

City of

Echo, Oregon

WATER SYSTEM MASTER PLAN UPDATE

2022



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WATER SYSTEM MASTER PLAN UPDATE

FOR

CITY OF ECHO, OREGON

2022



RENEWS 12-31-23
SIGNED MAY 10, 2022

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Executive Summary

This Executive Summary briefly summarizes the results of the Water System Master Plan (WSMP) Update prepared by Anderson Perry & Associates, Inc. (AP) for the City of Echo. The recommendations outlined hereafter have been developed in cooperation with the Echo City Council and City staff. The focus of this WSMP Update has been on the overall water system, including the water supply, storage, and distribution systems. This WSMP Update includes an analysis of the existing system and its performance, evaluation of system needs, evaluation of improvement alternatives, prioritization of improvements, and development of a financial plan and project Implementation Plan. Included in this Executive Summary is a brief discussion of the existing water system, the water system improvements recommended in this WSMP Update, the current financial status of the Water Department, and a preliminary project schedule and Implementation Plan. For a more detailed discussion of the information presented in this Executive Summary, please refer to the individual chapters of this WSMP Update.

The City of Echo completed a WSMP in 2012. This WSMP Update is intended to be a review of the overall water system and the prior recommended improvements to help ensure cost estimates are up to date and the needed improvements are still valid. The reader of this WSMP Update is encouraged to also review the 2012 WSMP for relevant water system information.

The City of Echo worked closely with AP, City Manager David Slaght, and Public Works Director Justin Northern during completion of this WSMP Update. Work sessions were held to specifically focus on the overall water system and the recommended improvements. The Echo City Council unanimously approved and adopted this WSMP Update at their Council meeting on October 19, 2021.

Present Water Supply and Water Rights

The City of Echo has four groundwater supply wells, specifically Wells No. 2, 3, 4, and 5. Well No. 2 is inactive and unusable. Well No. 3 is not equipped for regular use. Wells No. 4 and 5 are the City's main water supply wells. Each well is described hereafter.

Well No. 2

Well No. 2 was originally constructed in 1947 to a depth of 520 feet and then deepened to 820 feet in 1964. After improvements were made to the City's water system in 1980, Well No. 2 was used as a municipal irrigation well to irrigate the golf course. Plans for converting the well to a municipal well as part of the 1993 water supply improvements project were abandoned when the City decided that rehabilitation of Well No. 2 would cost more and involve more risk than constructing a new well.

Well No. 3

Well No. 3 was originally constructed in 1951 to a depth of 490 feet. During a water emergency in 1991, Well No. 3 was the only operational well supplying water to the system when the water table in Well No. 4 dropped below the pump bowls. Well No. 3 reportedly produced approximately 240 gallons per minute (gpm) at that time. Currently, the Well No. 3 pump is not operational, and

the well is not a viable supply source. The well has a significant hydrogen sulfide taste and odor issue that limits the desirability of its use.

Well No. 4

Well No. 4 is one of two wells that the City currently uses as a municipal water source. This well was originally constructed in 1974 to a depth of 600 feet. Improvements to Well No. 4 in 1993 included deepening the well to 1,045 feet and installing a new pump. According to City records, the well produces approximately 275 gpm in the winter when the well water level rises and then drops to around 175 gpm in the summer when the well water level drops.

Well No. 5

Well No. 5 was constructed in 1993 to a depth of 1,282 feet and currently serves as one of the City's primary municipal water supply sources. Well No. 5 currently produces approximately 790 gpm throughout the year.

A brief summary of the well characteristics is shown below on Table ES-1.

TABLE ES-1
WELL INFORMATION

Well No.	OWRD Well Log No.	Depth (feet)	Static Water Level (feet)	Estimated Capacity (gpm)
2	UMAT 1313	820	315	-
3	UMAT 1315	490	95	-
4	UMAT 5842	1,045	195	175
5	UMAT 5970	1,282	153	790

Note: Static water levels fluctuate annually.
OWRD = Oregon Water Resources Department

Disinfection

The City of Echo utilizes a sodium hypochlorite (liquid) chlorination system at Well No. 4 that doses the Well No. 4 water. Wells No. 4 and 5 are configured to operate in tandem, and the chlorinator at Well No. 4 doses at a sufficient rate for the combined flow from both Wells No. 4 and 5 prior to discharge to the reservoir.

Water Rights

The City of Echo has OWRD permits to appropriate groundwater and to use the water for municipal purposes within specified areas for each of its wells. A summary of the water right information is presented on Table ES-2.

TABLE ES-2
WATER RIGHTS

Water Source	Application Number	Permit Number	Water Right Certificate	Transfer Number	Allowed Flow Volume (cfs/gpm)	Priority Date	Allowed Use
Well No. 2	U-175	U-168	19613	----	1.1/490[1]	1945	Municipal
Well No. 2	G-8865	G-8546	----	----	2.9/1,300	1978	Municipal
Well No. 3	G-21	G-64	34386	----	0.89/400[2]	1953	Municipal
Well No. 4	G-8865	G-8546	----	----	2.0/900	1978	Municipal
Well No. 5	----	----	92295	T 7045 T 7044	1.1/490[1,3] 0.89/400[2,3] Combined = 1.99/890	1945 1953	Municipal

cfs = cubic feet per second

[1]The quantity of water diverted at the new point of appropriation (Well No. 5), together with the quantity diverted at Well No. 2, will not exceed the quantity of water available from the original point of appropriation.

[2]The quantity of water diverted at the new point of appropriation (Well No. 5), together with the quantity diverted at Well No. 3, will not exceed the quantity of water available from the original point of appropriation.

[3]Well No. 2, Well No. 3, and Well No. 5 can continue to be used until the new certificates are issued, provided the amount of water used at any well or combination of the wells does not exceed the amount stipulated in the transfers.

Existing Water Storage

The City of Echo's existing municipal water storage consists of one ground-level steel reservoir constructed in 1980. It has a capacity of 350,000 gallons. The reservoir is located adjacent to Well No. 5, north of Golf Course Road along the east boundary of the golf course. This is a welded steel reservoir with an interior and exterior paint system for corrosion protection. The reservoir is approximately 21 feet tall with a diameter of 56.5 feet. Wells No. 4 and 5 discharge directly into this reservoir.

Existing Distribution System

The City's original water system was installed in 1904 when the City first incorporated. The original water mains were likely wood stave or steel pipe. In 1980, a major system improvements project replaced the aging and deteriorating main lines and services with polyvinyl chloride (PVC), ductile iron, and polyethylene pipe. Also at that time, improvements were made to Well No. 3, a new reservoir was constructed, and a booster pump station together with a pressure reducing station were also installed. The City has used PVC for main line construction in the years since the 1980 improvements. In general, the distribution system is fairly well looped and for the most part has larger diameter water main lines. Some areas have dead-end and/or undersized main lines.

The City of Echo has two pressure zones serving their distribution system, a high-level zone and a low-level zone. System pressure in the low-level zone (the majority of the City of Echo) is controlled by the water level in the existing 350,000-gallon reservoir and typically produces approximately 78 to 80 pounds per square inch (psi) in the downtown area. In the high-level zone, pressure is provided by the existing booster pump system located near the golf course clubhouse approximately midway between the existing reservoir and Well No. 3. The downstream pressure at the booster pump station is set to maintain a constant 65 to 70 psi static pressure. The location where minimum pressures in the high-level

system occur is at homes near the cemetery. At this location the booster pump station provides approximately 55 psi static pressure.

Service Population and Planning Period

The planning period for this WSMP Update is 20 years. The Echo City Council selected a growth rate of 1.0 percent per year to be used for this WSMP Update. This results in an increase from the current year 2022 population of 657 to 802 by the year 2041.

Water Demand

For the City of Echo, the average daily demand (ADD) is calculated by dividing the total annual volume of water produced in million gallons (MG) by the population, divided by 365 days per year. ADDs are calculated for the years 2015 through 2017 and 2020 on Table ES-3 below.

TABLE ES-3
AVERAGE DAILY DEMAND (WELLS NO. 4 AND 5)

Year	Population	Annual Water Production (MG)	Golf Course Production (MG)	Annual Water Production, Less Golf Course Use (MG)	ADD (Not Including Golf Course Use)		
					gpd	gpm	gpcd
2015	705	79.7	29.4	50.3	137,808	95.7	195.5
2016	705	76.9	29.4	47.5	130,137	90.4	184.6
2017	705	76.1	30.7	45.4	124,384	86.4	176.4
2020	632	80.3	32.0	48.3	132,329	91.9	209.4
2021	657	89.1	36.2	52.9	144,932	100.6	220.6

gpd = gallons per day

gpcd = gallons per capita per day

Note: Water use at the golf course for 2015 and 2016 was assumed based on the average of 2017 through 2020 records. Golf course production from 2017 through 2020 varied from 27.7 MG to 32.0 MG. Production data for 2018 and 2019 are not available for Wells No. 4 and 5.

For this WSMP Update, an average daily flow of 200 gpcd was selected for planning purposes to project future demand needs for the City's system. The water system's 200 gpcd average water demand is on the lower end of typical demands in an eastern Oregon city, but removal of the golf course use is the main reason for the lower use total. If the average golf course use of 32 MG per year is included, the gpcd would be in the 348 gpcd range, which lies in the higher range of typical demands when compared to other water systems with water meters in eastern Oregon and Washington, as shown on Table 2-3 in Chapter 2.

Summary of Supply and Storage Requirements

Presented in Chapter 2 is a summary of the design criteria utilized for preparation of this WSMP Update. The required water supply to properly meet current demands should be 360 gpm for the present demands and 440 gpm to meet year 2041 demands. These supply requirements assume the wells operate a maximum of 18 hours per day to meet demands. For this WSMP Update, Well No. 5 operating at 790 gpm has been assumed to be allocated to community use. The Well No. 4 capacity of 175 to 275 gpm is assumed to be allocated to golf course irrigation. In the event that Well No. 5 becomes

inoperable for any period of time, the Well No. 4 capacity would not be enough to meet the required supply flow.

Based on the assumed design criteria, the City's storage needs by the year 2041 will be approximately 690,400 gallons. Currently, the City has a storage capacity of 350,000 gallons, resulting in the need for an additional 340,400 gallons of storage. However, when the golf course irrigation equalization component of 140,000 gallons is added to the additional storage required, the amount of storage required increases to 480,400 gallons. Further discussion of the City's water supply and water storage systems can be found in Chapters 3 and 4 of this WSMP Update, respectively.

Recommended Water System Improvements

The water system improvements discussed in this WSMP Update are briefly summarized hereafter. The proposed project improvements summarized below address the City's needs for improved supply system reliability, additional storage capacity, improved distribution system reliability, increased fire flows and hydrant coverage, and other miscellaneous water system improvements.

Water Supply Improvements

The recommended water supply improvements include securing additional supply from the City of Stanfield's water system and constructing a new well pump station for both Wells No. 4 and 5, including standby power capabilities. Recommended water supply improvements include the following:

1. The City of Echo needs additional water supply to help meet current and future water system demands. While both Wells No. 4 and 5 can meet current demands, both need to operate during higher demand periods, with no reliable backup water source. It is desirable for a municipal water system to have an additional supply source in the event a failure or other issue occurs with a main supply source. The City of Echo is negotiating with the City of Stanfield to secure water from Stanfield's well source located adjacent to the Stanfield reservoir near the Pilot Travel Center. A new booster pump and necessary piping, including a transmission line from the Stanfield well site to the City of Echo's proposed reservoir site north of the City, will be constructed. This new booster pump system and transmission line will provide an additional supply source for the City of Echo and will be used primarily to fill the City's new storage reservoir.

2. The City's main water supply well is Well No. 5, which is located adjacent to the existing 350,000-gallon storage reservoir on the east side of the City, near the golf course. The current building associated with Well No. 5 is in poor condition and needs to be replaced. In addition, installation of standby power capabilities at Well No. 5 would provide the City of Echo with their main, higher capacity supply well during power outage conditions. A new well pump station with a standby generator and a new chlorination system will be constructed for Well No. 5. This pump station will also house a replacement booster pump station to serve the higher elevation areas of Echo on the east side of the City. The booster pump system is described later in this Executive Summary. The new Well No. 5 pump station will also house piping and metering for Well No. 4, also discussed later in this Executive Summary. The new well pump station will serve Wells No. 4 and 5, will contain the new

booster pump system, and will contain standby power capable of running Well No. 5 and the booster pump system.

3. The existing well pump station at Well No. 4 is very inadequate to properly support operation of Well No. 4. Well No. 4 has a dedicated transmission line to the 350,000-gallon reservoir, and the chlorination system at Well No. 5 is used to add chlorine to the Well No. 4 water when it operates. Rather than invest in a new pump station at Well No. 4, the needed piping and flowmetering for Well No. 4 will be added to the Well No. 5 pump station. The existing Well No. 4 pump station will be demolished, and a new weatherproof power supply and wellhead vault will be constructed at Well No. 4. The Well No. 4 improvements will make the Well No. 4 wellhead more secure and safer to operate.

Water Storage Improvements

The recommended water storage improvements include constructing a new 500,000-gallon storage reservoir and transmission line and recoating the existing 350,000-gallon reservoir. Recommended storage improvements include the following:

1. The City of Echo needs additional water storage capacity to help meet current as well as anticipated future water storage needs. Constructing a new water storage reservoir at a different location than the existing reservoir, along with a new transmission line, would provide the City with considerably more storage capacity, and with storage and transmission system redundancy. The City would be able to have a storage reservoir and/or transmission line out of service while still providing full water service to the City. The City plans to construct a new 500,000-gallon storage reservoir north of Echo. The new reservoir will also have a new 12-inch diameter transmission line extending from the reservoir to the City of Echo's existing distribution system.

2. The City of Echo's existing 350,000-gallon steel water storage reservoir is in relatively good condition. The reservoir needs a new coating system to help ensure the reservoir remains in good service condition into the future. The City intends to sandblast and repaint the interior and exterior of the existing reservoir. With a new reservoir constructed and in service, the existing reservoir will be able to be taken out of service for the repainting work to occur.

Water Distribution System Improvements

The recommended distribution system improvements include an upgrade of the City's water meters and installation of an estimated 20 fire hydrants in areas lacking sufficient fire hydrant coverage and in areas where old hydrants need upgraded. In addition, an estimated 35 new 8-inch valves are needed to replace older valves and to provide improved piping isolation capabilities. The existing booster pump system that serves the higher elevation area on the east side of Echo needs to be completely replaced. Recommended distribution system improvements include the following:

1. The City utilizes an existing booster pump system, located in a buried vault, to serve the higher elevation residential area on the east side of the City. The booster pump system has experienced various electrical and controls issues in recent years, and some of the pumps are not in operational condition. The booster pump system needs replaced with an aboveground booster pump station where the pumps, piping, valves, electrical, etc., can be properly housed in a structure to provide for improved operating conditions as well as

significantly improved conditions for maintenance. The City will construct the new booster pump system within the Well No. 5 pump station discussed earlier in this chapter. A new water main line will need to be extended from the booster pump station to the distribution system grid on Golf Course Road.

2. The City's water service meters were installed in 2004. Water meters typically last between 15 and 20 years before requiring replacement, so the existing meters are either at or very close to the end of their service life. The City needs to upgrade their water meters to a new radio read water meter system. The new water meter upgrade will allow the City to read meters from City Hall, saving considerable time each month. The distribution system also needs a few additional fire hydrants to provide improved hydrant coverage and to replace some of the older fire hydrants. The distribution system also needs some existing valves replaced as well as new valves installed to provide improved system isolation during water main line work.

Summary of Estimated Costs for Recommended Improvements

The year 2021 estimated costs for the improvements recommended in this WSMP Update are outlined on Figures 6-1 through 6-6 in Chapter 6. The overall estimated project costs for the water system improvements are summarized on Figure ES-1. The total project costs include construction, administrative, legal, engineering, and contingencies. The year 2021 estimated costs presented in detail on Figure ES-1 are briefly summarized hereafter:

• Stanfield water supply system	$820,000
• Well No. 5/booster pump station	$1,485,000
• Well No. 4 improvements	$170,000
• 500,000-gallon reservoir and transmission line	$2,616,000
• Recoat existing 350,000-gallon reservoir	$390,000
• Meters, hydrants, valves	$680,000
Total Year 2021 Estimated Costs	$6,186,000
Total Year 2023 Estimated Costs	$ 6,820,000

The year 2021 estimated costs were projected to the year 2023 assuming an annual inflation rate of 5 percent to account for regularly increasing project costs. If the City does not complete the proposed improvements by 2023, it is recommended the estimated costs be increased by an annual inflation rate to account for potential increases in project costs to the year that construction occurs.

Current Financial Status

The annual cost of operating and maintaining the Echo water system is summarized on Figure 7-1 in Chapter 7. The costs presented were obtained from the City's financial statements and include all costs for the water system, such as operation, maintenance, and replacement (OM&R), staff payroll, reserve account payments, and debt service. A graphical plot of the City of Echo's water system budget showing total revenue and total expenditures is found on Chart 7-1 in Chapter 7. The addition of new water system components will result in an anticipated increase of operation and maintenance costs to a total

of $165,000 in the budget year 2022-23. This trend in expenditure increase will likely continue and will need to be reflected in future budgeting. It is recommended that the City continue to allocate funds to the Water Reserve Fund to cover future maintenance and replacement costs of equipment and facilities. Pump replacement, water meter repairs, reservoir repairs, etc., are all items that require funds from time to time to maintain a healthy water system.

A major financial commitment will be required on the part of the City to implement part or all the recommended water system improvements outlined in this WSMP Update. An increase in user cost (water rates and/or taxes) would be required to fund part or all of the recommended system improvements. Based on the anticipated future Water Department OM&R cost and debt capacity presented in Chapter 7, the City should anticipate a significant increase in monthly water system costs. The total cost of the recommended improvements likely exceeds the reasonable capacity of the City's Water Department. Water rates would need to be unreasonably high to fund all of the improvements. It will be imperative for the City to find very low interest loans, coupled with grant funds, as well as non-typical outside funding assistance in order to complete all of the recommended improvements.

