10:24	23' 3"	0
9/13/2003 23:54	23'	0
9/14/2003 15:09	23' 11"	0
9/15/2003 8:09	24' 7"	0
9/15/2003 11:55	23' 11"	0
9/16/2003 5:25	24' 3"	0
9/18/2003 7:10	24' 9"	0
9/21/2003 15:28	25' 3"	0
9/24/2003 19:58	25' 11"	0
9/27/2003 15:58	26' 4"	0
9/29/2003 20:58	26' 7"	0
10/1/2003 17:43	26' 11"	0
10/3/2003 17:59	27' 3"	0
10/5/2003 4:59	27' 6"	0
10/9/2003 13:29	28'	0
10/11/2003 22:59	28' 5"	0
10/13/2003 8:44	27' 3"	0
10/15/2003 5:14	28' 10"	0
10/18/2003 19:59	29' 3"	0
10/26/2003 15:44	30' 3"	0
10/27/2003 12:59	30' 4"	0
10/28/2003 9:14	29' 3"	0
10/28/2003 9:29	30' 9"	0
10/30/2003 18:30	30' 9"	0
10/31/2003 14:30	28' 3"	0
11/1/2003 0:00	30' 4"	0
11/2/2003 3:15	30' 7"	0
11/2/2003 3:30	30' 6"	0
11/4/2003 14:30	31' 2"	0

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11/5/2003 3:00	31' 3"	0
11/5/2003 21:30	31' 4"	0
11/8/2003 16:30	32' 3"	0
11/10/2003 12:31	32' 6"	0
11/10/2003 12:46	32' 7"	0
11/10/2003 23:16	33' 4"	0
11/12/2003 9:46	33' 9"	0
11/12/2003 10:01	33' 10"	0
11/13/2003 3:31	34' 2"	0
11/14/2003 18:32	34' 6"	0
11/17/2003 11:32	33' 3"	0
11/17/2003 14:17	32' 3"	0
11/18/2003 9:02	30' 8"	0
11/18/2003 13:02	30' 7"	0
11/18/2003 18:17	33' 3"	0
11/19/2003 0:32	33' 7"	0
11/20/2003 6:32	32' 6"	0
11/20/2003 6:47	32' 4"	0
11/20/2003 7:02	32' 3"	0
11/20/2003 12:17	31' 6"	0
11/20/2003 14:32	31' 3"	0
11/20/2003 22:17	30' 9"	0
11/21/2003 8:17	29' 3"	0
11/21/2003 8:32	30' 3"	0
11/21/2003 14:18	32' 4"	0
11/21/2003 14:33	32' 6"	0
11/21/2003 14:48	32' 6"	0
11/21/2003 23:18	33' 4"	0
11/21/2003 23:33	33' 5"	0
11/23/2003 5:48	34' 3"	0
11/23/2003 18:33	34' 4"	0
11/26/2003 11:18	34' 1"	0
11/27/2003 19:48	33' 11"	0
11/28/2003 23:33	33' 11"	0
11/29/2003 13:18	33' 11"	0
11/30/2003 23:48	33' 11"	0
12/1/2003 9:48	33' 11"	0
12/1/2003 20:18	33' 11"	0
12/2/2003 6:33	33' 11"	0
12/3/2003 7:48	33' 11"	0
12/3/2003 14:48	33' 11"	0
12/3/2003 22:03	34' 1"	0
12/4/2003 6:33	34' 1"	0
12/4/2003 14:48	34' 1"	0
12/5/2003 1:03	34' 1"	0
12/5/2003 11:48	34' 1"	0
12/5/2003 15:49	32' 7"	0
12/5/2003 19:49	32' 2"	0
12/6/2003 0:04	31' 10"	0
12/6/2003 5:34	25' 10"	0
12/6/2003 12:04	31'2"	0
12/6/2003 17:34	30' 11"	0

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12/6/2003 22:34	30' 9"	0
12/7/2003 3:34	30' 8"	0
12/7/2003 9:04	30' 6"	0
12/7/2003 13:49	30' 4"	0
12/7/2003 19:34	30' 2"	0
12/8/2003 1:34	29' 11"	0
12/8/2003 7:34	29' 10"	0
12/8/2003 13:04	29' 9"	0
12/8/2003 18:49	29' 6"	0
12/8/2003 23:34	29' 5"	0
12/9/2003 4:49	29' 4"	0
12/9/2003 9:19	29' 4"	0
12/9/2003 15:04	29' 2"	0
12/9/2003 19:34	29' 2"	0
12/9/2003 22:04	29' 1"	0

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MW #4 (At Entrance Gate)