Local Financing Options

Depending on the ultimate project scope and agency from which the City may obtain loan and/or grant funds, the City may need to develop authorization to incur debt for the needed project improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter. Bonding is not normally required by most state funding programs such as the Safe Drinking Water Revolving Loan Fund; however, bonding is required by Rural Development (RD). There are generally two options the City may use for its bonding authority: general obligation bonds or revenue bonds. General obligation bonds require a vote of the people to give the city the authority to repay the debt service through tax assessments, water rate revenue, or a combination of both. The taxing authority of the city provides the guarantee for the debt. Revenue bonds are financed through revenues of the water system. Authority to issue revenue bonds can come in two forms. One would be through a local bond election similar to that needed to sell a general obligation bond, and the second would be through Council action authorizing the sale of revenue bonds, if the City Charter allows. If citizens do not object to the bonding authority resolution during a 60-day remonstrance period, the city would have authority to sell these revenue bonds.

It should be noted that Oregon law currently requires a 50 percent voter turnout to pass a property tax measure, unless the election is held in November of an even numbered year. November elections in even-numbered years require only a majority of those who voted to pass a property tax measure. Due to current tax measure limitations in the State of Oregon, careful consultation with experienced, licensed bonding attorneys should be made if the City begins the process of obtaining bonding authority for the proposed water system improvements.

Preliminary Project Development Action Items and Implementation Plan

The following project development action items and proposed Implementation Plan will need to be made by the City of Echo to implement the desired water system improvements project. The steps outlined are general in nature and include the major steps that need to be undertaken. It should be noted that the steps outlined hereafter may be different if the City elects to delay the project and pursue improvements in the future.

Project Development Action Items

1. The City will need to adopt this WSMP Update and the recommended improvements.
2. The City will need to update the Comprehensive Plan and other planning documents, as required, to reference the newly adopted WSMP Update.
3. The City will need to contact regional funding representatives to discuss potential funding options for the proposed improvements.
4. The City will need to hold public information meetings to inform its citizens of the need for and scope of the project, to answer questions, and to explain the need for increases in user fees.
5. Working with the best identified funding opportunity and agency, the City will need to develop a funding plan for the desired improvements.
6. The City will need to prepare funding applications for the water system improvements project and submit them to the appropriate funding agencies. The City will need to budget appropriate up-front funds to go through the project development and funding application process.

Implementation Plan

Should the City wish to proceed with the identified water system improvements, the Implementation Plan shown below on Table ES-4 outlines the key steps the City would need to undertake. It is important to note that it may take three to four years from the date the City decides to proceed with an improvements project until the project is completed and serving the community. The following Implementation Plan uses winter 2021-22 as a starting date and assumes a three-year implementation schedule, which is aggressive.

TABLE ES-4
IMPLEMENTATION PLAN

Item		Completion Date
1.	Finalize and adopt this WSMP Update.	Winter 2021-22
2.	Initiate funding discussions with the Infrastructure Finance Authority and RD.	Spring 2022
3.	Submit funding application(s) to agencies.	Summer 2022
4.	Finalize project funding.	Fall and Winter 2022
5.	Design improvements.	Spring to Fall 2023
6.	Advertise, bid, and award improvements.	Winter 2023/24
7.	Construct improvements.	Spring to Late Summer 2024
8.	Close out project.	Fall 2024

The key to implementing the City of Echo's water system improvements is the ability of the City to acquire funding that will allow water rates to remain as low as possible. The City should work closely with its citizens through public meetings to inform them of the system needs and the necessity for increased water user costs. If a project in the range of the estimated year 2023 improvements cost of $6,820,000 is pursued, it appears the City will need to plan on raising average residential water costs to at least $50 per month, depending on potential low interest loan and grant fund availability, to help fund the proposed improvements. It should be noted that these average monthly water

costs include base rates and overage rates. Additional funding assistance will likely be required to fund all of the recommended improvements.

The City of Echo has not completed major water system improvements in approximately 27 years. This has resulted in the City's municipal system having significant improvement needs at this time. Significant infrastructure improvement projects typically occur every 20 to 25 years to address system deterioration, growth, and increased demands. Improvements can be necessary sooner depending on system needs. Completion of the preferred water supply improvements will address the current lack of supply reliability and will allow utilization of the Stanfield water supply source. Overall, the proposed water system improvements will provide a much improved and more reliable water system that should serve the City of Echo for many years.

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
SUMMARY OF ESTIMATED COSTS
WATER SYSTEM IMPROVEMENTS

FIGURE NO.	DESCRIPTION	2021 ESTIMATED CONSTRUCTION COST	2021 CUMULATIVE PROJECT ESTIMATED COST
Supply System Improvements			
6-1	Stanfield Water Supply System	600,000	$ 600,000
6-2	Well No. 5 / Booster Pump Station	1,100,000	1,700,000
6-3	Well No. 4 Improvements	126,000	1,826,000
Storage/Transmission Improvements			
6-4	500,000-gallon Reservoir and Transmission Line	1,938,000	3,764,000
6-5	Recoat Existing 350,000-gallon Reservoir	289,000	4,053,000
Distribution System Improvements			
6-6	Meters, Hydrants, Valves	504,000	4,557,000
Other Items			
	Legal	20,000	
	Water Rights	10,000	
	GIS Services	25,000	
	Permitting	35,000	
	Cultural Resources Evaluation/Monitoring	45,000	
	Operation and Maintenance Manual/ Record Drawings	20,000	
	Design Engineering	440,000	
	Other Engineering	40,000	
	Construction Engineering	510,000	
	Land and Right-of-Way	30,000	
	Construction Contingency	454,000	
	Subtotal Other Items	**$ 1,629,000**	
	Total Estimated Cost (Year 2021)	**$ 6,186,000**	
	Total Estimated Cost (Year 2023)	**$ 6,820,000**	

Note: 2021 costs projected to year 2023 assuming 5 percent annual inflation.

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

SUMMARY OF ESTIMATED COSTS
WATER SYSTEM IMPROVEMENTS

FIGURE
ES-1

Chapter 1 - Introduction

Purpose of Plan

This Water System Master Plan (WSMP) Update provides current information on which future operation and potential improvements to the City of Echo, Oregon's municipal water system can be based. This WSMP Update is also intended to satisfy the criteria of the Oregon Health Authority - Drinking Water Services (DWS) and Oregon Administrative Rules 333-061-0060. The DWS requires communities with more than 300 connections to maintain a current WSMP that evaluates water system needs for at least a 20-year period. The City previously completed a WSMP in 2012; therefore, this WSMP Update will extend the 20-year period for an approved WSMP to the year 2041. Preparation of this WSMP Update was authorized by an agreement between the City and Anderson Perry & Associates, Inc. (AP). The primary purpose for developing this WSMP Update has been to establish water system design criteria for a 20-year planning period; evaluate the adequacy of the existing water supply, storage, and distribution systems; evaluate alternatives for improving the City's water system; and identify a financial plan for implementing the recommended improvements.

Organization of Plan

This WSMP Update is divided into seven main chapters with an Executive Summary. Specifically, the WSMP Update includes the following:

A. The Executive Summary describes water quality and service goals (design criteria), present and future water system deficiencies, recommended improvements for achieving the goals and correcting the deficiencies, and the recommended implementation schedule and financing program for constructing improvements.

B. Chapter 1, "Introduction," discusses the objectives of the WSMP Update, describes the community and environment, and provides a brief history of past development and operation of the City's water system.

C. Chapter 2, "Water System Requirements," develops the data upon which recommended improvements to the water system are based. Data relating to elements such as service area, population, land use, water use, fire flows, state and federal regulations, and the design criteria developed for this WSMP Update are presented. A description of the water quality and level of service goals (design criteria) for the water system considering existing and anticipated future regulatory requirements, non-regulatory water quality needs of water users, flow and pressure requirements, capacity needs related to water use, and fire flow needs is also provided.

D. Chapter 3, "Water Supply," discusses the operation, capacity, and quality of the existing water supply systems with respect to existing and future system demands and regulations. Information concerning water rights and permits for the appropriation of water from the City's sources is presented.

E. Chapter 4, "Water Storage," discusses the existing storage reservoir, presents the four primary components of water storage relative to the City's design criteria, evaluates alternative storage facilities, and provides recommendations for storage improvements.

F. Chapter 5, "Distribution System," evaluates the existing distribution system facilities, water quality test results, and fire protection information. Existing deficiencies and deficiencies likely to develop during the planning period are identified. Based on the identified deficiencies, recommended improvements are presented.

G. Chapter 6, "Recommended Water System Improvements," presents information related to water supply, storage, and distribution system improvements developed through the analysis of the systems. Cost estimates are provided for each of the recommended water system improvements.

H. Chapter 7, "Project Financing and Implementation," provides a description of alternatives to finance water system improvements including local financing such as user rates, taxes, and financing assistance programs. Operation, maintenance, and replacement costs are projected for both the existing system and future system improvements. The number of residential and commercial accounts is provided. Potential water rate needs are developed, and rate implementation procedures are identified. A recommended water system improvement implementation process, including an evaluation of financing alternatives and identification of key implementation steps, is also provided.

I. The Appendices contain key materials referenced in this WSMP Update, which are provided for future reference by City staff. This information includes well log and water rights information, testing results, inspection reports, and other applicable water system information.

Sources of Information

The conclusions and recommendations outlined in this WSMP Update are based on data, information, and records provided by the City. This information includes, but is not limited to, past flow records (supply and usage); financial data (operational cost, revenues, and cost distribution); descriptions of system operation, condition of system components, and identification of problem areas; water quality data; and system layout and sizing. The recommendations and conclusions are, therefore, dependent on the completeness and accuracy of the base information provided.

Review and Updating of Plan

This WSMP Update should be periodically reviewed and updated to stay current with population growth, water system demands, and changing state and federal regulations. It is recommended this WSMP Update be reviewed at five-year intervals and be updated, if required, as growth dictates.

Objectives of Plan

The primary objectives of this WSMP Update are to provide the following information:

1. Establish planning criteria including service area boundaries; population growth projections; past, present, and future water usage patterns; fire flow requirements; federal and state standards; system pressures; and service goals.

2. Analyze the individual components of the existing water supply systems considering capacity, compliance with current water quality standards, water rights, condition of components, operational dependability, and cost of operation. Develop the water supply needs for the planning period and identify cost-effective alternatives for meeting long-term water supply needs including alternatives for correcting existing system deficiencies. Outline general operation and maintenance (O&M) requirements for the water supply systems.

3. Analyze the existing water storage facilities considering capacity, condition of the reservoirs, and distribution system pressures. Assess the City's storage capacity considering emergency storage, operating storage, equalization storage, and fire flow storage. Identify the storage requirements of the water system for the planning period.

4. Utilize existing distribution system maps and City records to review the condition and adequacy of the distribution system piping. Identify system deficiencies and alternatives for meeting current and future system needs. Outline general O&M requirements of the distribution system as well.

5. Identify distribution system deficiencies such as low system pressures, low fire flow capacities, dead-end or undersized lines, etc. Identify opportunities for distribution system improvements to address any noted deficiencies. Provide estimated costs for implementation of recommended improvements.

6. Review the existing Water Department financial condition considering historical water system revenues, O&M costs, and debt service including the adequacy of existing water user fees. Project the future cost of O&M, capital improvement investments, and debt service for the water system. Develop a financing plan for meeting the long-term system needs including general user rate charges and outside financial assistance.

7. Provide information on potential state and federal grant and loan programs that may be available to assist the City in implementing any needed system improvements.

8. Prepare a summary identifying current and future water system needs with their associated estimated costs. Provide recommendations for meeting the water system's needs for the planning period.

9. Provide an implementation schedule for recommended water system improvements, outlining the key steps the City would need to take to implement the improvements.

Regional Setting

The City of Echo is located in the northwest corner of Umatilla County. Umatilla County is bordered by Washington State and the Columbia River to the north, Wallowa and Union Counties to the east, Grant County to the south, and Morrow County to the west. The principal topographic features of Umatilla County are the Umatilla Plain and the Blue Mountains. The Umatilla Plain terrain is level to undulating or gently rolling, and it is bounded by the Blue Mountains to the south and east and the Columbia River to the northwest. The City is shown relative to surrounding physical features on Figure 1-1, Location and Vicinity Maps.

The elevation of Umatilla County varies from 250 feet above mean sea level (AMSL) near Umatilla, Oregon, to more than 5,000 feet AMSL at Huckleberry Mountain on the eastern extents of the County. Annual precipitation varies from 55 inches per year in the Blue Mountains to less than 10 inches per year near the Columbia River north of Echo.

Umatilla County is served by two major drainage basins. The major portion of the County lies in the Umatilla Drainage while the southern tip lies in the John Day Drainage Basin (Umatilla County Comprehensive Plan).

The County's primary economic activities are agriculture, manufacturing, forest industries, construction, retail trade, and transportation. Opportunities for economic growth and diversification are enhanced by quantities of reasonably priced land, high quality airshed characteristics, major energy transmission facilities, and good national/international transportation linkages (Umatilla County Comprehensive Plan).

A destination resort (Wildhorse Resort & Casino) is located near Mission on the Umatilla Indian Reservation, approximately 25 miles east of the City of Echo. Wildhorse Resort & Casino includes a hotel, cultural center, golf course, cineplex, and other amenities.

Water System History

General

The majority of the historical information for the water system was obtained from an engineering study of the water supply completed in 1992 by AP from City water maps, construction drawings, a review of well log and well use summaries on the Oregon Water Resources Department (OWRD) website, conversations with Diane Berry, former city administrator, Darin Tuil, former public works director, David Slaght, city administrator, and Justin Northern, former public works director.

Original System

The City's original water system installation began in 1904 when the City first incorporated, and the distribution system expanded as the City grew. Water mains were initially either wooden stave or steel. The water supply for the City was Well No. 1, a hand-dug well approximately 20 feet deep adjacent to the Umatilla River. This supply served the City until 1945 when Well No. 2 was constructed. The construction of Well No. 3 followed in 1951, Well No. 4 in 1974, and Well No. 5 in 1993.

The soils in and around the City are corrosive and eventually took a toll on the steel water main lines. Water line corrosion, together with numerous bacteriological violations reported in the 1970s with regard to Well No. 3's water supply, raised awareness of the need to review the City's water supply and distribution system. Wallulis & Associates, Inc., prepared an engineering report in 1978 that presented proposed water system improvements for the distribution system, as well as rehabilitation measures to bring Well No. 3 into compliance with DWS standards.

1980 System Improvements

The 1980 system improvements included rehabilitation of Well No. 3, construction of a new well house at Well No. 3, a new 350,000-gallon steel reservoir, a transmission line to the reservoir and

supply line from the reservoir, a belowground package booster pump station, a pressure reducing station, and complete replacement of the aging water distribution system throughout the City with polyvinyl chloride (PVC) and ductile iron (DI) pipe.

Well No. 4 Declining Water Levels

By October 1985, declining groundwater levels had placed the City's water supply in jeopardy and forced the City to invoke emergency watering restrictions while a solution was developed. To correct the problem, the pump was lowered in Well No. 4 as far as was possible above a physical obstruction in the well. Lowering the pump corrected the situation, and Well No. 4 was put back in service.

Lowering the pump in Well No. 4 improved the supply quantity available from the well and was successful until September 1991, when declining groundwater levels caused a repeat of the 1985 emergency supply situation. This time the pump bowls in Well No. 4 could not be lowered any farther. The City investigated funding sources to aid in the correction of the situation, but none were identified at that time.

1992 Water Supply Study

In 1992, the City retained AP to prepare a *Municipal Water Supply Study* that reviewed declining water levels around the City's supply wells, forecasted future groundwater level declines, and correlated to future water supply needs. The study also addressed future water supply and storage needs, evaluated the financial status of the Water Department, developed improvement alternatives, and recommended a cost-effective alternative along with an implementation schedule and proposed financial plan.

1993 System Improvements

Water supply improvements were constructed in 1993 as a result of the 1992 *Municipal Water Supply Study*. Those improvements included deepening Well No. 4, construction of Well No. 5, improvements to the golf course irrigation system, and installation of various water mains.

Reservoir Recoating

By 1992, the City had also discovered that the interior of the existing reservoir was badly corroded. The interior vinyl coating system was blistering and failing. The roof rafters and the portion of the reservoir above the water level in the tank were severely corroded from the presence of sulfur in the water, which reacted with the water to form sulfuric acid. The City commissioned a report from Industrial Coating Inspection Services in Dayton, Washington, to inspect the tank's interior, prepare a report discussing the causes, and outline remedial repairs to the tank's interior. Based on that report, the City replaced damaged roof rafters and recoated the interior of the tank in 1996. Since recoating the tank, the City schedules underwater tank inspections and tank cleaning every five years. With the exception of some minor coating touch up on the roof area, the coating system is performing well. Iron and manganese build up is also removed from the tank during each inspection.

Well No. 5 Declining Groundwater Levels

In 1999, declining groundwater levels jeopardized the City's water supply again. This time the groundwater level in Well No. 5 had declined to the point that an additional column and a larger pump needed to be installed in the well. This seemed to solve the problem until 2006, when the supply of water from Well No. 5 stopped.

Initially the City believed the well had gone "dry." However, when the pump column and pump were pulled, the City discovered the used column pipe installed in 1994 had corroded to the point that holes developed in a substantial portion of the pipe. The water pumped up the column pipe exited through the holes and cascaded back down the well. The City replaced 273 feet of column pipe, installed a new pump, and lowered the pump to 800 feet below ground surface. Since then, there have been no further problems with the operation of Well No. 5.

2005 Positive Coliform Samples and Chlorination

Beginning in 2005, positive coliform samples appeared in the City's routine bacteriological tests. There were positive samples in 2007 and then again in 2008. Although not required by DWS, the City installed a sodium hypochlorite chlorination system at Well No. 4 as a result of the positive samples. Wells No. 4 and 5 were then configured to operate in tandem, and the chlorinator doses both of these wells. These wells discharge directly to the reservoir.

The City continued to operate the chlorinator intermittently and checked for bacteria between uses. Each time chlorinator use was discontinued, the distribution system sampling would yield positive coliform results. Subsequently, the City operated the chlorinator full time and, at the suggestion of DWS, has operated the chlorinator full time since. While the chlorinator has been used full time, there have been no positive bacteriological tests. The source of the coliform was never identified, although there is strong suspicion that a failure of the golf course irrigation backflow device in 2005 allowed a slug of untreated water to enter the distribution system.

2012 Water System Master Plan

The City of Echo prepared a WSMP in 2012. The 2012 WSMP contained recommendations for the City's water system to address system deficiencies as well as water system improvements needed for growth, system reliability, and redundancy. The City was unable to pursue the recommended improvements.

Distribution System

Since the aging water distribution system was replaced with PVC and DI pipe in 1980, subsequent water main extensions have been made utilizing PVC pipe. The condition of the existing piping is reported to be good.

In general, the distribution system is fairly well looped and for the most part has larger diameter water main lines. Some sections have dead-end and/or undersized main lines. These areas are discussed in detail in Chapter 5.

A layout of the distribution system is shown on the Existing Water System Map at the end of this WSMP Update. The locations of fire hydrants and main line valves are also shown for reference.

Water Supply Sources

The City has two water supply wells that can be used for supplying the City's water system: Wells No. 4 and 5. Well No. 4 was initially drilled in 1974 to a depth of 600 feet and was deepened in 1993 to a depth of 1,045 feet. Well No. 5 was constructed in 1993 to a depth of 1,282 feet. Well No. 4 reportedly has a summertime capacity of 175 gallons per minute (gpm) and a wintertime capacity of 275 gpm. Variation in capacity can likely be explained by the seasonally declining water levels in the well with surrounding summertime irrigation use of the aquifer. Well No. 5 has a sustained capacity of approximately 790 gpm in both the summer and winter.

A more detailed discussion of water supply sources is presented in Chapter 3. The locations of the City's wells are shown on Figure 1-2.

Water Storage Reservoirs

The City's storage consists of one ground-level steel reservoir. The reservoir, located adjacent to Well No. 5, was constructed in 1980 and has a capacity of 350,000 gallons.

A more detailed discussion of the City's reservoir is presented in Chapter 4. The location of the City's reservoir is shown on Figure 1-2.

Booster Pump System

Currently, the City has one booster pump station located approximately midway between the reservoir and Well No. 3. The belowground package booster pump station originally operated with four pumps: one 3 horsepower (Hp) jockey pump, one 5 Hp pump, one 10 Hp pump, and one 30 Hp pump for fire flows. Presently, the 3, 5, and 10 Hp pumps are inoperative. The 30 Hp pump is controlled by a variable frequency drive (VFD). The VFD is regulated by downstream pressure and operates continuously. The 10 Hp pump can be manually set to run if the 30 Hp pump is not operational. The 10 Hp pump does not have a VFD. The booster pump station has run in this configuration for at least five years. The booster pump station serves the higher elevation areas on the east side of the City near the golf course and Smith Drive, the cemetery, and homes near the cemetery, and can be used to augment fire flows in the lower elevation areas of the City.

A more detailed discussion of the City's booster pump system is presented in Chapter 5.

To Boardman

To Stanfield

To Pendleton

To Rieth

To Lexington

T. 3 N., R. 29 E., W.M.

2,000 0 2,000

SCALE IN FEET

URBAN GROWTH BOUNDARY

CITY LIMITS

Echo

Echo Meadows

Stanfield Junction

Foster Cem

Siphon

Mile 26

Gaging Station

Golf Course

Well

Res

Dam

Siphon Cem

Rest Area

Echo (BM 638)

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CITY OF ECHO

VICINITY MAP

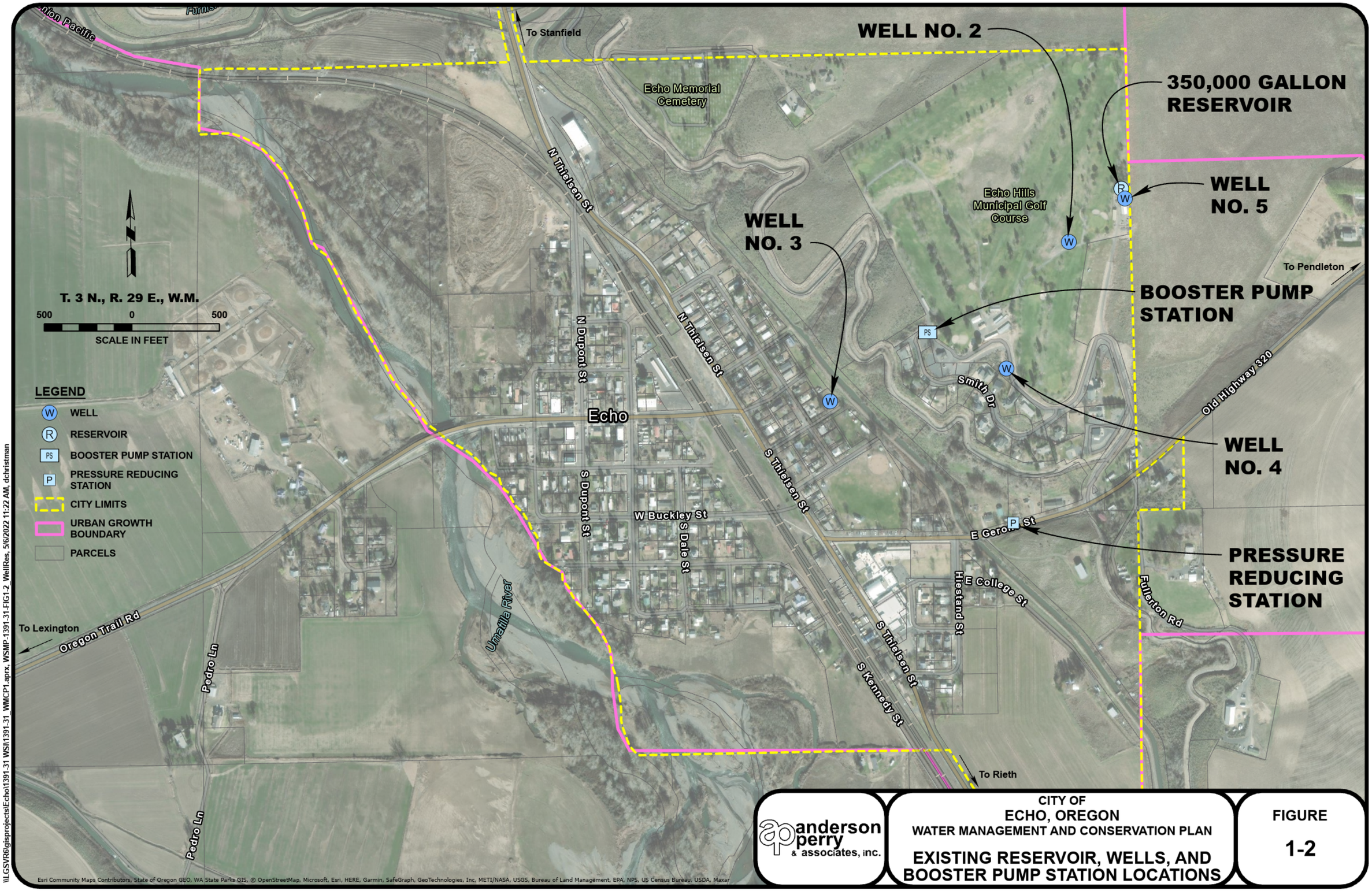
anderson perry & associates, inc.

CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

LOCATION AND VICINITY MAPS

FIGURE
1-1

\\LGSVR6\gisprojects\Echo\1391-31 WSI\1391-31_WMCP1.aprx, WSMP-1391-31-FIG1-1_LocVic, 5/6/2022 11:18 AM, dchristman



\\LGSVR6\gisprojects\Echo\1391-31 WSM\1391-31_WMCP1.aprx, WSMP-1391-31-FIG1-2_WellRes, 5/6/2022 11:22 AM, dchristman

anderson perry & associates, inc.

CITY OF
ECHO, OREGON
WATER MANAGEMENT AND CONSERVATION PLAN

EXISTING RESERVOIR, WELLS, AND BOOSTER PUMP STATION LOCATIONS

FIGURE
1-2

Chapter 2 - Water System Requirements

Introduction

This chapter presents basic information from which criteria have been developed for evaluating the City of Echo's existing water system and for defining and sizing the required components of the system for the 20-year planning period. Information concerning the service areas, population projections, water use, and state and federal requirements is presented.

Service Area

The term "service area" refers to the area being served with water from the City's water system. Both the present and future service areas are considered in this Water System Master Plan (WSMP) Update. The present service area for the City primarily consists of developed lands within the boundaries of the city limits. The existing service area is shown on Figure 1-1 in Chapter 1. For the purposes of this WSMP Update, it has been assumed that the future service area of the water system will mostly include the area within the current urban growth boundary (UGB), but outside the "permanent open space" zoning designation as shown on Figure 2-1, Zoning Map.

Many areas of undeveloped residential and industrial land currently exist within the UGB. With a significant area of open and undeveloped land available, the City has the potential for residential, commercial, and industrial growth. The UGB area is situated east, north, and northwest of the present community. The UGB extends north to Interstate 84 (I-84). The elevation of lands within most of the UGB is generally higher than the present service area and will likely require a reservoir located at a higher elevation than the existing reservoir and/or booster pump system to serve the higher elevation areas. Nearly all of this land can be serviced by the existing water system with appropriate piping extensions provided that higher elevation reservoirs or booster pump stations are used to appropriately increase available system pressures. This also assumes adequate water supply and storage provisions are made to accommodate additional users. Issues related to the service area and service limits of the existing water system are discussed in subsequent chapters. The undeveloped areas within the city limits can be seen on the aerial photograph shown on Figure 1-2 in Chapter 1.

Service Population and Planning Period

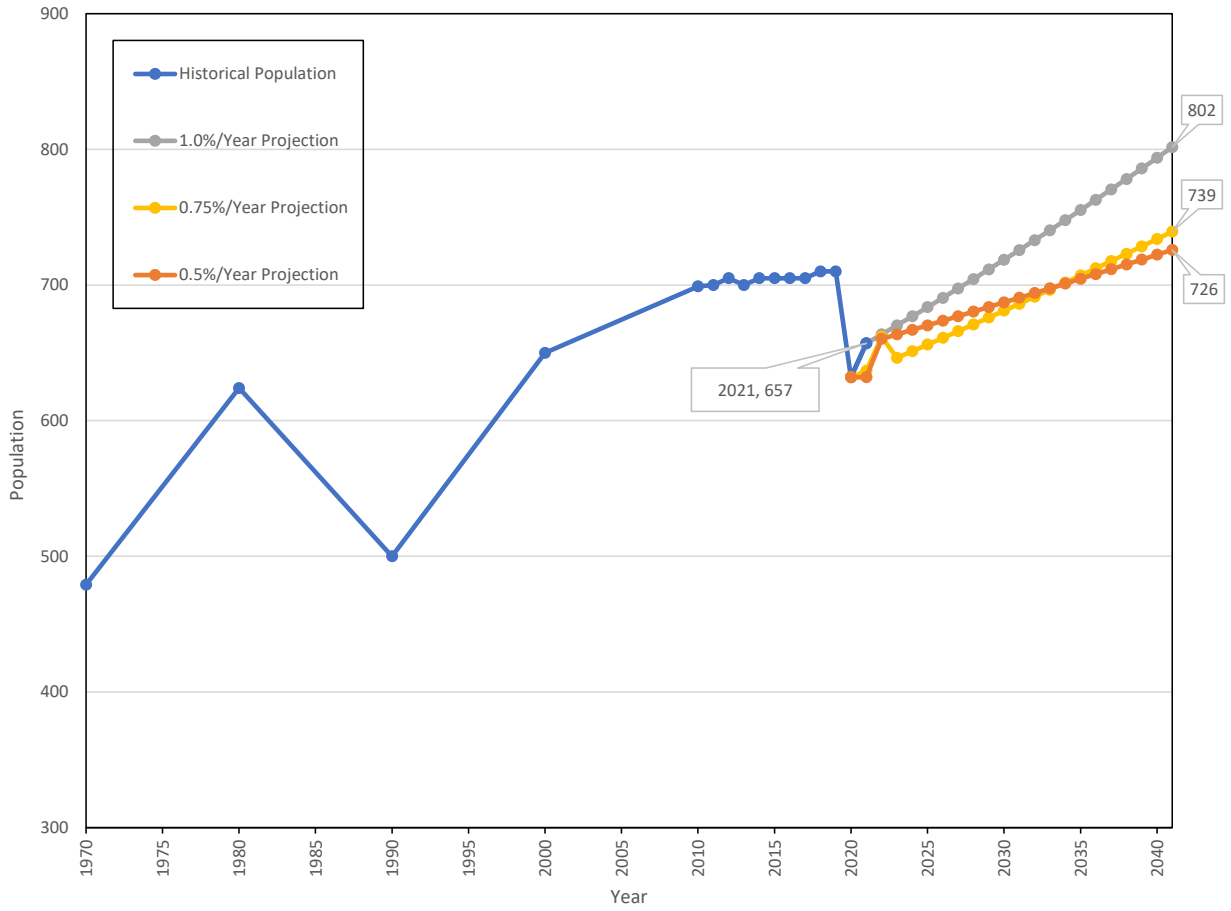
To estimate the demands that may be placed on a municipal water system, a determination of the population to be served must be made. Population estimates must be made with reference to time. Projections are usually made on the basis of an annual percentage increase estimated from past growth rates, tempered by future expectations. It is difficult to accurately predict the population of a small community over an extended period of time. Significant population fluctuations are typical in small communities. The addition or deletion of a major business, industry, or recreation use in the area could significantly affect the population and the overall water system needs.

The period of time over which the population is to be projected usually depends on the type of improvements to be considered. Improvements that will require long-term financing should be designed for no less than the term of the financing. Facilities that are not easily modified or expanded, such as buried pipelines and storage reservoirs, may be designed for their expected life, which is approximately 40 to 50 years.

The City's 2021 population was 657 according to the Portland State University's Population Research Center (PRC) certified population estimates. PRC is the official source of population data available in Oregon between the official Census data generated at the beginning of each decade. For the purpose of this WSMP Update, the current population will be estimated as 657.

The City has experienced periods of population fluctuations, both negative and positive depending on regional conditions. The population peaked in 1980 before seeing a decline until 1990 when the population began rising again. Since 2000 the City has experienced a gradual and steady increase in population. Historical population data are plotted on Chart 2-1. The period from 2000 to 2021 showed a population increase from 650 to 657, a change of only seven people over the 21-year period.

CHART 2-1
HISTORICAL AND PROJECTED POPULATION



In accordance with Oregon Revised Statutes, the PRC is responsible for establishing and maintaining population forecasts for cities in Oregon. The City experienced an average annual growth rate of approximately 0.62 percent from 1970 through 2021. Currently, subdivisions are in the process of being created within the city limits, and housing demands are very high in the Umatilla County area due to the economic growth currently occurring, especially in the west Umatilla County area. Based on this historical trend, as well as the recent housing demand, the City has selected a 1.0 percent annual growth rate for the purpose of this WSMP Update. A projected population growth with an assumed 1.0 percent

annual growth rate will require an addition of 145 people over a 20-year period, which is approximately seven people per year or approximately two families per year, resulting in a 2041 population of 802.

Land Use

The current zoning in the City is shown on Figure 2-1, Zoning Map. The zoning classifications and their primary areas within the City are summarized on Table 2-1.

TABLE 2-1
CITY OF ECHO ZONING CLASSIFICATIONS

Zoning Description	General Description of Location of Zoning
R-1 - General Residential	This is the most common residential zone and includes most of the residential areas in the lower elevation areas of Echo on each side of the Union Pacific Railroad main line.
R-2 - Limited Residential	This zone is present above the irrigation canal on the east side of the City, which includes the higher elevation residential areas.
R-3 - High Density Residential	This zone is present on each side and adjacent to Thielsen Street extending north toward Stanfield.
R-4 - Farm Residential	This zone is present west of Thielsen Street for the existing higher elevation residential development in that area. Two smaller R-4 areas are also present just south of Old Highway 30 in the east portion of Echo.
RC - Residential Commercial	This zone is present both north and south of Main Street along each side street from Main Street, specifically Sprague and Bridge Streets.
C-1 - Central Commercial	This zone is located in the core downtown business area of the City generally between Sprague and Bridge Streets and west of Thielsen Street.
C-2 - Tourist Commercial	This zone is present on each side of Thielsen Street near I-84.
POS - Permanent Open Space	This zone is present just below the upper irrigation canal on the east side of the City and also includes the golf course and low elevation floodplain areas just east of the Umatilla River.
M-1 - Light Industrial	This zone is located on each side of Thielsen Street on the north side of the city limits.
F1 - Exclusive Farm Use	This zone includes mostly farm use areas outside city limits but within the UGB and is primarily located in existing farmed areas south, east, and north/northwest of the developed areas in the City.
EFU - Exclusive Farm Use (County)	This zone includes all farm use areas outside the UGB and is present surrounding the City.

Considerable acreage of vacant land zoned residential is available within the city limits based on a review of Figure 2-1. The larger areas are located around the southwest and northwest sides of the golf course just south of the school. The vacant land around the golf course is relatively steep, inaccessible due to the irrigation ditch, and will be difficult to develop, requiring larger lots. The vacant land at the south end of the City is approximately the same elevation as that portion of the community in the developed portions west of the Feed Canal. This area is not located in a floodplain and is relatively flat. The remaining developed portion of the City has very few vacant or dividable lots available.

In general, the City of Echo has significant area available for residential expansion, both inside the city limits and the UGB. Areas are also available for commercial and light industrial expansion. Land use areas, potential demands on a water system, and areas where growth is anticipated to occur are important factors to consider when analyzing the City's water system capability to meet current and

future needs. Any future distribution system improvements should also consider these potential areas of expansion when considering pipe size and location.

Regulatory Requirements

The City's water system comes under the jurisdiction of the Oregon Health Authority - Drinking Water Services (DWS). The DWS assumed primacy (responsibility) from the U.S. Environmental Protection Agency (EPA) in February 1986 for enforcement of the federal Safe Drinking Water Act (SDWA). In Umatilla County, the DWS is responsible for administering and enforcing both the federal and state rules for public drinking water systems. Therefore, the City is currently, and will principally be, working with the DWS as the regulating agency in regard to their water system. The City is required to publish annual Consumer Confidence Reports (CCRs); and a copy of the 2020 CCR is located in Appendix A.