Well 30862

Date/Time	Feet
9/10/2003 9:34	15'
9/10/2003 15:04	14' 5"
9/10/2003 19:34	14' 5"
9/11/2003 1:49	14' 8"
9/11/2003 10:19	14' 8"
9/11/2003 20:04	14' 8"
9/12/2003 1:04	14' 8"
9/12/2003 10:04	14' 8"
9/12/2003 21:04	14' 8"
9/13/2003 6:04	14' 8"
9/13/2003 16:49	14' 8"
9/14/2003 1:19	14' 8"
9/14/2003 14:34	14' 8"
9/14/2003 18:49	14' 9"
9/15/2003 5:49	14' 9"
9/15/2003 19:04	14' 11"
9/16/2003 5:49	14' 11"
9/16/2003 17:34	14' 11"
9/17/2003 5:04	15'
9/17/2003 15:34	15'
9/18/2003 3:49	15'
9/18/2003 14:04	15'
9/19/2003 3:04	15'
9/19/2003 8:49	15'
9/19/2003 12:49	15' 2"
9/19/2003 15:51	15' 3"
9/19/2003 20:36	15' 2"
9/19/2003 23:51	15' 2"
9/20/2003 3:21	15'
9/20/2003 11:36	15'
9/20/2003 19:06	15'
9/21/2003 0:51	15' 1"
9/21/2003 6:21	15'
9/21/2003 12:36	15' 1"
9/21/2003 18:06	15' 3"
9/22/2003 0:36	15' 1"
9/22/2003 7:36	15' 3"
9/22/2003 13:51	15' 3"
9/22/2003 20:36	15' 3"
9/23/2003 1:36	15' 3"
9/23/2003 13:51	15' 3"
9/23/2003 23:51	15' 3"
9/24/2003 12:36	15' 3"
9/24/2003 16:51	15' 5"
9/25/2003 5:36	15' 5"
9/25/2003 17:36	15' 5"
9/25/2003 19:36	15' 5"
9/26/2003 8:21	15' 5"
9/26/2003 17:51	15' 5"

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9/27/2003 4:36	15' 7"
9/27/2003 12:06	15' 5"
9/27/2003 21:36	15' 5"
9/28/2003 7:21	15' 7"
10/3/2003 14:54	15' 8"
10/4/2003 1:39	15' 7"
10/4/2003 10:24	15' 8"
10/4/2003 19:39	15' 8"
10/5/2003 7:09	15' 8"
10/5/2003 19:39	15' 8"
10/6/2003 8:24	15' 8"
10/6/2003 19:54	15' 7"
10/7/2003 19:09	15' 7"
10/8/2003 16:24	15' 7"
10/9/2003 19:54	15' 11"
10/10/2003 12:09	15' 11"
10/11/2003 12:54	16' 3"
10/12/2003 12:09	16' 4"
10/26/2003 15:39	16'
10/26/2003 21:54	15' 11"
10/27/2003 3:09	16'
10/27/2003 10:09	16' 2"
10/27/2003 21:09	16' 3"
10/28/2003 1:54	16' 5"
10/28/2003 7:54	16' 6"
10/28/2003 17:39	16' 6"
10/29/2003 1:09	16' 7"
10/29/2003 8:54	16' 8"
10/29/2003 17:09	16' 7"
10/30/2003 0:09	16' 7"
10/30/2003 8:09	16' 7"
10/30/2003 14:39	16' 6"
10/30/2003 22:24	16' 6"
10/31/2003 12:39	16' 6"
11/1/2003 0:09	16' 6"
11/1/2003 12:54	16' 6"
11/2/2003 0:54	16' 7"
11/2/2003 11:54	16' 7"
11/3/2003 0:09	16' 7"
11/3/2003 11:39	16' 8"
11/4/2003 11:54	16' 8"
11/5/2003 16:24	16' 8"
11/6/2003 10:39	16' 8"
11/7/2003 4:24	16' 10"
11/7/2003 16:09	16' 10"
11/8/2003 5:54	16' 10"
11/8/2003 18:54	16' 10"
11/9/2003 7:54	16' 10"
11/9/2003 20:54	17'
11/10/2003 10:09	17'
11/14/2003 22:40	17' 4"
11/15/2003 13:10	17' 4"

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11/15/2003 23:40	17' 5"
11/16/2003 11:10	17' 5"
11/16/2003 23:55	17' 5"
11/17/2003 13:25	17' 5"
11/18/2003 3:25	17' 5"
11/18/2003 17:10	17' 5"
11/19/2003 6:25	17' 6"
11/19/2003 23:25	17' 6"
11/20/2003 23:55	17' 6"
11/22/2003 23:40	17' 6"
11/23/2003 23:25	17' 5"
11/24/2003 23:55	17' 4"
11/25/2003 12:55	17' 7"
11/26/2003 0:55	17' 7"
11/26/2003 14:25	17' 7"
11/27/2003 4:40	17' 6"
11/27/2003 18:40	17' 7"
11/28/2003 8:10	17' 7"
11/28/2003 21:40	17' 8"
11/29/2003 11:10	17' 9"
11/30/2003 2:40	17' 6"
11/30/2003 15:40	14' 2"
12/1/2003 4:10	12'
12/1/2003 12:10	11' 3"
12/1/2003 21:10	11' 5"
12/2/2003 5:55	10' 8"
12/2/2003 14:40	10' 2"
12/3/2003 0:10	11' 10"
12/3/2003 4:40	12' 4"
12/3/2003 8:10	12' 10"
12/3/2003 15:55	15'
12/3/2003 22:40	14' 9"
12/3/2003 22:55	14' 10"
12/4/2003 4:40	15' 3"
12/4/2003 10:40	15'
12/4/2003 19:25	16' 3"
12/5/2003 0:55	16' 4"
12/5/2003 6:10	16' 3"
12/5/2003 11:40	16' 4"
12/5/2003 16:55	16' 7"
12/5/2003 21:40	16' 5"
12/6/2003 1:55	16' 1"
12/6/2003 6:40	16'
12/6/2003 11:25	16' 1"
12/6/2003 15:10	16'
12/6/2003 20:40	16'
12/7/2003 0:55	15' 11"
12/7/2003 6:40	16'
12/7/2003 11:25	15' 11"
12/7/2003 15:25	15' 11"
12/7/2003 20:25	15' 2"
12/8/2003 0:25	15' 11"

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12/8/2003 4:25	16'
12/8/2003 8:25	16'
12/8/2003 13:10	16' 3"
12/8/2003 18:40	15' 3"
12/8/2003 23:40	15' 6"
12/9/2003 5:10	15' 4"
12/9/2003 11:10	15' 6"
12/9/2003 17:10	15' 6"
12/9/2003 22:10	15' 6"

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MW #5 (M.W. East of Luckiamute)

Well 30864

Date / Time	feet
9/9/2003 11:28	18' 4"
9/9/2003 16:13	19'
9/9/2003 19:58	19' 1"
9/9/2003 20:13	19' 3"
9/10/2003 5:43	19' 3"
9/10/2003 18:43	19' 3"
9/11/2003 7:43	19' 3"
9/11/2003 13:58	18' 9"
9/11/2003 19:13	21' 3"
9/12/2003 0:13	21' 3"
9/12/2003 6:13	21' 3"
9/12/2003 10:58	21' 3"
9/12/2003 15:43	21' 1"
9/12/2003 21:43	21' 3"
9/13/2003 1:58	21' 6"
9/13/2003 6:58	21' 6"
9/13/2003 12:43	21' 6"
9/13/2003 18:13	21' 4"
9/13/2003 22:28	21' 4"
9/14/2003 4:43	22'
9/14/2003 9:28	21' 4"
9/14/2003 13:43	21' 3"
9/14/2003 18:13	20' 6"
9/14/2003 23:58	21' 5"
9/15/2003 5:43	21' 6"
9/15/2003 11:13	21'
9/15/2003 15:43	21'
9/15/2003 22:43	21'
9/16/2003 2:13	21'
9/16/2003 7:43	20' 11"
9/16/2003 13:58	20' 6"
9/16/2003 19:43	20' 6"
9/17/2003 3:28	20' 8"
9/17/2003 12:43	20' 4"
9/17/2003 20:58	20' 3"
9/18/2003 5:43	20' 6"
9/18/2003 13:28	20' 6"
9/18/2003 23:58	20' 2"
9/19/2003 12:13	20' 2"
9/19/2003 23:59	20' 10"
9/20/2003 12:44	20' 6"
9/20/2003 23:59	20' 7"
9/21/2003 12:29	20' 7"
9/21/2003 23:59	20' 8"
9/22/2003 12:14	20' 7"
9/22/2003 23:59	20' 7"
9/23/2003 12:44	20' 6"
9/23/2003 23:59	20' 6"
9/24/2003 12:29	20' 7"

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9/24/2003 23:59	20' 9"
9/25/2003 12:14	20' 7"
9/25/2003 23:59	20' 6"
9/26/2003 12:29	20' 7"
9/26/2003 23:59	20' 9"
9/27/2003 12:44	20' 7"
9/27/2003 23:59	20' 10"
9/28/2003 12:14	20' 9"
9/28/2003 23:59	20' 11"
9/29/2003 12:44	20' 10"
9/30/2003 0:44	20' 11"
9/30/2003 11:44	20' 11"
9/30/2003 23:59	21'
10/1/2003 10:59	21'
10/1/2003 19:59	21'
10/2/2003 9:59	21' 2"
10/2/2003 18:59	21'
10/3/2003 8:14	21' 2"
10/3/2003 17:58	21' 3"
10/4/2003 5:58	21' 6"
10/4/2003 18:28	21' 4"
10/5/2003 6:43	21' 6"
10/5/2003 19:28	21' 6"
10/6/2003 7:58	21' 6"
10/6/2003 21:43	21' 6"
10/7/2003 11:43	21' 4"
10/7/2003 23:58	21' 7"
10/8/2003 12:43	21' 7"
10/8/2003 23:58	21' 7"
10/9/2003 12:28	21' 7"
10/10/2003 0:58	21' 9"
10/10/2003 12:43	21' 9"
10/10/2003 23:58	21' 9"
10/11/2003 12:28	21' 10"
10/11/2003 23:58	21' 10"
10/12/2003 12:13	22'
10/12/2003 23:58	22'
10/13/2003 12:13	22' 1"
10/13/2003 23:58	22' 3"
10/14/2003 12:13	22' 1"
10/15/2003 0:43	22' 3"
10/15/2003 12:43	22' 4"
10/16/2003 7:13	22' 4"
10/16/2003 23:43	22' 4"
10/17/2003 9:43	22' 7"
10/17/2003 19:28	22' 5"
10/18/2003 0:58	22' 6"
10/18/2003 10:58	22' 6"
10/18/2003 21:13	22' 6"
10/19/2003 8:43	22' 6"
10/19/2003 20:13	22' 6"
10/20/2003 8:43	22' 6"