Regulatory Background

The SDWA was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources, including rivers, lakes, reservoirs, springs, and groundwater wells. The primary regulations associated with the SDWA address requirements concerning trace minerals, compounds, and microorganisms that may affect the health of water consumers. The SDWA provides monitoring, testing requirements, reporting, recordkeeping, and public notification procedures in the event of noncompliance.

The 1986 amendments to the SDWA included provisions for wellhead protection, new monitoring for certain substances, filtration for certain surface water systems, disinfection for certain groundwater systems, and restrictions on lead content in pipe solder and plumbing.

The 1996 amendments to the SDWA also included provisions for consumer confidence reporting, stronger protection for microbial contaminants and disinfection byproducts, operator certification, lowering maximum contaminant levels (MCLs), and source water assessments.

Enacted in 1981, the Oregon Drinking Water Quality Act established periodically amended statutes and subsequent administrative rules to enforce, at a minimum, the federal SDWA requirements. The DWS administers and enforces drinking water quality standards for public water systems in Oregon. The agency focuses resources in the areas of highest public health benefit and promotes voluntary compliance with state and federal drinking water standards. The DWS also emphasizes prevention of contamination through source water protection, provides technical assistance to water system owners, and provides water system operator training. The DWS works closely with public water systems to ensure public notification is made in accordance with regulatory guidelines when required. If the City is unaware of their compliance status or is in need of regulatory guidance, it is recommended that the regional DWS office be contacted.

Recent Regulatory History (Last Five Years)

Following is a list of regulations that have been enacted in the last five to ten years:

1. **Reduction of Lead in Drinking Water Act.** This act requires any new installation or purchase of materials used in potable locations to be "lead-free." Lead-free has been redefined as

"(A) not containing more than 0.2 percent lead when used with respect to solder and flux; and (B) not more than a weighted average of 0.25 percent lead when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures." This law was enacted on January 4, 2014. Oregon requires drinking water components to be National Sanitation Foundation/American National Standards Institute Standard 61-compliant to meet the intent of this law.

2. **Stage 2 Disinfectants and Disinfection Byproduct Rule (D/DBPR).** This rule focuses on public health protection by limiting exposure to disinfection byproducts. The D/DBPR specifically targets total trihalomethanes and five haloacetic acids that can form in water through disinfectants used to control microbial pathogens. This rule applies to all community water systems (CWS) and non-transient, non-community (NTNC) water systems that add a primary or residual disinfectant other than ultraviolet light. Stage 2 of the D/DBPR was enacted in 2012 for large CWS and NTNC and in October 2013 for all CWS and NTNC water systems.

3. **Unregulated Contaminant Monitoring Rule (UCMR) 3.** The EPA uses the UCMR program to collect data for contaminants suspected to be present in drinking water that do not have health-based standards set under the SDWA. Every five years, the EPA develops a new list of UCMR contaminants that is largely based on the Contaminant Candidate List. Oregon Administrative Rule 333-061-0043 requires CWSs to report detection of unregulated contaminants in their annual CCR.

4. **Revised Total Coliform Rule.** This rule requires that total coliform samples be collected by public water systems at sites representative of water quality throughout the distribution system according to a written sample site identification plan.

Potential Regulatory Changes

Following is a list of regulations that may be enacted in the future:

1. **Radon in Drinking Water Rule.** This rule would attempt to reduce airborne and waterborne radon concentrations to limit exposure levels. This rule would apply to CWSs that use groundwater or mixed groundwater and surface water. The proposal is currently on hold, and the EPA has no timeline for publishing this rule.

2. **Fourth Contaminant Candidate List (CCL4) Regulatory Determinations.** The CCL4 is currently in draft form. The EPA has made a preliminary determination to regulate strontium, which is currently still pending. Two new nominated contaminates, manganese and nonylphenol, have been added for the final publication.

3. **Carcinogenic Volatile Organic Chemicals (cVOC) Rule.** The EPA is developing a proposed national primary drinking water regulation for a group of 16 known cancer-causing compounds, including eight currently regulated cVOCs and up to eight from the CCL3.

4. **Perchlorate Rule.** The EPA is developing a proposed national primary drinking water regulation for perchlorate. Perchlorate may cause adverse health effects. Scientific research

indicates that this contaminant can disrupt the thyroid's ability to produce hormones needed for normal growth and development.

5. **Hexavalent Chromium.** The EPA currently regulates hexavalent chromium as part of the total chromium drinking water standard. New information on health effects has become available since the original standard was set, and the EPA is reviewing this information to determine whether new health risks need to be addressed. The State of California has already implemented a hexavalent chromium-specific MCL.

6. **Fluoridation.** Fluoride MCLs may be lowered in the future as the health impacts of fluoride are fully realized. The current MCL of 4 parts per million could be reduced to 1 or less. This lower MCL could require systems with naturally occurring fluoride above the MCL to treat to reduce levels.

7. **Cybersecurity.** Executive Order 13636: Improving Critical Infrastructure Cybersecurity was established in February 2013. The order calls for the development of a voluntary, risk-based cybersecurity framework. The EPA will make an evaluation as to whether any additional authority and/or regulations to address cybersecurity in the water sector are needed.

8. **Lead and Copper Rule (LCR) Long-Term Revisions.** The LCR is a treatment technique rule. The rule requires public water systems to take certain actions to minimize lead and copper in drinking water in lieu of setting an MCL. The goals for the revisions are to improve the effectiveness of the corrosion control treatment and prompt additional actions that may help reduce public exposure to lead and copper.

Regulatory Violations

According to the DWS, the City has only received violations relating to reports that were received late in the last five years.

Regulatory Requirements Summary

The information presented herein is intended to provide the City with a brief summary of the regulations and possible future regulations that may affect operation of the City's water system. These regulations continue to expand and will require careful attention to maintain compliance. It is recommended the City periodically consult with the DWS to ensure compliance with current regulatory requirements and to address any regulatory questions or issues.

Water System Sanitary Survey

The DWS conducts sanitary surveys of water systems for communities in Umatilla County to assist in identifying potential contamination sources that may impact water quality. These surveys are generally scheduled to occur every five years.

The latest water system sanitary survey for the City was conducted on October 30, 2018. A copy of the survey is included in Appendix B. The DWS found one significant deficiency related to the 100-foot setback for the sanitary hazard requirement around Well No. 5. This deficiency was related to the application of chemical pesticide containing 2,4-D being located within 25 feet of Well No. 5. The City

corrected this deficiency by eliminating application of the pesticide within 100 feet of Well No. 5. Other recommendations were made within the sanitary survey included in Appendix B.

Water Demand

Future water demands, for the purpose of identifying needed future water system improvements, can be estimated from past water use data and population projections. Water use data are usually expressed in terms of various rates of water used for various periods of time. This allows components of the water system to be sized for the maximum demands that will be placed on them. The rates of water use that are important in evaluating a water system are the average daily demand (ADD), which is the total amount of water used during a one-year period divided by 365 days; the peak daily demand (PDD), which is the maximum total amount of water used during any 24-hour period; and the peak hourly or peak instantaneous demand, which is a measure of the maximum flow of water at any given time.

Water supply facilities are normally designed to accommodate PDDs. As a rule, a well should be sized for supplying the needed water during the PDD without continuous 24-hour operation. For example, if the water usage during high demand summer months required a well pump to operate 18 hours or more per day to keep up with the PDD, the situation may warrant the addition of another well or other water supply source to provide some backup capability and to not over-stress the well pumping equipment. Booster pumps and distribution pipelines are generally sized to deliver peak instantaneous demands because they must be capable of meeting the highest demand. Storage reservoirs are sized to make up the difference between water supply capacity and peak water use rates, at a minimum. Additional capacity (reserve) is usually provided in water storage reservoirs for both emergencies and fire suppression.

Per Capita Water Use

To be utilized for projecting future water demands, past water use data must be converted to a per capita (per person) rate of use. This is done by dividing the average daily, peak daily, and peak instantaneous water use rates by the number of people being served by the water system. These water demand rates are then expressed as gallons per capita per day (gpcd). These values, multiplied by a population projected for some future year, then give estimated total demand rates for that year.

Historical Average Water Use

To determine current water demands, production records from 2012 through 2020 for the City's water system was reviewed. Population data for the same time frame were also utilized.

Monthly well production for the City's well sources for 2012 through 2020 is shown on Charts 2-2 through 2-3. Note that the scale related to the volume of water pumped varies between charts.

CHART 2-2
CITY WELL NO. 4 WATER PRODUCTION, 2012 THROUGH 2020

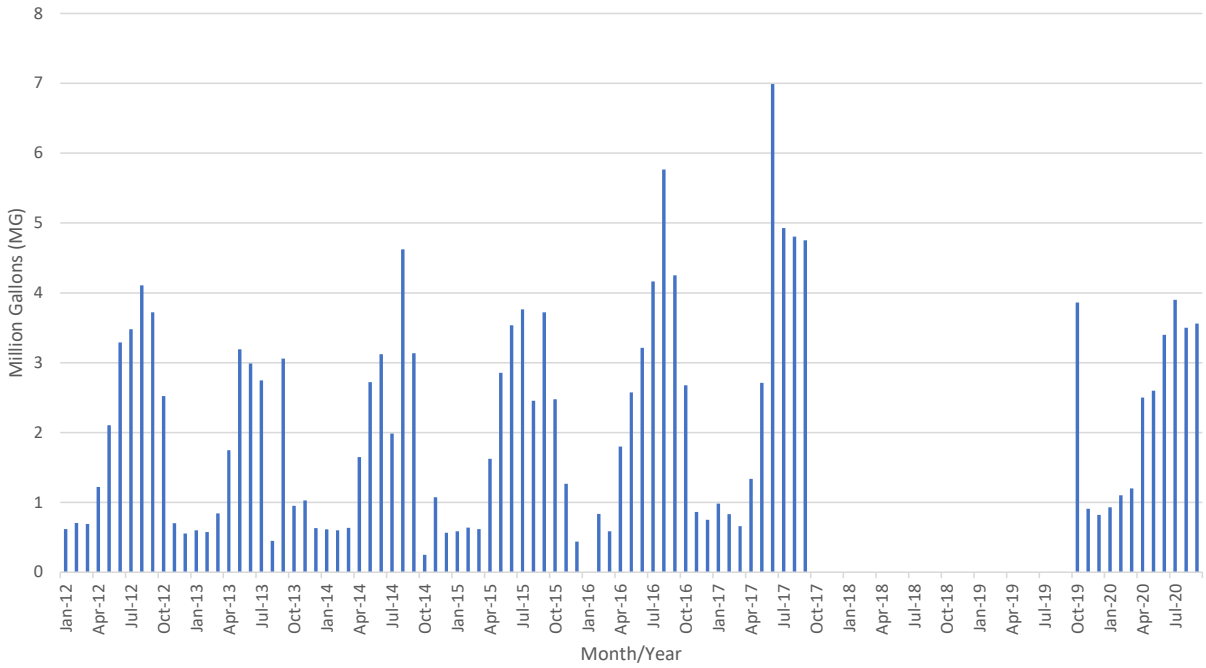
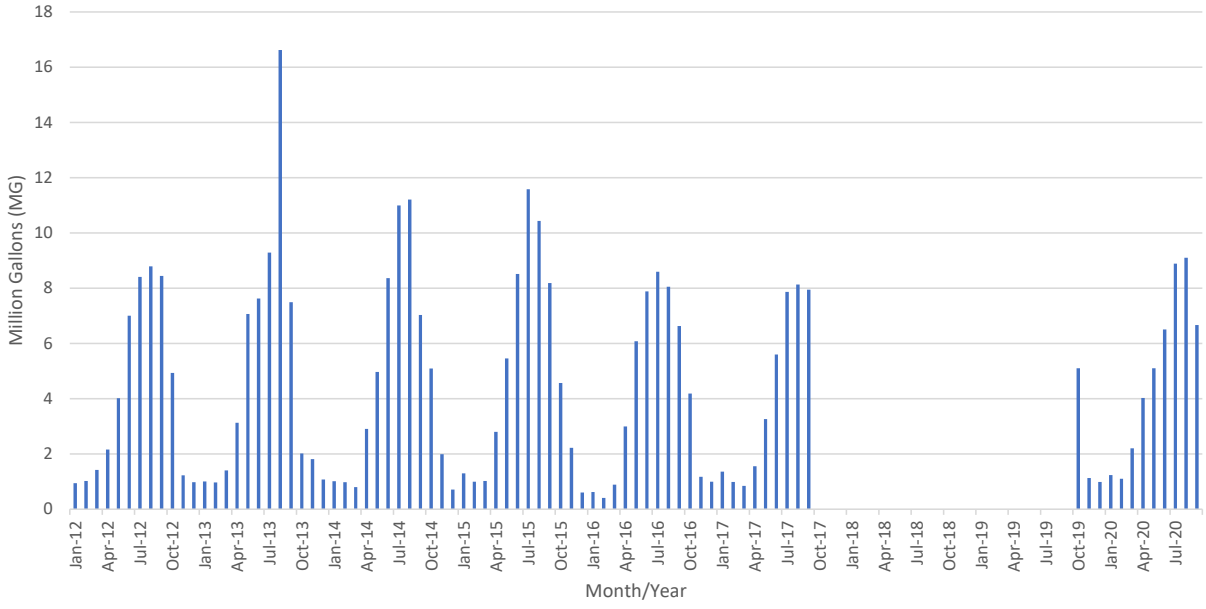


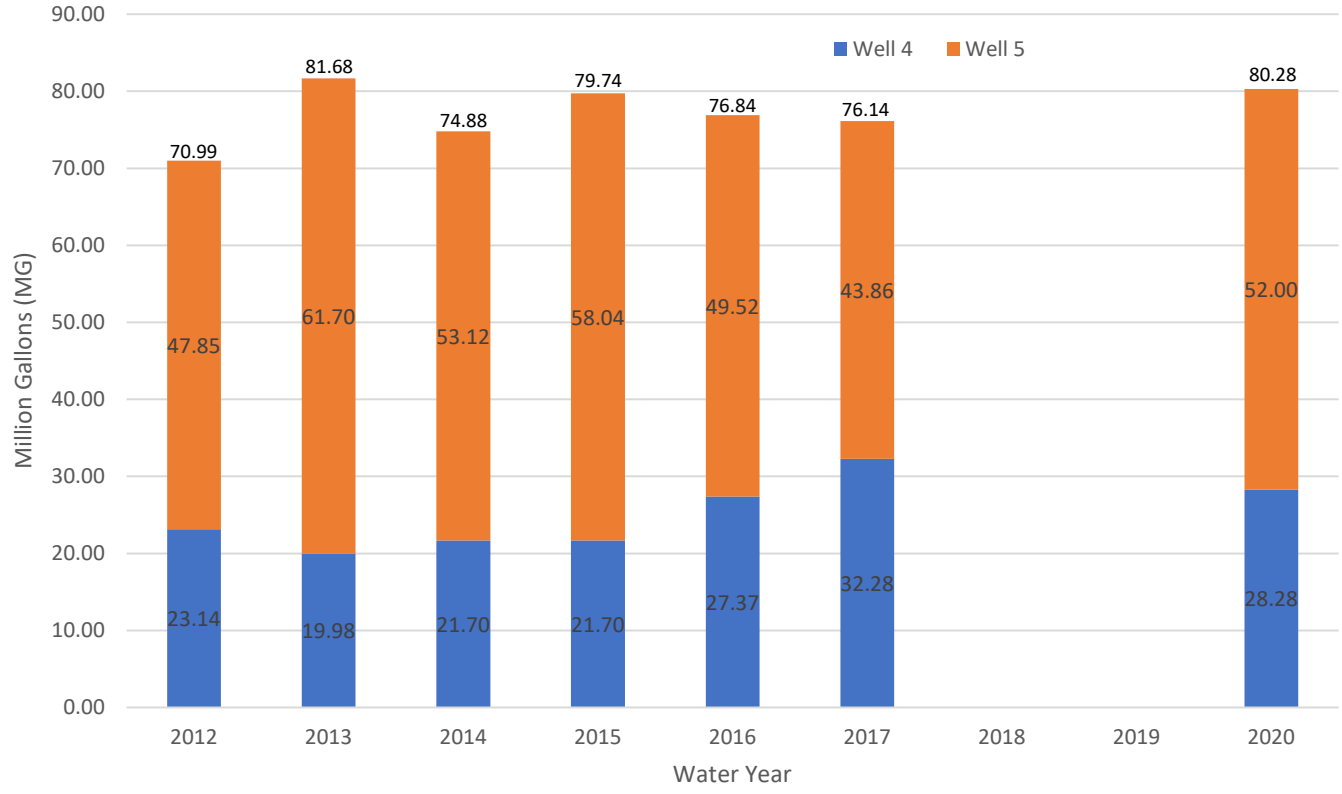
CHART 2-3
CITY WELL NO. 5 WATER PRODUCTION, 2012 THROUGH 2020



The total annual water produced from Wells No. 4 and 5 is shown on Chart 2-4. The data show that Well No. 5 is more heavily used as the primary supply well but both wells are used throughout the year to provide water to the system. The annual water supplied to the municipal water system has varied over the period from 2012 through 2020 from a low of 71 million gallons (MG) in 2012 to a high of 81.7 MG in 2013 and 80.3 MG in 2020. The data on Chart 2-4 show a generally steady quantity of water supplied to

the municipal water system. Chart 2-4 does not show water use data for 2018 and 2019, which cannot be located by the City.

CHART 2-4
ANNUAL WATER USE, CITY WELLS NO. 4 AND 5, 2012 THROUGH 2020



Average Daily Demands

For planning purposes, ADD are developed as an average per capita daily flow. Average per capita daily flow is calculated by dividing the total annual volume of water produced in MG by the population, divided by 365 days per year. ADDs are calculated for the years 2015 through 2017 and 2020 on Table 2-2 below.