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10/20/2003 19:28	22' 7"
10/21/2003 8:43	22' 7"
10/21/2003 21:28	22' 7"
10/22/2003 10:13	22' 8"
10/23/2003 0:13	22' 8"
10/23/2003 14:13	22' 8"
10/24/2003 0:43	22' 8"
10/24/2003 12:43	22' 10"
10/24/2003 23:58	22' 10"
10/25/2003 12:28	22' 10"
10/26/2003 1:28	22' 11"
10/27/2003 0:13	22' 11"
10/27/2003 7:43	23'
10/27/2003 16:43	22' 11"
10/28/2003 2:43	23'
10/28/2003 14:13	23'
10/28/2003 22:43	23'
10/29/2003 5:28	23'
10/29/2003 12:43	23'
10/29/2003 17:28	23'
10/30/2003 2:13	23' 2"
10/30/2003 11:29	23' 4"
10/30/2003 20:44	23' 8"
10/31/2003 6:14	23' 8"
10/31/2003 15:44	23' 8"
11/1/2003 1:29	23' 10"
11/1/2003 10:14	23' 8"
11/1/2003 19:14	23' 9"
11/2/2003 5:44	23' 11"
11/2/2003 16:59	23' 10"
11/3/2003 3:44	24'
11/3/2003 14:14	23' 8"
11/3/2003 23:59	23' 11"
11/4/2003 9:44	23' 11"
11/4/2003 20:44	23' 10"
11/5/2003 5:44	24' 2"
11/5/2003 14:44	23' 11"
11/6/2003 0:14	23' 11"
11/6/2003 7:29	24' 3"
11/6/2003 14:29	24'
11/6/2003 21:14	24'
11/7/2003 4:59	24' 2"
11/7/2003 12:29	24'
11/7/2003 22:29	24'
11/8/2003 9:44	24' 2"
11/8/2003 18:59	24'
11/9/2003 4:29	24' 2"
11/9/2003 11:59	24' 2"
11/9/2003 18:59	24' 2"
11/10/2003 2:44	24' 3"
11/10/2003 11:14	24' 3"
11/10/2003 21:59	24' 3"

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11/11/2003 8:29	24' 3"
11/11/2003 18:29	24' 4"
11/12/2003 6:14	24' 6"
11/12/2003 17:44	24' 5"
11/13/2003 4:44	24' 6"
11/13/2003 16:29	24' 6"
11/14/2003 2:29	24' 5"
11/14/2003 12:29	24' 5"
11/14/2003 21:45	24' 5"
11/15/2003 6:00	24' 5"
11/15/2003 14:45	24' 5"
11/15/2003 21:30	24' 6"
11/16/2003 6:45	24' 6"
11/16/2003 15:30	24' 7"
11/17/2003 3:30	24'
11/17/2003 11:15	24'
11/17/2003 23:15	24'
11/18/2003 7:15	24'
11/18/2003 19:00	24'
11/19/2003 10:15	24'

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MW #7- Davidson Rd (West of Luckiamute)

Well 30863

Date / Time	feet
9/5/2003 13:51	18' 1"
9/5/2003 15:51	18'
9/6/2003 0:06	18'
9/6/2003 12:06	18'
9/6/2003 20:36	18' 1"
9/7/2003 0:06	18' 1"
9/7/2003 4:36	18' 1"
9/7/2003 9:51	18' 1"
9/7/2003 23:36	18' 1"
9/8/2003 12:36	18' 1"
9/8/2003 23:51	18' 1"
9/9/2003 12:36	18' 1"
9/10/2003 0:06	18' 1"
9/10/2003 12:21	18' 1"
9/11/2003 0:06	18' 1"
9/11/2003 12:21	18' 1"
9/12/2003 0:51	18' 1"
9/12/2003 8:36	18'
9/12/2003 21:51	18'
9/13/2003 4:21	17' 11"
9/13/2003 16:21	17' 11"
9/14/2003 0:06	17' 11"
9/14/2003 12:36	17' 11"
9/14/2003 23:51	18'
9/15/2003 12:06	18'
9/15/2003 17:06	18' 1"
9/16/2003 2:21	18' 1"
9/16/2003 12:06	18' 1"
9/16/2003 23:51	18' 3"
9/17/2003 12:21	18' 3"
9/17/2003 23:51	18' 4"
9/18/2003 10:21	18' 4"
9/18/2003 23:06	18' 5"
9/19/2003 12:36	18' 6"
9/20/2003 1:51	18' 6"
9/20/2003 14:51	18' 6"
9/21/2003 0:06	18' 8"
9/21/2003 12:51	18' 8"
9/22/2003 0:06	18"
9/22/2003 12:06	18' 9"
9/22/2003 23:51	18' 10"
9/23/2003 12:21	18' 10"
9/23/2003 23:51	18' 11"
9/24/2003 12:06	19'
9/24/2003 23:51	19'
9/25/2003 12:36	18' 1"
9/25/2003 23:51	18' 1"
9/26/2003 12:06	18' 1"
9/26/2003 23:51	19' 3"