TABLE 2-2
AVERAGE DAILY DEMAND (WELLS NO. 4 AND 5)

Year	Population	Annual Water Production (MG)	Golf Course Production (MG)	Annual Water Production, Less Golf Course Use (MG)	ADD (Not Including Golf Course Use)		
					gpd	gpm	gpcd
2015	705	79.7	29.4	50.3	137,808	95.7	195.5
2016	705	76.9	29.4	47.5	130,137	90.4	184.6
2017	705	76.1	30.7	45.4	124,384	86.4	176.4
2020	632	80.3	32.0	48.3	132,329	91.9	209.4
2021	657	89.1	36.2	52.9	144,932	100.6	220.6

gpd = gallons per day

gpm = gallons per minute

Note: Water use at the golf course for 2015 and 2016 was assumed based on the average of 2017 through 2020 records. Golf course production from 2017 through 2020 varied from 27.7 MG to 32.0 MG.

For this WSMP Update, an average daily flow of 200 gpcd was selected for planning purposes to project future demand needs for the City's system. This flow is more representative of the most recent year of water use data, which is considered the most accurate water use data available at this time. The water system's 200 gpcd average water demand is on the lower end of typical demands in an eastern Oregon city, but removal of the golf course use is the main reason for the lower use total. If the average golf course use of 32 MG per year is included, the gpcd would be in the 348 gpcd range, which lies in the higher range of typical demands when compared to other water systems with water meters in eastern Oregon and Washington, as shown on Table 2-3 below.

Peak Daily Demands

PDD usually occur during the period between June through September, which is when water use is normally at its greatest due to irrigation and other summer uses. PDDs can occur in other months, but normally occur during the hottest period of the year. PDDs typically vary from 2.5 to 3.5 times more than ADDs. A peak factor of 3.0 was assumed from prior water use data in the City. Currently, for 632 people this equates to 379,200 gpd or 263 gpm. For the design population of 802, this equates to 481,200 gpd (334 gpm). A PDD of 600 gpcd was selected for design purposes in this WSMP Update. The estimated PDD of 600 gpcd is comparable to other Oregon and Washington cities as shown on Table 2-3 below.

TABLE 2-3
COMPARATIVE WATER USAGE TYPICAL FOR SMALL WATER SYSTEMS
IN OREGON AND WASHINGTON (METERED SYSTEMS)

Water System	ADD (gpcd)	PDD (gpcd)	Peak Factor (Peak Daily)	Population
Lostine, Oregon	170	545	3.2	250
White Salmon, Washington	176	452	2.6	3,761
Adams, Oregon	195	625	3.2	265
Weston, Oregon	195	834	4.3	670
Echo, Oregon	**200**	**600**	**3.0**	**632**
Ice Fountain Water District, Oregon	207	621	3.0	1,921
Umatilla, Oregon	210	483	2.3	4,686

Water System	ADD (gpcd)	PDD (gpcd)	Peak Factor (Peak Daily)	Population
Cove, Oregon	215	628	2.9	594
Baker City, Oregon	227	834	3.7	10,035
La Grande, Oregon	230	667	2.9	13,238
Union, Oregon	230	890	3.9	2,121
Prairie City, Oregon	234	549	2.3	1,195
Mt. Vernon, Oregon	240	585	2.4	617
Stanfield, Oregon	240	600	2.5	1,770
Athena, Oregon	250	710	2.8	1,142
Vale, Oregon	250	625	2.5	1,890
Island City, Oregon	270	810	3.0	989
John Day, Oregon	270	865	3.2	2,010
La Pine, Oregon	280	700	2.5	982
Enterprise, Oregon	284	582	2.0	1,940
Irrigon, Oregon	290	800	2.8	1,790
Milton-Freewater, Oregon	300	750	2.5	6,550
Boardman, Oregon	320	960	3.0	3,445
Helix, Oregon	323	1,130	3.5	155
Arlington, Oregon	325	1,040	3.2	615
Lexington, Oregon	325	1,150	3.5	260
Hines, Oregon	350	1,600	4.6	1,700
Joseph, Oregon	375	1,100	2.9	1,060
St. John, Washington	379	993	2.6	554
Ione, Oregon	461	1,865	4.0	250
Wallowa, Oregon	487	1,900	3.9	890
Halfway, Oregon	600	1,240	2.1	352

The current ADD and PDD for the system are summarized on Table 2-4. These demands have also been summarized as a flow rate to provide the basis for comparison to water supply capacity. The year 2020 population for determining the daily demand rates is 632, as discussed earlier in this chapter. In addition, the golf course's typical annual use of 32 MG has been included in the total daily demands on Table 2-4 since the golf course is supplied by the municipal water system. This represents the highest demand period for the City of Echo's water system. Over the typical irrigation period of May through September, the average daily flow to the golf course is approximately 200,000 gallons.

TABLE 2-4
CURRENT AVERAGE DAILY DEMANDS AND PEAK DAILY DEMANDS (YEAR 2021)

Parameter	Total Daily Use, Including Golf Course (gpd)	Gallons per Minute	Percent of Well No. 4 Capacity	Percent of Well No. 5 Capacity	Percent of Combined Wells No. 4 and 5 Capacity
ADD (200 gpcd)	326,400	227	Exceeded	28.7	23.5
PDD (600 gpcd)	579,200	402	Exceeded	50.9	41.7

Water supply facilities (well pumps) are normally designed to meet PDDs without providing 24-hour service. It is preferable that well pumps operate a maximum of 18 hours per day, if possible.

The current total production capability of Well No. 4 is approximately 175 to 275 gpm, and the current production capability of Well No. 5 is approximately 790 gpm. The existing capacity of the current water system meets the current ADD and PDD. The PDD can be met with the well pumps operating approximately 42 percent of the day. If Well No. 4 was not in service, Well No. 5 can meet peak day demands on its own. Additional water supply would be beneficial to the City to provide water supply reliability and redundancy, if possible. More detailed discussions on water supply and storage capacities are included in Chapters 3 and 4.

Description of Customers Served

The City's water accounts, as of 2021, are summarized on Table 2-5.

TABLE 2-5
WATER ACCOUNT INFORMATION

Account Type	Number of Accounts	Percent of Total Accounts
Residential	253	91.0
Commercial	17	6.1
Industrial	0	0
Public	7	2.5
Golf Course	1	0.4
TOTAL	**278**	**100.0**

As shown on the table, residential water users account for approximately 91.0 percent of the total water users, while commercial users account for approximately 6.1 percent.

Fire Demand

Fire Protection Ratings

Flow rates for fire suppression in residential, commercial, and industrial areas within developed communities are usually determined from the size, density, and occupancy of buildings, type of construction materials, and desired fire insurance rating. Incorporated cities and some rural areas are given a fire suppression rating by Insurance Services Office, Inc. (ISO). The rating is used by insurance companies to determine the cost for providing fire insurance to home and business owners. ISO's fire suppression rating schedule is used to review those features of available public fire protection that have a significant influence on minimizing damage once a fire has begun. These features include the receiving and handling of fire alarms; the fire district's manpower, equipment, and training; and the capability of the water system to provide the needed fire flows.

ISO periodically evaluates fire suppression capabilities of incorporated cities and rural fire districts. They assign numerical ratings ranging from Class 1 down to Class 10, with Class 1 indicating the highest fire suppression capability and Class 10 the lowest. A Class 10 rating is reserved for unprotected areas that have no fire department and no water supply system. Most protected areas outside of cities have a Class 9 rating, and most small rural cities with municipal water systems are rated Class 8, 7, or 6, depending on the strength of their water system and fire department. The ISO rating for Echo, based on the rating presented in the City's 2012 WSMP, is Class 6/9. The 6 rating covers structures within 5 miles of the primary fire response station that have a fire hydrant within

1,000 feet. The 9 rating covers structures that do not have a hydrant but are within 5 miles of the primary response fire station. All of the developed area within the city limits is less than 5 miles from the fire station and most all residences are less than 1,000 feet from a hydrant and would have a 6 rating. The ISO rating system may be different since the 2012 WSMP was prepared. This information was not updated for this WSMP Update.

ISO's fire suppression rating schedule evaluates the City's fire department capabilities and the domestic water supply capacity on an approximately equal basis (50 percent and 40 percent of the rating schedule, respectively). To reduce the cost of fire insurance in a community, improvements usually must be made to the fire department, the water system, or both depending on their present condition. It is difficult to determine possible fire insurance savings on commercial buildings because the insurance costs are determined by many other factors related to the type of occupancy and the type of building construction. The City has an average rating for typical rural communities of similar size. Improving the rating as a result of water system improvements may be possible.

Recommended Fire Flows

ISO also recommends fire flows for various conditions in both residential and commercial settings. Recommended fire flows for residential areas are set forth in the 2012 ISO schedule as shown below.

Distance Between Buildings	Required Fire Flows
Over 30 feet	500 gpm
21 to 30 feet	750 gpm
11 to 20 feet	1,000 gpm
10 feet or less	1,500 gpm

Recommended fire flows for commercial buildings are based on many factors including building size, construction materials used, and what is housed in the building.

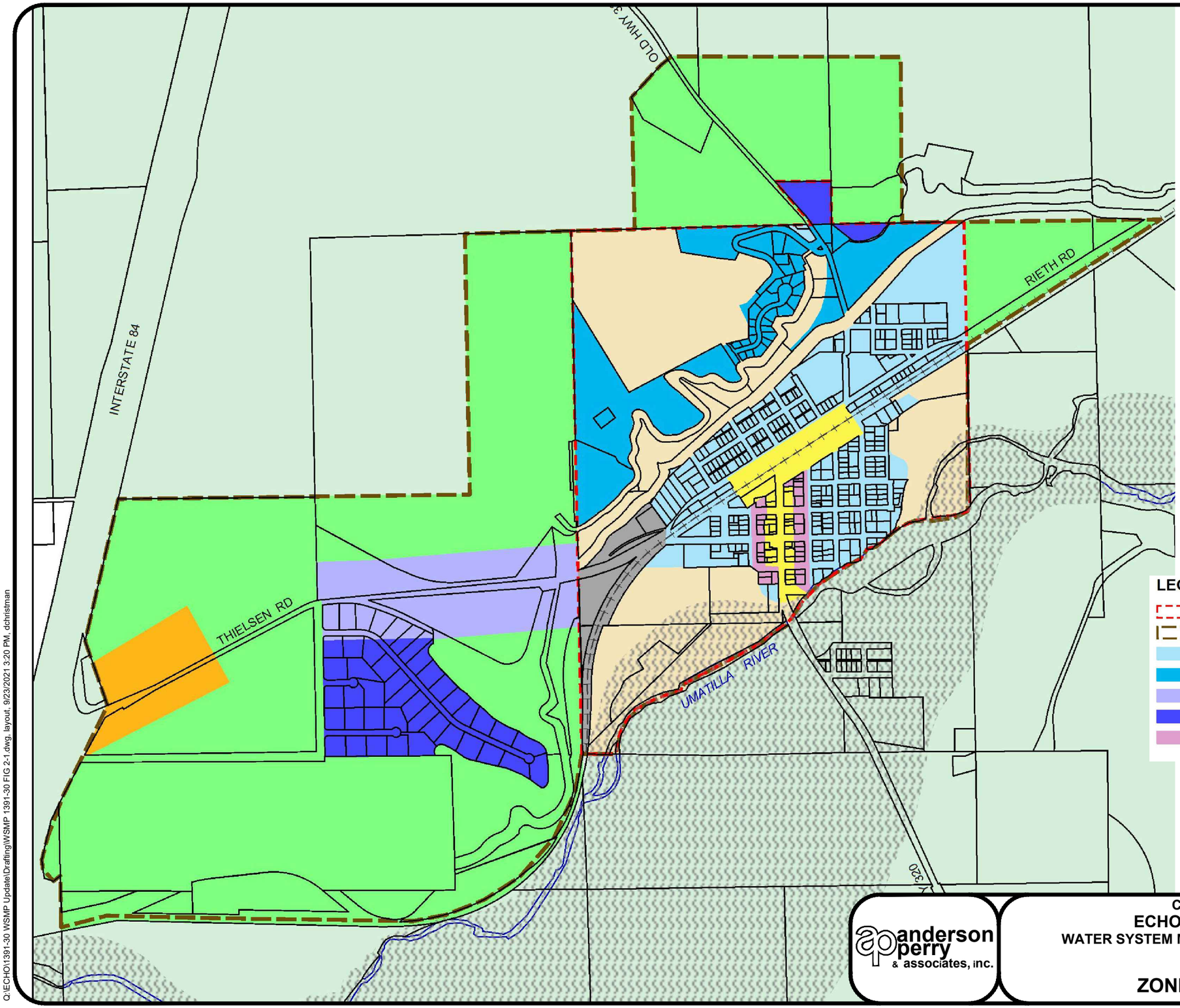
The Oregon Fire Code (OFC) requires a minimum flow of 1,000 gpm in residential areas and a minimum of 1,500 gpm for a minimum of two hours in all other occupancies. These requirements increase with the square footage of the building and can be quite large for commercial and institutional buildings (i.e., schools). These fire flows must be maintained with a system-wide minimum of 20 pounds per square inch residual pressure. Attaining the required fire flows for commercial areas may not be realistically achievable. The OFC has an allowance for decreases in fire flows for small communities (if approved by the local fire chief), where development of full fire flows is impractical.

Appendix C contains a summary of ISO fire hydrant flow test data from 2010. The 2010 data show the City's municipal water system can provide fire flows in the range of 1,200 to 3,900 gpm. ISO does not consider needed fire flows over 3,500 gpm in determining the Public Protection classification for cities. The fire flow design criterion for this WSMP Update is based on the typical maximum fire flow recommended by ISO, which is 3,500 gpm for a two-hour duration. This maximum fire flow is typically recommended for school areas and other high-density development.

Design Criteria

In establishing design standards for a water system, primary consideration must be given to state and federal rules and regulations governing water quality and construction standards for water systems. These regulations, as previously stated, are set by both the EPA and DWS. In addition to these public health and safety requirements, many other factors control the design parameters for municipal water systems. The City must evaluate factors such as financial feasibility, philosophy and policies of the City Council, past system performance and service, and expectations of the water users. All of these factors are important and can influence the standards by which water system improvements are made.

Figure 2-2 presents a summary of the water system design criteria for evaluating the existing water system and developing improvements to satisfy present and future needs for the water system. Application of these criteria is discussed further in the specific chapters that address the water supply, storage, and distribution system facilities. The figures present design criteria based on the estimated present service population and present estimated ADDs and PDDs. Design criteria are shown for the year 2041 based on recommended service area changes, anticipated development, and a 1.0 percent growth rate per year in the City. Storage volumes are derived from calculations summarized in Chapter 4. The design criteria presented on Figure 2-2 are used as base information in later chapters for evaluating existing and future system needs and capability.



N

500 0 500 1000 1500
SCALE IN FEET

LEGEND

- City Limits
- Urban Growth Boundary
- R-1 - General Residential
- R-2 - Limited Residential
- R-3 - High Density Residential
- R-4 - Farm Residential
- RC - Residential Commercial
- C-1 - Central Commercial
- C-2 - Tourist Commercial
- POS - Permanent Open Space
- M-1 - Light Industrial
- F1 - Exclusive Farm Use
- EFU - Exclusive Farm Use (County)
- Flood Hazard Overlay

MAP DISCLAIMER: No warranty is made by Umatilla County as to the accuracy, reliability or completeness of this data. Parcel data should be used for reference purposes only. Not for legal use. Created in GeoMedia Pro by J.Alford, Umatilla County Planning Dept. 12/14/10
Update 7/23/13
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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

ZONING MAP

FIGURE
2-1

Q:\ECHO\1391-30 WSMP Update\Drafting\WSMP 1391-30 FIG 2-1.dwg, layout, 9/23/2021 3:20 PM, dchristman

DESIGN CRITERIA

	Year 2021	Year 2041 with 1.0 Percent Per Year Growth	Golf Course Irrigation
Design Population[1]	657	802	N/A
Supply			
Average Daily Demand (gpcd)	200	200	N/A
Average Daily Flow (gpd)	131,400	160,400	200,000
Average Daily Flow (gpm)	91	111	300
Peak Daily Demand[2] (gpcd)	600	600	N/A
Peak Daily Flow[2] (gpd)	394,200	481,200	350,000
Peak Daily Flow[2] (gpm)	274	334	530
Peak Hourly Flow[3] (gpm)	685	835	N/A
Estimated Supply Flow Available[4] (gpm)	790	1,290	300
Estimated Supply Flow Required[5] (gpm)	370	450	300
Fire Demand			
Residential (gpm)	1,000	1,000	N/A
Commercial/Public (gpm)	3,500	3,500	N/A
Duration (hour)	2	2	N/A
Minimum Residual Line Pressure Under Peak Demands Plus Fire Flow (psi)	20	20	N/A
Storage			
Operating Storage[6] (gal)	75,000	110,000	N/A
Equalization Storage[7] (gal)	0	0	140,000
Fire Reserve[8] (gal)	420,000	420,000	N/A
Emergency Reserve[9] (gal)	131,400	160,400	N/A
Total Recommended Storage (gal)	626,400	690,400	140,000
Total Existing Storage[10] (gal)	350,000	350,000	0
Potential Storage Need (gal)	276,400	340,400	140,000

gal = gallons
gpcd = gallons per capita per day
gpd = gallons per day
gpm = gallons per minute
psi = pounds per square inch

[1] Population based on Portland State University Population Research Center's estimates for the City of Echo for 2021. A population growth of 1.0 percent was requested by the City Council.

[2] Community Use: 3.0 times average daily demand. Golf Course Irrigation: 1.5 times average daily flow.

[3] 2.5 times peak daily flow.

[4] Assumes Well No. 4, Well No. 5, and new interconnection with the City of Stanfield have a combined capacity of 1,290 gpm to be allocated to community use in 2041 and remaining supply flow capacity can be allocated for golf course irrigation during the irrigation season.

[5] Total capacity required to operate well pumps a maximum of 18 hours per day and meet peak daily demand.

[6] Assumes a reservoir operating level of 4 feet in the existing reservoir for the 2021 design criteria and an additional 4 feet of operating storage in the proposed new reservoir for the 2041 design criteria.

[7] Community Use: Difference between peak hourly flow and available supply for a 2.5-hour period. Golf Course Irrigation: Difference between supply (300 gpm x 10 hours) or 180,000 gal and irrigation use (530 gpm x 10 hours) or 320,000 gal.

[8] 3,500 gpm flow for two-hour duration, assuming only storage is used.

[9] One-day supply at average daily demand, assuming only storage is used.

[10] Available existing storage is approximately 350,000 gallons.

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

FIGURE 2-2

WATER SYSTEM DESIGN CRITERIA

Chapter 3 - Water Supply

Introduction

This chapter includes a description of the City of Echo's present water supply system and a discussion of its capacity to meet present and future needs. The current water supply system consists of four deep basalt wells, two of which regularly contribute to the system. Needs and concerns associated with the water supply facilities are discussed. Water rights are also addressed in this chapter, as well as recommended system improvements.

Present Water Supply, Disinfection, and Controls

General

The City of Echo currently has four deep basalt groundwater supply wells, Well No. 2, Well No. 3, Well No. 4, and Well No. 5, all of which are located within the city limits. Wells No. 3, 4, and 5 are capable of discharging directly into the City's existing 350,000-gallon ground level reservoir. Well No. 2 was taken out of service around 1990 because a declining water table and crooked well bore prevented lowering the pump, which would have been required for proper operation. Wells No. 4 and 5 are the City's primary water sources. Well No. 3 is no longer operational. The well has significant taste and odor issues due to a high concentration of hydrogen sulfide. The last time Well No. 3 was used was approximately 2001. Copies of the City's well logs are presented in Appendix D. A summary of each of the City's wells is discussed later in this chapter. All references to well depth are below ground surface.

Critical Groundwater Areas

In 1985, the Oregon Water Resources Department (OWRD) initiated proceedings for the determination of a Critical Groundwater Area (CGA) in the Stage Gulch area. The 252-square-mile Stage Gulch CGA is located in the Umatilla Basin in western Umatilla County. The City of Echo is located in this area. Designating the Stage Gulch CGA was based on data suggesting that water levels in the basalt aquifers were declining excessively, inferring that the available groundwater supply was being overdrawn. The action prohibited the issuance of new groundwater appropriation permits.

According to OWRD studies, water levels in the basalt aquifers in the Stage Gulch CGA declined 50 to 100 feet or more between 1965 and 1980 and have continued to drop despite reduced pumping in the area. Oregon's Groundwater Protection Act of 1955 provides for tighter state control of water withdrawal from an area if the water levels are declining and have declined excessively, if the available supply of groundwater is being overdrawn, and if substantial well interference is occurring. The Stage Gulch area has been identified as such an area. Public hearings were held in 1990 and 1991 by OWRD and an order was subsequently issued declaring a CGA.

The impact to the City of Echo of the critical groundwater designation should be beneficial. If the OWRD's limitations on annual pumping are effective and result in stabilization of groundwater levels, the City can be assured a long-term water supply from the basalt aquifers. However, the City, like other users, will not be able to obtain new water permits or rights. It will be important for the City to complete the water supply development allowed by the City's present groundwater permits

and perfect them into a permanent water right. If any remaining undeveloped portions of the existing permits were taken from the City by potential future regulations, they probably would be difficult to regain.

Well No. 2

Well No. 2 was originally constructed in 1947 to a depth of 520 feet and then deepened to 820 feet in 1964. After improvements were made to the City's water system in 1980, Well No. 2 was used as a municipal irrigation well to irrigate the golf course. Plans for converting the well to a municipal well as part of the 1993 water supply improvements project were abandoned when the City decided that rehabilitation of Well No. 2 would cost more and involve more risk than constructing a new well. This decision was made primarily because the well is not straight, which creates excess wear on pumping equipment. Well No. 2 cannot be considered a reliable supply source. The pump and pump column were removed from Well No. 2 and placed in Well No. 5 in 1995 when the golf course began to be irrigated directly from the municipal system. A cover plate was welded to the Well No. 2 casing after the pump and column were removed.

Well No. 3

Well No. 3 was originally constructed in 1951 to a depth of 490 feet. During a water emergency in 1991, Well No. 3 was the only operational well supplying water to the system when the water table in Well No. 4 dropped below the pump bowls. The well reportedly produced approximately 240 gallons per minute (gpm) at that time. Currently, the Well No. 3 pump is not operational and is not available as a supply source in an emergency. The well has a significant hydrogen sulfide taste and odor issue that limits the desirability of its use. Well No. 3 could be used for non-potable uses, such as golf course irrigation. The last time the well was used was approximately 2001. The impact of declining water levels on the capacity of Well No. 3 is unknown without conducting a pump test and monitoring well water levels. Currently, no provision to pump the well to waste and perform a pump test with the current plumbing arrangement exists.



Existing Well No. 3 Building



Existing Well No. 4 Building

Well No. 4

Well No. 4 is one of two wells that the City currently uses as a municipal water source. This well was originally constructed in 1974 to a depth of 600 feet. In 1991 the water level in the well dropped below the level of the pump

bowls and the well became inoperable. Improvements to Well No. 4 in 1993 included deepening the well to 1,045 feet and installing a new pump. According to City records, the well produces approximately 275 gpm in the winter when the well water level rises and then drops to around 175 gpm in the summer when the well water level drops.

Well No. 5

Well No. 5 was constructed in 1993 to a depth of 1,282 feet and currently serves as one of the City's primary municipal water supply sources. In 1999, the groundwater level in Well No. 5 had declined to the point that an additional column and a larger pump needed to be installed in the well. This seemed to solve the problem until 2006, when the pumps quit operating and the City lost this supply well. Initially, the City believed that the well had gone "dry." However, when the pump column and pump were pulled, the City discovered the used column pipe installed in 1993 had corroded to the point that holes developed in a substantial portion of the pipe. The water pumped up the column pipe exited through the holes and cascaded back down the well. The City replaced 273 feet of the original column, installed a new pump, and lowered the pump to 800 feet below ground surface. To date, there have been no further problems with the operation of Well No. 5. Currently, Well No. 5 produces approximately 790 gpm throughout the year.

Well logs for all four wells are included in Appendix D. A brief summary of the well characteristics is shown below on Table 3-1.

TABLE 3-1
WELL INFORMATION

Well No.	OWRD Well Log No.	Depth (feet)	Static Water Level (feet)	Estimated Capacity (gpm)
2	UMAT 1313	820	315	-
3	UMAT 1315	490	95	-
4	UMAT 5842	1,045	195	175
5	UMAT 5970	1,282	153	790

Note: Static water levels fluctuate annually.

Disinfection

Beginning in 2005, positive coliform samples began appearing in the City's routine bacteriological tests. There were some positive samples in 2007 and again in 2008. Although it was not required, the City installed a sodium hypochlorite (liquid) chlorination system at Well No. 4 as a result of the positive samples. Wells No. 4 and 5 were then configured to operate in tandem, and the chlorinator at Well No. 4 doses both wells prior to discharge to the reservoir.

The City continued to operate the chlorinator intermittently, checking for bacteria in between uses. Each time the chlorinator use was discontinued, the distribution system sampling would yield positive coliform results. Subsequently, the City began operating the chlorinator full time and, at the suggestion of the Oregon Health Authority - Drinking Water Services (DWS), has been operating the chlorinator full time since then. While the chlorinator has been used full time, there have been no positive bacteriological tests. The source of the coliform has never been identified, although there is a strong suspicion that a failure of the golf course irrigation backflow device in 2005 allowed a slug of irrigation system water to backflow into the distribution system.

System Operational Controls

Operation of Well No. 4 is controlled via the water level in the 350,000-gallon storage reservoir. Well No. 5 operation is controlled via Well No. 4. These wells operate in tandem so that both sources are disinfected by the chlorine injected at Well No. 4. Chlorine can be introduced to the supply only when Well No. 4 is running.

Currently, the City has one booster pump station located approximately midway between the reservoir and Well No. 3, as shown on Figure 1-2 in Chapter 1. The belowground packaged booster pump station originally operated with four pumps: one 3 horsepower (Hp) jockey pump, one 5 Hp pump, one 10 Hp pump, and a 30 Hp pump for fire flows. Presently, the 30 Hp pump is the only pump that is operative. The 30 Hp pump operates on a variable frequency drive and operates continuously. The City has historically had problems with this booster pump station flooding with water and has recently completed electrical and control improvements. The booster pump station serves the Smith Drive area, the cemetery, and homes near the cemetery and golf course, together with augmenting fire flows to the school area of the City, if required.

Water Rights

The City of Echo has OWRD permits to appropriate groundwater and to use the water for municipal purposes within specified areas for each of its wells. A summary of the water right information is presented on Table 3-2. Copies of the City's water rights and well permit information is presented in Appendix E.

TABLE 3-2
WATER RIGHTS

Water Source	Application Number	Permit Number	Water Right Certificate	Transfer Number	Allowed Flow Volume (cfs/gpm)	Priority Date	Allowed Use
Well No. 2	U-175	U-168	19613	----	1.1/490[1]	1945	Municipal
Well No. 2	G-8865	G-8546	----	----	2.9/1,300	1978	Municipal
Well No. 3	G-21	G-64	34386	----	0.89/400[2]	1953	Municipal
Well No. 4	G-8865	G-8546	----	----	2.0/900	1978	Municipal
Well No. 5	----	----	92295	T 7045 T 7044	1.1/490[1,3] 0.89/400[2,3] Combined = 1.99/890	1945 1953	Municipal

cfs = cubic feet per second

[1]The quantity of water diverted at the new point of appropriation (Well No. 5), together with the quantity diverted at Well No. 2, will not exceed the quantity of water available from the original point of appropriation.

[2]The quantity of water diverted at the new point of appropriation (Well No. 5), together with the quantity diverted at Well No. 3, will not exceed the quantity of water available from the original point of appropriation.

[3]Well No. 2, Well No. 3, and Well No. 5 can continue to be used until the new certificates are issued, provided the amount of water used at any well or combination of the wells does not exceed the amount stipulated in the transfers.

Well No. 2

Well No. 2 was initially constructed in 1947, under Permit No. U-168, to a depth of 520 feet. A water right of 1.1 cfs (490 gpm), with a priority date of August 24, 1945, was originally permitted and then perfected for the well (Certificate 19613). In 1964, Well No. 2 was deepened to 820 feet. Then, Permit G-8546 to appropriate Waters of the State in the amount of 2.9 cfs (1,300 gpm) with a priority date of June 21, 1978, was issued. This appropriation was supplemental to Certificate 19613. Improvements completed in 1980 were made to increase the capacity of the well, but the well was never pumped at a high enough flow rate to make a Claim of Beneficial Use (COBU) for the total permitted amount of 2.9 cfs. Subsequent extensions to Permit G-8546 to complete the conditions of the permit and apply the water (2.9 cfs) to full beneficial use have been submitted to the OWRD. The last extension received from the OWRD extends Permit G-8546 to October 1, 2028.

During the onset of the water system improvements project completed in 1993, the City decided that rehabilitation of Well No. 2 would cost more and present more risk than constructing a new well. Therefore, the City elected to drill Well No. 5. Well No. 2 has not been used since.

In 1997, Transfer 7045 added Well No. 5 as an additional point of appropriation to Well No. 2 (Certificate 19613). The transfer allowed 1.1 cfs to be withdrawn from Well No. 2, Well No. 5, or a combination thereof, and also cancelled water right Certificate 19613 until a new certificate is issued. The conditions detailed in the transfer were to be completed and the water was to be put to full beneficial use on or before October 1, 1998. Subsequently, when the conditions had not been met by October 1, 1998, the City applied to the OWRD for and received an extension of time to October 1, 2003. No further extensions to complete the conditions shown in the transfer have been applied for. The current status of Transfer 7045 on the OWRD website is shown as being inchoate, which means it is in an uncompleted state.

Although technically no certificated water rights exist for either Well No. 2 or Well No. 5, and assuming Well No. 2 will not be used in the future, a certificated water right for Well No. 5 could be obtained by completing the conditions in Transfer 7045, documenting the amount of water being diverted, and submitting a COBU to the OWRD. The certificate priority date for the new water right would remain the same as the original certificate date of August 24, 1945.

Well No. 3

Well No. 3 was originally constructed in 1951, under Permit No. G-64, to a depth of 490 feet. A water right of 0.89 cfs (400 gpm) with a priority date of September 24, 1953, was then perfected for the well (Certificate 34386).

In 1997, Transfer 7044 approved Well No. 5 as an additional point of appropriation to Well No. 3 (Certificate 34386). The transfer allowed 0.89 cfs to be withdrawn from Well No. 3, Well No. 5, or a combination thereof, but also cancelled water right Certificate 34386 until the flow being diverted from either Well No. 3 or Well No. 5 could be confirmed and a new certificate issued. The conditions detailed in the transfer were to be completed and the water was to be put to full beneficial use on or before October 1, 1998. Subsequently, when the conditions had not been met by October 1, 1998, the City applied to the OWRD for and received an extension of time to October 1, 2003. No further extensions to complete the conditions shown in the transfer have been applied for. The current status of Transfer 7044 on the OWRD website is inchoate.

Although technically no certificated water rights exist for either Well No. 3 or Well No. 5, a certificated water right for Well No. 5 or Well No. 3, or a combination thereof, could be obtained by completing the conditions in Transfer 7044, documenting the amount of water being diverted, and submitting a COBU to the OWRD. The certificate priority date for the new water right would remain the same as the original certificate date of September 24, 1953.

The well pump in Well No. 3 is no longer operational. The well has significant hydrogen sulfide taste and odor issues that extremely limit the desirability of its use. The well was last used in approximately 2001.

Well No. 4

Well No. 4 is one of two wells that the City currently uses as a municipal water source. This well was originally constructed in 1974 to a depth of 600 feet. Thereafter, Permit No. G-8546 was issued with a priority date of June 21, 1978, to pump the well at a rate up to 2.0 cfs (900 gpm). Improvements completed in 1980 included development of Well No. 4 as a water supply for the City. Although the improvements to the well were completed in 1980, the source allocation was not put to full beneficial use. Improvements were also made to Well No. 4 in 1993 that included deepening the well to 1,045 feet. Subsequent extensions to complete the conditions of the permit and apply the water to full beneficial use have been submitted to the OWRD. The last extension granted by the OWRD extends Permit G-8546 to October 1, 2028.

Well No. 5

Well No. 5 was constructed in 1993 to a depth of 1,282 feet and is currently used as the City's primary municipal water source. Well No. 5 was added as a point of appropriation to Wells No. 2 and 3 through OWRD Transfers 7045 and 7044, respectively. Although the water right certificates for Wells No. 2 and 3 were cancelled by the transfers, a water right for Well No. 5 can be perfected by completing the conditions in Transfers 7044 and 7045, documenting the amount of water being diverted at Well No. 5, and submitting a COBU. The original priority date for the respective water rights transferred would remain in place. See the Well No. 2 and Well No. 3 discussion for details of the transfer status.

Water Supply Analytical Testing

General Supply Well Testing Data

Summaries of the analytical data related to the City's water quality testing for Wells No. 3, 4, and 5 were obtained from the DWS website. The City's wells have been sampled for the constituents required by the DWS, including total coliform and fecal coliform, *E. coli*, volatile organic chemicals, synthetic organic chemicals, inorganic chemicals, radiological agents, pesticides, fluoride, nitrate, nitrite, arsenic, and several metals. However, Well No. 3 has not been sampled since 1990 and has not been used since approximately 2001. Due to the high levels of hydrogen sulfide, Well No. 3 will likely not be used as a future supply source. If Well No. 3 is considered for future use as an emergency backup well, the water should be tested for listed constituents to make sure the source is still in compliance with DWS rules. Modifications to the well outlet piping would be required to allow the well to be flushed to waste.

Most of the listed constituents were not detected in samples obtained from the two primary supply wells, Wells No. 4 and 5. The constituents present in both wells were arsenic, barium, chromium, fluoride, nitrate, nitrate/nitrite, selenium, sodium, and sulfate. The concentrations of arsenic, barium, chromium, fluoride, nitrate, nitrate/nitrite, and selenium are well below their corresponding U.S. Environmental Protection Agency (EPA) maximum contaminant levels (MCLs).

Fluoride levels were slightly above 1 parts per million (ppm) in 2014, which is well below the currently MCL of 4 ppm. However, the MCL for fluoride is currently under review and may be lowered due to potential health risks that have been identified with fluoride exposure. The MCL being discussed is 0.7 ppm. Depending on the MCL level for fluoride that might be established, a supply source with a contaminant level above a revised MCL could require treatment to lower the concentration before use. Mixing the well with another source to result in a combined fluoride concentration below the MCL is typically allowed by the DWS.

Sulfate currently has a secondary maximum containment level (SMCL) of 250 ppm based on aesthetic effects (i.e., taste and odor). Sulfate levels are highest in Well No. 4 at 25 ppm, which is significantly below the SMCL.

Sodium levels in drinking water are currently not regulated. The EPA has set a guidance level for sodium of 20 ppm. This guidance level may be low and likely needs updating according to the EPA website. The sodium level in Wells No. 4 and 5 is just over 50 ppm.

Based on the latest chemical results, groundwater from the City's supply wells does not contain bacteriological or chemical constituents at concentrations greater than the corresponding EPA MCLs. The DWS's water quality testing summaries are presented in Appendix F.

Distribution System Water Quality Testing

Although the distribution system is discussed in greater detail in Chapter 5, a brief discussion of the distribution system sample analytical testing is presented herein for completeness. The City routinely obtains samples from the distribution system each month for analysis of total coliform and *E. coli*. In general, total coliforms have not been present in any of the City's system samples since disinfection of the supply sources was implemented full-time in 2008. Fecal coliform and/or *E. coli* has never been detected in the system according to the records reviewed. The City also obtains samples from the distribution system for chemical analysis of lead and copper concentrations. From 1993 to 2018, all detected concentrations of lead and copper were less than their corresponding EPA action levels. The DWS does not require the City of Echo to test for asbestos. Results from the City's coliform, lead, and copper tests are summarized in the DWS's water quality testing summaries in Appendix F.

Source Water Assessment Report

The 1996 amendments to the Safe Drinking Water Act required states to provide the information needed by public water systems to develop drinking water protection plans if they chose to do so. The information provided includes the identification of the area most critical to maintaining safe drinking water, i.e., the Drinking Water Protection Area (DWPA), an inventory of potential sources of contamination with the DWPA, and an assessment of the relative threat that these potential sources pose to the water system. In Oregon, the principal agencies involved with the source water assessments are the Oregon Department of Environmental Quality and the DWS. These agencies completed a Source

Water Assessment (SWA) Report for the City of Echo's water supply wells in 2002. The report was updated in 2007 by the City. A copy of the 2002 SWA Report is included in Appendix G. A copy of the 2007 SWA is included in Appendix H.