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9/27/2003 12:36 19' 3"
9/27/2003 23:51 19' 4"
9/28/2003 12:51 19' 4"
9/28/2003 23:51 19' 5"
9/29/2003 12:06 19' 6"
9/29/2003 23:51 19' 6"
9/30/2003 12:21 19' 8"
9/30/2003 23:51 19' 8"
10/1/2003 12:36 19' 9"
10/1/2003 23:51 19' 9"
10/2/2003 20:21 19' 10"
10/4/2003 1:52 19' 11"
10/4/2003 15:07 20'
10/4/2003 22:07 20'
10/5/2003 6:22 20' 2"
10/5/2003 23:37 20' 2"
10/6/2003 12:07 20' 2"
10/6/2003 23:52 20' 3"
10/7/2003 12:52 20' 3"
10/7/2003 23:52 20' 4"
10/8/2003 12:52 20' 4"
10/9/2003 0:07 20' 5"
10/9/2003 12:37 20' 5"
10/9/2003 23:52 20' 5"
10/10/2003 11:52 20' 6"
10/10/2003 23:52 20' 6"
10/11/2003 12:37 20' 6"
10/11/2003 23:52 20' 6"
10/12/2003 12:37 20' 7"
10/13/2003 0:07 20' 5"
10/13/2003 12:22 20' 6"
10/13/2003 23:52 20' 7"
10/14/2003 12:22 20' 7"
10/15/2003 0:07 20' 7"
10/15/2003 12:22 20' 8"
10/15/2003 23:52 20' 8"
10/16/2003 11:52 20' 8"
10/16/2003 23:52 20' 10"
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10/17/2003 23:52 20' 7"
10/18/2003 12:37 20' 8"
10/18/2003 23:52 20' 8"
10/19/2003 11:37 20' 8"
10/20/2003 12:22 20' 11"
10/21/2003 0:37 20' 11"
10/21/2003 12:22 21'
10/21/2003 12:37 21'
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SALEM OREGON

10/24/2003 12:37 21' 3"
10/25/2003 0:07 21' 3"
10/25/2003 13:07 21' 4"
10/25/2003 23:37 21' 4"
10/26/2003 12:22 21' 4"
10/27/2003 12:22 21' 4"
10/28/2003 12:22 21' 4"
10/29/2003 12:37 21' 5"
10/30/2003 12:39 21' 5"
10/31/2003 12:39 21' 6"
11/1/2003 12:39 21' 6"
11/2/2003 12:39 21' 5"
11/3/2003 12:24 21' 5"
11/4/2003 12:39 21' 5"
11/5/2003 12:24 21' 5"
11/6/2003 0:09 21' 6"
11/6/2003 12:24 21' 6"
11/7/2003 12:39 21' 7"
11/8/2003 0:09 21' 6"
11/8/2003 23:54 21' 7"
11/10/2003 12:40 16' 2"
11/10/2003 16:55 17' 3"
11/10/2003 21:10 18' 4"
11/11/2003 1:10 18' 3"
11/11/2003 4:40 18' 2"
11/11/2003 8:40 18' 9"
11/11/2003 12:40 19' 6"
11/11/2003 16:40 19' 7"
11/11/2003 20:40 20'
11/12/2003 0:10 20' 3"
11/12/2003 11:55 20' 1"
11/12/2003 15:10 18' 11"
11/12/2003 18:55 19'
11/12/2003 21:55 19' 3"
11/13/2003 0:40 19' 6"
11/13/2003 4:25 19' 8"
11/13/2003 8:40 20'
11/13/2003 12:40 19' 11"
11/13/2003 17:10 19'
11/13/2003 22:10 20' 5"
11/14/2003 3:10 19' 10"
11/14/2003 7:55 19' 7"
11/14/2003 11:55 19' 7"
11/14/2003 17:41 19' 4"
11/14/2003 22:41 19' 7"
11/15/2003 3:56 19' 8"
11/15/2003 10:41 19' 8"
11/15/2003 15:56 18' 6"
11/15/2003 20:26 19' 11"
11/16/2003 0:26 17' 3
11/16/2003 5:11 18' 10"
11/16/2003 10:11 18' 10"

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WATER RESOURCES DEPARTMENT
SALEM, OREGON

11/16/2003 15:26	19' 2"
11/16/2003 20:11	16' 5"
11/17/2003 0:26	19' 10"
11/17/2003 4:56	18' 4"
11/17/2003 22:11	18' 7"
11/18/2003 1:56	19' 4"
11/18/2003 5:41	19' 4"
11/18/2003 8:41	18' 6"
11/18/2003 11:56	18' 7"
11/18/2003 15:41	16' 4"
11/18/2003 18:11	18' 6"
11/19/2003 0:26	17' 6"
11/19/2003 6:11	14' 10"
11/19/2003 12:11	16' 11"
11/20/2003 0:41	13' 3"
11/20/2003 12:26	14' 10"
11/21/2003 0:41	15' 4"
11/21/2003 12:11	15' 10"
11/22/2003 0:41	14' 2"
11/25/2003 12:26	16' 3"
11/28/2003 12:26	19' 1"
11/29/2003 0:11	20' 11"
11/29/2003 12:11	21' 6"
11/29/2003 23:26	21' 6"
11/30/2003 12:26	21' 6"
12/1/2003 0:11	21' 8"
12/2/2003 0:26	21' 6"
12/2/2003 12:41	21' 8"
12/3/2003 0:56	20' 4"
12/3/2003 12:11	17' 6"
12/4/2003 0:41	18' 6"
12/4/2003 12:11	19' 10"
12/5/2003 0:11	20' 11"
12/5/2003 11:26	20' 10"

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WATERLAB CORP.

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DEC 0 - 2003
BY:

2603 - 12th Street S.E.
Salem, Oregon 97302
(503) 363-0473
FAX (503) 363-8900

TEST RESULTS

TO: Stettler Supply Co.
1810 Lana Ave. NE
Salem, OR 97303

12/8/03

STESUP

PO#: 9866

Collection Information

Date: 12/5/03
Time: 1430
By: Butch Williams
Lab #: 20031205-032
Location: Monmouth/Buena Vista #1

Lab Receipt Information

12/5/03
1520
KI

Test	Results	Units	Analysis Date	Tech	Method
Iron Treater					
pH	6.98	pH units	12/5/03	BEM	EPA 150.1
Specific Conductance	295.	uhos/cm	12/5/03	BEM	EPA 120.1
Alkalinity, total	148.	mg/l CaCO3	12/8/03	BEM	SM2320
Hardness as CaCO3	118.	mg/l CaCO3	12/8/03	BEM	SM2340C
Iron	2.56	mg/l	12/8/03	BEM	SM3111B
Manganese	0.79	mg/l	12/8/03	BEM	SM3113B
Iron-utilizing bacteria	NONE		12/8/03	BEM	SM9240B
Tannin/Lignin	ND@1.	mg/l	12/8/03	BEM	SM5550

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WATER RESOURCES DEPT
SALEM OREGON

* ORELAP ID# OR100039
++Neilson Research Corp-ORELAP ID#OR100016/Umpqua Research Co-ORELAP ID#OR100031
ND Means No Detection at specified limit. NA Means Not Applicable, no standard set.
SM = "Std. Methods for the Examination of Water and Wastewater", 20th ed., 1998
EPA = "Methods for Chemical Analysis for Water and Wastes",USEPA
APPROVED BY: Peter E. Hyps

WATERLAB CORP.

2603 - 12th Street S.E.
Salem, Oregon 97302
(503) 363-0473
FAX (503) 363-8900

TEST RESULTS

TO: Stettler Supply Co.
1810 Lana Ave. NE
Salem, OR 97303

10/16/03

STESUP

PO#: 10284

Collection Information

Date: 10/6/03
Time: 1030
By: Gary Caswell
Lab #: 20031006-033
Location: City of Monmouth/Well Tap

Lab Receipt Information

10/6/03
1115
BEM

Test	Results	Units	Analysis Date	Tech	Method
Iron Treater					
pH	7.10	pH units	10/6/03	BEM	EPA 150.1
Specific Conductance	292.	uhos/cm	10/6/03	BEM	EPA 120.1
Alkalinity, total	122.	mg/l CaCO3	10/6/03	BEM	SM2320
Hardness as CaCO3	128.	mg/l CaCO3	10/6/03	BEM	SM2340C
Iron	1.99	mg/l	10/8/03	BEM	SM3111B
Manganese	0.464	mg/l	10/8/03	BEM	SM3113B
iron-utilizing bacteria	NONE		10/14/03	BEM	SM9240B
Tannin/Lignin	ND@1.	mg/l	10/6/03	BEM	SM5550
Sodium	14.7	mg/l	10/10/03	BEM	SM3111B
Nitrogen, Nitrate	ND@0.1	mg/l N	10/10/03	BEM	EPA 300
Chloride	11.4	mg/l	10/10/03	BEM	EPA 300.