The SWA includes information related to the City's well sources, including delineation of the source water protection area, a sensitivity analysis, an inventory of potential contamination sources, the susceptibility of the wells, and recommended uses of the SWA. It is recommended the reader of this Water System Master Plan (WSMP) Update refer to Appendices G and H for considerable information relative to the City's water supply wells and the aquifers present beneath the Echo area.

The DWPA is intended to approximate the next 10 to 15 years of groundwater supply for the City of Echo's wells. Figures showing the DWPA, the times of travel (TOT) for groundwater to the wells (2-year, 5-year, and 10-year), and potential contamination sources are included in the report in Appendix H.

The report indicated that Wells No. 3, 4, and 5 met both the highly sensitive and moderately sensitive criteria. This is partly due to the presence of lead, which serves as an indicator of the potential for inorganic concentrations in the wells that originate from surface or shallow contamination sources. The water supply analysis that this conclusion was based on was conducted in 1989. In 1989, the level of lead measured in Well No. 3 was 0.034 ppm, no lead was detected in Well No. 4, and Well No. 5 had not yet been constructed. Well No. 4 was deepened in 1993 and Well No. 5 was constructed in 1993 down to an aquifer below the level of Well No. 3. The construction of Wells No. 4 and 5 was documented, and conformed to the requirements in effect at that time. Based on this information, it appears the SWA should be revised to reflect current water quality conditions for Wells No. 4 and 5.

Wells No. 4 and 5 are both constructed in a confirmed confined aquifer separated from the surface by a thick succession of basalt flow strata. The Columbia River Basalt aquifer supplying both Wells No. 4 and 5 consists of volcanic interflow zones that are highly permeable.

Potential contaminant sources identified in the SWA in the 2-year TOT zone include the golf course, a confirmed leaking underground storage tank (LUSTs) at the Echo School, irrigation canals, and the railroad corridor. Two LUSTs have been decommissioned since the SWA was developed within the 5-year and 10-year TOT. One tank was at the Mobile bulk plant and the other at the Mobile station. Also, due to the low number of wells in the area, there is relatively low risk of contamination from other wells.

The 2007 SWA follows the format for a Wellhead Protection Plan and contains information on an inventory of potential contaminant sources in the DWS-identified DWPA and recommended Best Management Practices. The report notes that the updated DWPA delineation was proposed to occur in 2007, but does not appear to have occurred, and that two high-risk LUSTs in or near the City's DWPA have been removed. The well sensitivity should be updated to reflect current conditions.

Water Supply Design Criteria

To evaluate the supply capacity of the existing wells, the design criteria presented in Chapter 2 have been utilized. The planning period for this WSMP Update extends to the year 2041. The 2021 certified population of Echo is 657. For planning purposes, this is assumed to be the current population. With the assumed 1.0 percent per year population growth discussed in Chapter 2, the projected population for the year 2041 is 802. Based on these population data and the City's current water use characteristics,

the average daily demands (ADD) and peak daily demands (PDD) for the water system are shown on Table 3-3.

TABLE 3-3
PROJECTED WATER DEMANDS

Year	Population	ADD (gpm)	PDD (gpm)
2021	657	91	274
2041	802	111	334

Note: Water demand data on Table 3-3 do not reflect water use by the City's golf course. The golf course adds approximately 200,000 gallons per day during summer irrigation months.

Water supply facilities are normally designed to meet PDD without having to provide 24-hour service. The current total production capacity of the City's water system is approximately 965 gpm. Well No. 5 is the main well providing water to the system and has a capacity of approximately 790 gpm. Well No. 4 is also used to provide water at a flow rate of 175 gpm during the summer period when aquifer water levels are lower. Well No. 4 can provide up to 275 gpm in winter/spring periods when the aquifer water levels improve. Wells No. 4 and 5 would have to operate approximately 63 percent of the time to keep up with the golf course and existing PDDs and approximately 69 percent of the time to keep up with the golf course and the 2041 PDDs.

Water Supply Reliability

Reliability is one of the most important components of any water system. Because the health and safety of the community depends on a reliable water source, high priority should be given to help ensure a municipal water system has the ability to always meet the water needs of its customers. A number of factors, such as mechanical failures, water quality concerns, power outages, primary water transmission line failures, etc., can affect the reliability of a water supply. It is nearly impossible to ensure 100 percent reliability of any system; however, having proper system components can reduce the risk of a water supply failure.

Currently, the existing water system components provide the City with a limited degree of redundancy. In the event of a power outage, the City will be totally reliant on their storage reserves. The City does not have a backup generator or engine-driven fire pump to supply water. Currently, the storage reserves are not adequate. Therefore, construction of a new storage reservoir, as discussed in Chapter 4, will provide considerably more reserve storage, significantly improving water supply reliability. In addition, installing a generator at at least one well site, at a minimum, would also greatly improve the reliability of the supply system. A generator should be installed at the highest producing well (Well No. 5).

Many communities in eastern Oregon rely on wells as their primary water source, and properly constructed wells have proven to be dependable and reliable. When possible, it is preferred that communities have a backup supply well available in addition to the wells used to meet daily demands. This helps provide redundancy to the system, allowing one well to be taken out of service while others continue to operate. The City does not have backup supply capability for the primary wells (Wells No. 4 and 5). If a failure were to occur at either of these two wells, the City would be faced with an immediate water supply shortage since an equivalent backup supply is not available. Well No. 3 potentially could be

used in an emergency situation; however, as previously discussed, Well No. 3 has not been operated since 2001 and is not considered a viable supply option.

Because of the City's water supply redundancy concerns, it is recommended that the City seek out an additional supply source. In the 2012 WSMP, it was recommended that the City pursue constructing a new well next to a potential new water storage reservoir; however, no improvements have been constructed. At the time this WSMP Update was prepared, the City is in discussions with the City of Stanfield regarding a potential water supply connection with their water system. Because of the existing groundwater concerns in the area of the City of Echo, it is recommended that the City continue to pursue a water supply connection with the City of Stanfield's water system. The City will need to complete the process for adding the City of Stanfield's water system as an additional point of appropriation for the City of Echo's existing water rights related to existing Permit No. G-8546 (Well No. 2). This will also give the City of Echo the ability to utilize the unused water rights permit capacity, which would be a wise investment into the current and future reliability of the City's water system.

The proposed supply connection with the City of Stanfield would take place near the City of Stanfield's existing Well No. 5 and reservoir near the Pilot Travel Center, just north of Interstate 84 (I-84) from the City of Echo. To provide adequate flows, it is recommended that the City also construct a new booster pump station near the City of Stanfield's water storage reservoir. The booster pump station would serve as a mechanism to pump water from the City of Stanfield's reservoir to the City of Echo's new water storage reservoir, as presented in Chapter 4. With a water supply connection with the City of Stanfield, a new water storage reservoir, new backup power generator at Well No. 5, and new well pumps, motors, and columns at Wells No. 4 and 5, the City's water supply reliability would be greatly enhanced.

Static Water Level Trends

The static water level is the depth to water in a well when the well is not being pumped. Over time, static water levels of a well can be the best indicator of the status and condition of the underlying aquifer. A reduction in static water levels could indicate the aquifer is being depleted faster than it can be recharged. It is very important to observe any trends in static and pumping water levels in the City's wells. Data collected can then be plotted over several years to observe any trends. These data will be invaluable to the City in predicting long-term usability of the City's existing wells, especially considering the documented groundwater level declines in the Echo area.

Recommended Water Supply Improvements

Well No. 4 Improvements

The existing well pump, motor, and column piping have reached the end of their useful life and should be replaced as part of the next water system improvements project. Installing a new pump, motor, and column pipe will ensure the City has a mechanically reliable supply source at Well No. 4 for the duration of the 20-year planning period.

In addition to the proposed Well No. 4 improvements listed above, it is recommended that the City replace the existing Well No. 4 building with an underground vault. The existing building is deteriorating quickly and needs replacement. As part of the proposed Well No. 5 improvements discussed later in this chapter, the existing chlorination system can be taken out of service and a new chlorination system can be installed at Well No. 5. This will help condense the Well No. 4 pump

station, enabling it to fit in an underground vault. Having the Well No. 4 pump station in a vault will provide a simpler pump station for the City, as maintenance on a pump station building will no longer be necessary. It is recommended that piping modifications be made to allow for Well No. 4 to discharge through the proposed Well No. 5 pump station.

Well No. 5 Improvements

Similar to the proposed Well No. 4 improvements, the existing Well No. 5 pump, motor, and column piping have reached the end of their useful life and should be replaced as part of the next water system improvements project. Installing a new pump, motor, and column pipe will ensure the City has a mechanically reliable supply source at Well No. 5 for the duration of the 20-year planning period.

In addition to the Well No. 5 improvements listed above, it is recommended that the City construct a new pump station at the Well No. 5 site. This pump station is proposed to replace the City's existing 2,100-square-foot maintenance shop. Within the proposed Well No. 5 pump station, it is recommended that the City install a generator for backup power and a gas chlorination system. Additionally, it is recommended that the City install a booster pump system in the proposed Well No. 5 pump station to replace the existing belowground packaged booster pump system (discussed in more detail in Chapter 5). Completing these improvements at the Well No. 5 site will give the operator the ability to operate the entire water system from one location.

Water Supply Connection with the City of Stanfield

As previously discussed in this chapter, it has been recommended that the City seek an additional supply source for the water system to improve system reliability and redundancy. In previous planning documents, options for drilling a new well or obtaining an existing well have been explored. As of 2021, no additional supply sources have been obtained.

Recently the City has been in discussions with the City of Stanfield regarding potentially securing a water supply connection. It is recommended that Echo continue to have these conversations with the City of Stanfield, as it is a much more feasible and cost-effective approach when compared to drilling or obtaining a new supply well. Should the City of Stanfield permit the City of Echo to develop a water supply connection between the two systems, it is recommended that the connection take place near the Pilot Travel Center on the north side of I-84. The City of Stanfield has an existing well and reservoir at this location that the City of Echo could connect to. It is recommended that water obtained from the City of Stanfield be pumped to the proposed new water storage reservoir, as discussed in Chapter 4, via a proposed booster pump.

Water Rights Related Activities

Water rights related activities were recommended earlier in this chapter to help improve the City's water rights security. Water rights-related recommendations include the following:

- Complete and submit an application to amend Permit No. G-8546 (Well No. 2) to add an additional point of appropriation for the water supply connecting to the City of Stanfield's water system.

- Perfect the City's existing water permits into permanent water rights, in all places possible.

Well No. 3 Recommendations

Well No. 3 is currently inoperable, and it has taste and odor issues. However, Well No. 3 could be utilized as a non-potable water source, such as a construction water source, golf course irrigation, etc. It is recommended the City consider investigating the current Well No. 3 pumping equipment condition and possibly equip Well No. 3 for non-potable use. While Well No. 3 improvements are not included in the recommended water system improvements outlined in Chapter 6, the City may want to consider investing in Well No. 3 as a non-potable water source.

Summary

The City of Echo's water supply system is in fair condition. There are two existing sources; however, the City is limited in water supply redundancy. To meet current and future demands, water supply improvements are recommended, as outlined herein. Estimated costs for the proposed supply system improvements can be found in Chapter 6. Should the City pursue the proposed improvements, a water supply system with adequate redundancy will be accomplished through an additional water source, backup power generator, and updated pumping equipment.

Chapter 4 - Water Storage

Introduction

This chapter presents information on the City of Echo's water storage facilities. The purpose for storage in municipal water systems is discussed. The condition and needs of the City's existing storage reservoir are outlined, and recommended storage improvements to meet 2041 design criteria are presented. The types of storage facilities generally available are also discussed.

General

Water storage facilities are constructed to serve several purposes. First, storage reservoirs are often used to provide control for well or booster pump system operation. When a reservoir drops a few feet or more from the full level, the water level can be used as a control for well pump or booster pump activation. The amount of storage required for this type of control is called "operating storage." Second, stored water must be available to supply water during periods in which the demand for water exceeds the available water supply. This reserve is called "equalization storage." Third, reserve storage is usually provided to supply unusually high, short duration demands, such as fire flows. This is referred to as "fire reserve." Finally, reserve storage is often provided for emergencies that may arise and interfere with production from water supply sources. Such emergencies could be created by power outages, mechanical equipment failure, or sudden water contamination. The amount of storage to be provided for an emergency depends on the likelihood and the impact of such an occurrence. The amount of emergency storage provided usually becomes a balance between what is needed and what can be afforded. This storage allowance is usually called "emergency reserve."

Storage facilities can be located at approximately the same elevation as the water distribution system. Storage facilities of this type require continuous operation of a booster pump system to maintain distribution system pressure. Storage facilities can also be elevated, in which case the water is stored at an elevation considerably above the distribution system to generate adequate system pressure. For example, a water elevation of 120 feet above a distribution system would be required to generate a distribution system static pressure of approximately 50 pounds per square inch (psi). Reservoirs may be elevated by locating them on natural ground high enough above the service area or by construction on top of a steel support frame.

Storage reservoirs are generally constructed of either steel, reinforced concrete, or prestressed concrete. The choice is usually based on an economic analysis made for the particular installation. Reservoirs may be constructed either above ground or buried, with the choice based on cost, location, and community acceptance.

The remainder of this chapter reviews the City's existing storage facilities, presents a discussion of future storage needs, and provides alternatives for satisfying those needs.

Existing Facilities

The City of Echo's existing municipal water storage consists of one ground-level steel reservoir constructed in 1980. It has a capacity of 350,000 gallons. The reservoir is located adjacent to the existing

Well No. 5, north of Golf Course Road, along the east boundary of the golf course as shown on Figure 1-2 in Chapter 1. This welded steel reservoir has an interior and exterior paint system for corrosion protection. The reservoir is approximately 21 feet high with a diameter of 56.5 feet. Existing Wells No. 4 and 5 discharge directly into this reservoir.



Existing 350,000-Gallon Reservoir

A detailed inspection of the 350,000-gallon reservoir was completed on November 27, 2007, by LiquiVision Technology, Inc. A copy of the Report of Procedures and Findings is included in Appendix I. The reservoir inspection report indicates that the exterior coating was in good condition, with small amounts of corrosion on the ring walls, roof, and main entries (less than 0.03 percent of the surface was corroded). The exterior ladder and roof vent coating was reportedly in good condition, with little corrosion. The interior coating was also reported to be in good condition, with minute corrosion of the interior ladder, ringwalls, floor, center support column, and ceiling. The report also notes that the overflow pipe, inlet pipe, outlet pipe, and drain coating were in good condition, with 0.03 percent to 1 percent of the surface corroded. Per the inspection report, a reservoir in poor condition typically requires immediate repairs of structural related problems, and a reservoir in good condition typically does not require improvements, but optional repairs of cosmetic problems could be completed if desired.

In June 2019, the City had the 350,000-gallon reservoir cleaned; however, no inspection report was completed at the time of the cleaning. As part of the next water system improvements project, it is recommended that the City consider recoating the existing 350,000-gallon reservoir to maintain its quality for years to come, since the original paint system is more than 40 years old, past its design life.

Distribution System Pressure

The City of Echo has two pressure zones in the existing distribution system. System pressure is provided in the low-level pressure zone (the majority of the City of Echo) by the elevation of the water in the existing 350,000-gallon reservoir. The ground surface elevation of the reservoir is approximately 798 feet above mean sea level. The reservoir provides system pressures of approximately 78 to 80 psi in the downtown area. A booster pump station provides system pressure to the high levels of the City, the Smith Addition, and the cemetery area. The current booster pump system delivers water pressure of approximately 65 to 70 psi. Water from the high-level pressure zone can discharge into the low-level pressure zone when a reduction in pressure in the low-level pressure zone occurs through pressure reducing valves located along Gerone Street near the Government Ditch. Distribution system pressure is discussed in more detail in Chapter 5.

Storage Requirements

Water storage is usually provided for several purposes. Various methods are used to calculate the volume of each type of storage component required. Most involve a rational approach to estimating the

volume of each storage component, consisting of operating, equalization, fire reserve, and emergency reserve. The decision can then be made as to which component controls and which storage volumes will actually be necessary. For example, the decision may be made to provide storage for operating, equalization, and fire reserve storage components only, assuming any emergency storage would be available from the fire reserve. If this option were selected, there may not be adequate fire storage available if there is a sustained power outage or if a well pump is out of service for some reason. For this reason, it is recommended that all four of the storage components be considered when evaluating the City of Echo's potential storage needs.

Operating Storage

Operating storage is generally provided to facilitate operation of wells or booster pumps in a water system. For example, when water system demands result in the water level lowering in a reservoir, the water level will reach a certain point that can be used to trigger activation of well pumps to refill the reservoir. The storage needed to activate water supply sources is typically referred to as operating storage. This zone of operation can be set as desired but is often set to help ensure circulation occurs during each pump run cycle, allowing water to cycle through the reservoir to help maintain water quality while keeping the reservoir as full as possible.

The existing 350,000-gallon reservoir and proposed new reservoir, as discussed later in this chapter, will be designed to "float" on the system. This means the overflow elevation of each reservoir is the same and the water level in each reservoir will equalize during operation. This will be true for only the top third of the new reservoir because the proposed reservoir site ground elevation is lower than the existing reservoir site ground elevation. The water height in the existing reservoir is only 18 feet when full. For the purposes of this Water System Master Plan (WSMP) Update, 4 feet of operational storage volume has been assumed. The calculated operating storage volume for 2021 is 75,000 gallons. Assuming a new reservoir is installed as part of a future improvements project, the 2041 operating storage volume is estimated to be approximately 110,000 gallons.

Equalization Storage

Equalization storage must be provided to balance out the difference between peak hour demand and water supply capacity during a peak day demand period. An empirical method for estimating the required equalization storage uses the difference between the peak hour flow and the peak water supply availability for a specific number of peak hours per day. In both the current and 2041 design, the available supply of 790 gpm (2021) and 1,290 gpm (2041, with the addition of the City of Stanfield water supply connection coupled with the existing wells) exceeds the calculated community peak hour flows of 685 gpm (2021) and 835 gpm (2041). Therefore, because the water supply capacity can meet projected peak hour demands, no equalization storage in required.