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SM = "Std. Methods for the Examination of Water and Wastewater", 20th ed., 1998
EPA = "Methods for Chemical Analysis for Water and Wastes",USEPA
+New Maximum Contaminant Level effective January 2006
APPROVED BY: Kathleen E. Myers

WATERLAB CORP.

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NOV 5 2003
BY:

2603 - 12th Street S.E.
Salem, Oregon 97302
(503) 363-0473
FAX (503) 363-8900

TEST RESULTS

TO: Stettler Supply Co.
1810 Lana Ave. NE
Salem, OR 97303

11/4/03

STESUP

PO#: 10545

Collection Information

Date: 10/24/03
Time: 1320
By: Ron DesRoche
Lab #: 20031024-019
Location: City of Monmouth Test Well

Lab Receipt Information

10/24/03
1640
KI

Test	Results	Units	Analysis Date	Tech	Method
Iron Treater					
pH	7.04	pH units	10/24/03	BEM	EPA 150.1
Specific Conductance	285.	uhos/cm	10/24/03	BEM	EPA 120.1
Alkalinity, total	126.	mg/l CaCO3	10/24/03	BEM	SM2320
Hardness as CaCO3	138.	mg/l CaCO3	10/24/03	BEM	SM2340C
Iron	3.33	mg/l	10/30/03	BEM	SM3111B
Manganese	0.409	mg/l	10/30/03	BEM	SM3113B
Iron-utilizing bacteria	PRESENT		11/3/03	BEM	SM9240B
Tannin/Lignin	ND@1.	mg/l	10/31/03	BEM	SM5550
Sodium	15.3	mg/l	10/30/03	BEM	SM3111B
Nitrogen, Nitrate	ND@0.1	mg/l N	10/24/03	BEM	EPA 300
Chloride	11.1	mg/l	10/24/03	BEM	EPA 300.

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SALEM, OREGON

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EPA = "Methods for Chemical Analysis for Water and Wastes",USEPA
APPROVED BY: Kathi E. Myers

ENGINEERING & CONSULTING, LLC

3000 Market Street NE Suite 528
Salem, Oregon 97301

Phone: (503) 589-1115
Fax: (503) 589-1118

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APR 11 2005
WATER RESOURCES DEPT
SALEM, OREGON

April 1, 2005

Lisa Juul
Water Rights Specialist
Water Resources Department
North Mall Office Bldg.
725 Summer Street, Suite A
Salem, OR 97301-1271

OK - Additional time through May 1, 2005 is granted. 4-13-05

RE: City of Monmouth
Water Rights Application #G-13521-Request for Extension

Dear Ms. Juul,

I am writing this letter to you on behalf of the City of Monmouth as an official response to your letter of December 20, 2004 in which you expressed a need for additional detail regarding the City's request for an extension to the above application. As I indicated on the telephone last week, your letter was caught up in the understandable turmoil and confusion surrounding the recent departure of the individual who made the request, Gary Wilson, former Public Works Director, and the arrival of the new Public Works Director, Craig Johns. Simply put, the City was not able to respond by the requested March 21, 2005 date due to this change of Public Works Directors and Mr. Johns unfamiliarity with the issues surrounding the extension request and your letter of response. The City has every intention of providing an adequate response to the questions outlined in your letter and is simply requesting additional time to allow myself to meet with Mr. Johns, review the background and information sent in by Mr. Wilson, and formulate a response. Given the current backlog of work that would be expected during a change of personnel such as this, I am now requesting an extension until May 1, 2005. This will permit the time needed for Mr. Johns and myself to adequately prepare a response.

We sincerely appreciate the Department's understanding of this situation and your appreciation for the reasons we make this request. Please contact me if there is any clarification you desire and we thank you for your consideration in this matter.

Respectfully,

Edward Butts, PE, DEE, CWRE
City Water Engineer

CC: Craig Johns, Public Works Director, City of Monmouth

Oregon Water Resources Department
Water Rights Division

PLACED IN U.S. MAIL
NOV 15 1996
OREGON WATER RESOURCES DEPT.

Water Rights Application
Number G-13521

Final Order

Application History

On October 1, 1993, CITY OF MONMOUTH submitted an application to the Department for a water use permit. The Department issued a Proposed Final Order on September 10, 1996. The protest period closed October 25, 1996, and no protest was filed.

The proposed use would not impair or be detrimental to the public interest.

Order

Application G-13521 therefore is approved as proposed by the Proposed Final Order, and Permit G-12976 is issued as limited by the conditions proposed by the Proposed Final Order.

DATED October 21 , 1996

Martha O. Pagel
Director

Appeal Rights

Under the provisions of ORS 183.484, the applicant may appeal this order by filing a petition for review in the Circuit Court for Marion County or the circuit court for the county in which the applicant resides or has a principal business office. The petition for review must be filed within 60 days after the date this order is served.

STATE OF OREGON

COUNTY OF POLK

PERMIT TO APPROPRIATE THE PUBLIC WATERS

THIS PERMIT IS HEREBY ISSUED TO

CITY OF MONMOUTH
151 W MAIN ST
MONMOUTH, OREGON 97361

(503)838-0722

The specific limits for the use are listed below along with conditions of use.

APPLICATION FILE NUMBER: G-13521

SOURCE OF WATER: TWO WELLS IN THE DUCK SLOUGH BASIN

PURPOSE OR USE: MUNICIPAL

MAXIMUM RATE: 6.0 CUBIC FOOT PER SECOND

PERIOD OF USE: YEAR ROUND

DATE OF PRIORITY: October 1, 1993

POINT OF DIVERSION LOCATION: SW 1/4 SE 1/4, SECTION 3, NW 1/4 NE 1/4, SECTION 10, T9S, R4W, W.M.; WELL A - 1550 FEET NORTH & 1600 FEET WEST; WELL B - 1050 FEET NORTH & 850 FEET WEST, BOTH FROM SE CORNER DLC 40

THE PLACE OF USE IS LOCATED AS FOLLOWS:

WITHIN THE CITY OF MONMOUTH SERVICE AREA

Measurement, recording and reporting conditions:

A. Before water use may begin under this permit, the permittee shall install a meter or other suitable measuring device as approved by the Director. The permittee shall maintain the meter or measuring device in good working order, shall keep a complete record of the amount of water used each month and shall submit a report which includes the recorded water use measurements to the Department annually or more frequently as may be required by the Director. Further, the Director may require the permittee to report general water use information, including the place and nature of use of water under the permit.

B. The permittee shall allow the watermaster access to the meter or measuring device; provided however, where the meter or measuring device is located within a private structure, the watermaster shall request access upon reasonable notice.

The water user shall develop a plan to monitor and report the impact of water use under this permit on water levels within the aquifer that provides water to the permitted well(s). The plan shall be submitted to the Department within one year of the date the permit is issued and shall be subject to the approval of the Department. At a minimum, the plan shall include a program to periodically measure static water levels within the permitted well(s) or an adequate substitute such as water levels in nearby wells. The plan shall also stipulate a reference water level against which any water-level declines will be compared. If a well listed on this permit (or replacement well) displays a total static water-level decline of 25 or more feet over any period of years, as compared to the reference level, then the water user shall discontinue use of, or reduce the rate or volume of withdrawal from, the well(s). Such action shall be taken until the water level recovers to above the 25-foot decline level or until the Department determines, based on the water user's and/or the Department's data and analysis, that no action is necessary because the aquifer in question can sustain the observed declines without adversely impacting the resource or senior water rights. The water user shall in no instance allow excessive decline, as defined in Commission rules, to occur within the aquifer as a result of use under this permit.

If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

The use of water allowed herein may be made during the months of July and August only at times when waters from Duck Slough would not otherwise flow into the Willamette River, or sufficient water is available to satisfy all prior rights, including rights for maintaining instream flows.

STANDARD CONDITIONS

The wells shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon. The works shall be equipped with a usable access port, and may also include an air line and pressure gauge adequate to determine water level elevation in the well at all times.

The use shall conform to such reasonable rotation system as may be ordered by the proper state officer.

Prior to receiving a certificate of water right, the permit holder shall submit the results of a pump test meeting the department's standards, to the Water Resources Department. The Director may require water level or pump test results every ten years thereafter.

Failure to comply with any of the provisions of this permit may result in action including, but not limited to, restrictions on the use, civil penalties, or cancellation of the permit.

This permit is for the beneficial use of water without waste. The water user is advised that new regulations may require the use of best practical technologies or conservation practices to achieve this end.

By law, the land use associated with this water use must be in compliance with statewide land-use goals and any local acknowledged land-use plan.

The use of water shall be limited when it interferes with any prior surface or ground water rights.

The Director finds that the proposed use(s) of water described by this permit, as conditioned, will not impair or be detrimental to the public interest.

Actual construction of the well shall begin within one year from permit issuance, and shall be completed on or before October 1, 1998. Complete application of the water to the use shall be made on or before October 1, 1999.

Issued October 31, 1996

Martha O. Pagel, Director
Water Resources Department

STATE OF OREGON

COUNTY OF POLK

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151 W MAIN ST (503)838-0722
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If substantial interference with a senior water right occurs due to withdrawal of water from any well listed on this permit, then use of water from the well(s) shall be discontinued or reduced and/or the schedule of withdrawal shall be regulated until or unless the Department approves or implements an alternative administrative action to mitigate the interference. The Department encourages junior and senior appropriators to jointly develop plans to mitigate interferences.

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The Director finds that the proposed use(s) of water described by this permit, as conditioned, will not impair or be detrimental to the public interest.

Actual construction of the well shall begin within one year from permit issuance, and shall be completed on or before October 1, 1998. Complete application of the water to the use shall be made on or before October 1, 1999.

Issued October 31, 1996

Martha O. Pagel, Director
Water Resources Department