Fire Reserve

Reserve storage for fire suppression is usually determined from either the Insurance Services Office, Inc. (ISO) recommended fire flow or the fire flow recommended by a city's fire chief. Based on the typical maximum fire flow recommended by ISO and the fire chief's concurrence, a fire flow of 3,500 gallons per minute (gpm) with a 2-hour duration has been utilized as the maximum design fire flow for the City of Echo. A total of 420,000 gallons of fire reserve storage is needed to sustain a fire flow of 3,500 gpm for a 2-hour duration.

Emergency Reserve

Emergency storage is usually provided for one to three days' supply in the event of a power outage, mechanical problems, or other problems that would interrupt the reliable supply of water. In most cases, one day would be the minimum amount of time to repair or replace a well pump or other equipment. The City of Echo does not have an emergency power supply to operate the wells or booster pumps in the event of a power outage. For the purposes of this WSMP Update, a minimum one-day storage reserve will be assumed to meet the City of Echo's emergency storage needs. This assumes a water supply source will be available to fill the reservoir within 24 hours after a water supply source failure. To provide a minimum one-day emergency reserve at the present estimated average water use rates and population, a total emergency storage volume of 131,400 gallons would be required. This one-day emergency storage volume would be approximately 160,400 gallons at the projected year 2041 population of 802.

Storage Requirements Summary

The total storage requirement needs for the current population of 657 as well as the anticipated year 2041 population of 802 is summarized on Figure 2-2 in Chapter 2. Currently, an estimated 626,400 gallons of storage is needed, and an estimated total of 690,400 gallons of storage is needed to meet the year 2041 design population of 802. The City currently has a total of 350,000 gallons of storage available for use to meet all four of the typical storage needs of operating storage, equalization storage, fire reserve storage, and emergency reserve storage. The City's existing water storage reservoir is in relatively good shape and should continue to serve the City. It is recommended that the City recoat the existing reservoir sooner rather than later to maintain its good condition. Additionally, the City has a storage deficit that should be addressed by constructing an additional storage reservoir as part of a future improvements project.

Recommended Improvements

Currently, the City's existing reservoir does not meet the recommended fire reserve storage amount of 420,000 gallons without considering equalization storage, operating storage, and emergency reserve storage. Due to this storage deficit, it is recommended that a new water storage reservoir with a minimum storage capacity of 500,000 gallons be constructed. This new reservoir, coupled with the existing 350,000-gallon reservoir, will meet the City's long-term storage needs.

While the total storage needs indicated that a 340,400-gallon storage reservoir, coupled with the existing 350,000-gallon storage reservoir, would meet the year 2041 design criteria for the community's storage needs (without golf course irrigation equalization storage), a 500,000-gallon reservoir is being recommended. Water storage reservoirs, when properly maintained, typically remain operational for 40 to 80 years. Furthermore, the cost associated with construction of a larger reservoir is usually less when compared with constructing a smaller reservoir and then constructing another smaller reservoir at a later date to meet the City's long-term storage requirements. Constructing a 340,400-gallon reservoir or a 500,000-gallon reservoir requires approximately the same amount of site work, fencing, foundation requirements, etc. The additional cost to increase a reservoir from 340,400 gallons to 500,000 gallons is very small when compared to the overall cost of the total reservoir project. Also, a 500,000-gallon reservoir would include allowance for the 140,000-gallon equalization component for golf course irrigation. For these reasons, the City may desire to select the size of the reservoir not only to meet the year 2041 storage needs, but to meet storage needs longer into the future, better matching the

anticipated reservoir life and providing equalization storage for golf course irrigation. Thus, a 500,000-gallon reservoir size was selected for planning purposes to meet the City's long-term storage needs.

Reservoir Materials

Storage reservoirs may be constructed of either steel, reinforced concrete, or prestressed concrete. The choice is usually based on an economic analysis made for the particular installation. For smaller ground-level type reservoirs, steel reservoirs are usually less expensive to construct when compared to concrete reservoirs, but the two can be comparable in cost when storage volumes exceed 1 million gallons. There are two primary types of steel reservoirs: bolted steel reservoirs with glass-fused-to-steel or epoxy coatings, and welded steel reservoirs coated with a paint system. Glass-fused bolted steel reservoirs are usually more expensive to install when compared to epoxy-coated bolted steel reservoirs, but are comparable in cost to a welded steel reservoir with a paint system. Epoxy-coated bolted steel reservoirs generally require complete disassembly to recoat the panels when recoating is required (generally assumed to occur approximately every 30 years). When comparing life cycle costs that include maintenance, such as recoating, the glass-fused-to-steel bolted steel reservoir typically results in less overall maintenance cost because sandblasting and recoating is not required. For cost estimating purposes, it was assumed the City would install a standpipe glass-fused bolted reservoir or a painted welded steel reservoir since they are typically comparable in cost.

Reservoir Location

Several locations were evaluated as potential sites for the proposed reservoir. The primary criteria for selecting a potential site were a location north of the City and the ground elevation of the site. The new reservoir should be designed with an overflow elevation equal to the elevation of the existing 350,000-gallon reservoir overflow. This would allow the proposed reservoir and the existing reservoir to "float" on the system, which would generally equalize the water levels in the reservoirs. The preferred reservoir location would have a base elevation of approximately 800 feet to match the existing reservoir. The preferred location is shown on Figure 4-1.

A new reservoir and transmission line north of the City would provide storage and transmission line redundancy for the entire City. In addition, the new reservoir would be in an location to serve anticipated residential and commercial development in the Interstate 84 interchange area. Water service to the interchange area would require a booster pump system to deliver adequate system pressure, which would typically be constructed by a developer.

The proposed new reservoir location would readily allow the receiving of water from the proposed water supply connection with the City of Stanfield. This location would also allow the City to augment demands, especially for fire flow. Additionally, a new transmission pipeline is proposed from the new reservoir site to connect with the City's existing distribution system. Should the City elect to pursue the proposed reservoir site, negotiations with the existing landowner will be needed to allow the City to construct the new reservoir.

Summary

The City of Echo's existing water storage system includes one 350,000-gallon water storage reservoir. Because this amount of storage does not meet the demands for operating storage, equalization storage,

fire reserve, and emergency reserve, it is recommended that the City construct a new 500,000-gallon water storage reservoir and transmission line. It is projected that the 500,000-gallon water storage reservoir will meet the City's year 2041 storage needs, assuming the City's average water use rates per capita remain unchanged, fire storage and one-day emergency storage requirements remain unchanged, and the population increases at the 1.0 percent annual rate selected by the City. Estimated improvement costs are presented in Chapter 6.

T.3 N. R.29 E., W.M.
1" = 1000'

To Pendleton

EXISTING 350,000 GALLON RESERVOIR - TANK HEIGHT 20 FT.

POTENTIAL RESERVOIR SITE
EL. 800± - TANK HEIGHT 20 FT.

To Pendleton

URBAN GROWTH BOUNDARY

To Rieth

Golf Course

FURNISH

CANAL

PACIFIC

CITY LIMITS

INTERSTATE 84

U.S. HWY. 30

U.P.R.R.

Cem

FEED

Umatilla River

Dam

DITCH

ROAD

UNION

ECHO

PROPOSED TRANSMISSION LINE ROUTE FROM PROPOSED INTERTIE TO NEW RESERVOIR

To Stanfield

PROPOSED INTERTIE WITH CITY OF STANFIELD WATER SYSTEM WITH NEW BOOSTER PUMP STATION

To Boardman

PROPOSED TRANSMISSION LINE ROUTE FROM NEW RESERVOIR

To Lexington

LEGEND

- EXISTING LOW LEVEL SERVICE AREA
- EXISTING HIGH LEVEL SERVICE AREA
- POTENTIAL LOW LEVEL SERVICE AREA EXPANSION
- POTENTIAL BOOSTER PUMP SERVICE AREA
- GOLF COURSE
- POTENTIAL RESERVOIR

anderson perry & associates, inc.

CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

PROPOSED WATER SYSTEM STORAGE IMPROVEMENTS

FIGURE
4-1

M:\Projects\Echo\1391-30 WSMP Update\1391-30 WSMP Update PropStorage.indd, 05/06/22, 11:42 AM

Chapter 5 - Distribution System

Introduction

This chapter discusses the City of Echo's existing water distribution system that delivers water to residential and commercial users. Components of the distribution system include pipelines, valves, water meters, water service lines, and fire hydrants. The distribution system has been briefly evaluated for both present and future needs. Recommended distribution system improvements have been developed to address existing identified deficiencies and provide future service to help meet Oregon Health Authority - Drinking Water Services (DWS) and Oregon Fire Code (OFC) fire flow requirements.

Existing System

Historical information for the City of Echo's water distribution system was obtained from an engineering study of the water supply completed in 1992 by Anderson Perry & Associates, Inc., from City water system maps and record drawings, from the City's 2012 Water System Master Plan (WSMP), and City staff. The City's original water system was installed in 1904 when the City first incorporated. The original water mains were likely wood stave or steel pipe. In 1980, a major system improvements project replaced the aging and deteriorating main lines and service lines with polyvinyl chloride (PVC), ductile iron, and polyethylene pipe. At that time, well improvements were made to Well No. 3, a new reservoir was constructed, and a booster pump station together with a pressure reducing station were installed. In 1993, major improvements were made to the water supply system that included deepening Well No. 4 and the construction of Well No. 5. See Figure 5-1 for the layout of the existing distribution system.

In general, the distribution system is fairly well looped and for the most part has larger diameter water main lines. The existing distribution system layout, including fire hydrant and valve locations and pipe size and locations, is shown on the Existing Water System Map contained in a pocket at the end of this WSMP Update. Water main lines and associated valves have been color coded based on pipe type for easy reference by City staff. If distribution system main lines or other system features are added in the future, the map can be easily updated as the improvements occur so the City always has the most accurate map available to staff. Available resources were utilized to make the map as accurate as possible. However, the map is intended to be a schematic representation of the City's water system and inaccuracies may exist in the depiction of the system layout.

Water Meters

Approximately seven water services have been identified by the City as unmetered. These include several small City-owned landscape areas, City-owned tennis court landscaping, a City-owned RV park, and the City fire hall and City Hall. Although the amount of use from these locations is likely very small, to account for all the water consumed within the system, all end users need to be metered. It is recommended that the City pursue metering all connections to better account for all water use. Full metering will also be a requirement listed in the upcoming Water Management and Conservation Plan (WMCP) required by the Oregon Water Resources Department (OWRD).

City staff have expressed concern over the existing water meters throughout the distribution system. In the past, City staff have had issues due to age and deterioration of the existing water meters. It is recommended that the City pursue replacement of the existing water meters throughout the distribution system as part of a future improvements project.

Water Loss

One important monitoring activity that should be performed by the City is to conduct a periodic audit of the volume of water supplied to the system versus the volume of water being metered and used by customers. To complete an accurate water audit, the City would need to compare master meter readings from each water supply source with the total meter readings of all users. To complete this, the City must first install water meters at all end-user connections or have an accurate means of estimating water use at the unmetered City connections.

Implementing a good water auditing method would help ensure water is being adequately accounted for in the City's distribution system and help determine if leaks are present. Monitoring water loss in the system can reduce the cost of operating and maintaining the system, whether it is through decreased power costs to operate pumps or the amount of maintenance performed in the field by the City. Leaking service lines can be identified prior to failure, and areas of system leakage can be isolated and repaired. The details of conducting a water audit can be accessed by the City from multiple resources, including the American Water Works Association.

Currently, the City does not routinely complete annual water audits. However, the City is in the process of completing a WMCP in accordance with OWRD requirements. The WMCP includes completion of a detailed water audit to estimate unaccounted for water.

Distribution System Pressure

The City of Echo has two pressure zones serving their distribution system, a high-level zone and a low-level zone. System pressure in the low-level zone (the majority of the City of Echo) is controlled by the water level in the existing 350,000-gallon reservoir and typically produces approximately 78 to 80 pounds per square inch (psi) in the downtown area. In the high-level zone, pressure is provided by the existing booster pump system located near the golf course clubhouse approximately midway between the existing reservoir and Well No. 3.

Booster Pump Station

A belowground packaged booster pump system was installed in 1980. The booster pump station serves the higher elevation areas on the east side of the City near the golf course and Smith Drive, the cemetery, and homes near the cemetery, and can be used to augment fire flows in the school area of the City. It initially operated with four pumps: a 3 horsepower (Hp) jockey pump, a 5 Hp pump, a 10 Hp pump, and a 30 Hp pump. Depending on demands, the pump station was designed



Existing Packaged Booster Pump System

to provide approximately 60 to 70 psi at the pump station outlet and flows ranging from 0 to 750 gallons per minute (gpm).

Presently the 3 Hp jockey pump, 5 Hp, and 10 Hp pumps are inoperative. The 30 Hp pump is controlled by a recently installed variable frequency drive (VFD). The VFD is regulated by downstream pressure and operates continuously. The VFD is preset to maintain a certain downstream pressure which, in turn, controls the speed of the pump. When there is little to no flow in the high-level zone, the pump will continue to turn, but there may be little to no flow through the pump. As the downstream pressure falls (meaning the system demand is increasing), the VFD will increase the pump speed, increasing downstream flow and maintaining preset system pressure. There are no outward signs that operation of the pump in this manner is detrimental to it. However, utilizing a VFD to operate a pump over too wide of a flow range can shorten the life of the pump and motor.

The City has had a number of occasions when a plumbing fitting broke, resulting in the pump station filling with water and repairs being required. A drain incorporated in the original design became blocked. In an attempt to solve the issues, the City installed a portable sump pump to dewater the pump station. Due to the pump station continuing to fill with water, the electrical equipment soon became inoperable. Recently, the City elected to complete electrical improvements to bring all electrical equipment outside of the booster pump station to avoid future electrical complications resulting from flooding.

The booster pump station has reached the end of its useful life. Only one of the original four pumps is currently in operation, and the pump is considerably oversized for the actual normal operating conditions. This results in the pump drawing more power than necessary. Access into the pump station is difficult and, being belowground, the risk of water damage from a leak inside the basin continues to exist. As previously discussed in Chapter 3, it is recommended that the City install a new booster pump station at the proposed Well No. 5 pump station to replace the existing belowground station.

Pressure Reducing Valve Station

Water from the high-level zone can discharge into the low-level zone via pressure reducing valves (PRVs) located along Gerone Street near the Government Ditch. The upstream pressure at the PRV station is approximately 96 psi during normal flow conditions. Low downstream demand is routed through the 2-inch PRV bypass, and higher downstream demand will open the 6-inch PRV such as would occur with a fire hydrant opening downstream, near the PRV station. This PRV station provides the means to increase available fire flows in the school area.



Existing PRV Station

Distribution System Water Quality

Coliform Bacteria

The City typically obtains one routine sample per month from the distribution system for analysis of total coliforms and *E. coli*. Routine sample results on file with the DWS were reviewed for the period from January 2002 through August 2021. Twelve samples tested positive for total coliforms in the period from June 2005 to July 2008. Additional samples obtained after each positive total coliform event did not contain total coliforms. No samples over this period were positive for fecal coliforms or *E. coli*. There have been no positive samples recorded since 2008. In 2008, the City also began continuously chlorinating the distribution system, as discussed in Chapter 3.

Lead and Copper

The City has also obtained samples from the distribution system to satisfy chemical analysis requirements for total lead and copper. Tests were conducted in 1993, 1994, 1995, 1996, 1997, 2000, and 2003, and then every three years, in 2006, 2009, 2012, 2015, and 2018. Initially 20 samples were obtained for the 1993 and 1994 tests. Ten samples were obtained for subsequent test events after 1994. Five samples were obtained in 2003 and 2006, then 10 samples in 2009, 2012, 2015, and 2018. The DWS database lists the highest lead concentrations detected for these sampling events, which ranged from 0.0000 to 0.005 milligrams per liter (mg/L). The U.S. Environmental Protection Agency (EPA) action limit for total lead in municipal water systems is 0.015 mg/L. Copper was also detected in the samples at maximum concentrations ranging from 0 to 0.05 mg/L. The EPA action level for copper is 1.3 mg/L. Based on the lead and copper analytical results for sampling from 1993 to 2018 (the next sampling is scheduled for 2021), all detected concentrations of lead and copper were less than their corresponding EPA action levels. A copy of the lead and copper analytical result summary sheet from the DWS database is included in Appendix F.

Fire Protection

General

The City's existing water supply, storage, and distribution systems provide adequate fire protection to the majority of the system. The reservoir, supply, and distribution systems for the low-level zone are estimated to provide fire flow capacities (in the main line piping) of 1,500 to 2,500 gpm while maintaining minimum system residual pressures of 20 psi. These flows are based on a computer model developed for the City's water system to estimate system response to various demand situations as part of the 2012 WSMP.

In the high-level zone, the capacity of the 30 Hp pump in the booster pump station limits available capacity. The calculated capacity of main line piping in the high-level system along Smith Drive is 500 to 1,000 gpm. This is to be expected since the maximum capacity of the 30 Hp pump is approximately 750 gpm.

Fire Hydrant Flow Tests

Fire flow tests were performed on some of the City's fire hydrants on September 15, 2009, by the Insurance Services Office, Inc. (ISO). The results of the hydrant tests are presented in Appendix C. Based on the ISO test results, the City of Echo's water system is generally able to deliver fire flows

ranging from approximately 1,200 to 3,900 gpm with residual pressures lowering to 20 psi. ISO uses a theoretical formula to estimate available main capacity based on the measured fire flow. The formula for calculating available main capacity will be discussed hereafter.

Theoretical Fire Flows

In some cases, such as in ISO fire hydrant flow capacity reporting, the available flow from a fire hydrant is calculated using a theoretical formula. The formula assumes the water supply "feeding" the tested area is generally not limited, and the 20 psi residual pressure resulting from the fire flow occurs where the hydrants are being tested. In reality, there are likely other connections in the distribution system, such as users in the City on small-diameter main lines or at higher elevation areas, that would fall below 20 psi sooner than the formula predicts. Considering this, the theoretical formula can overestimate available fire flows.

Fire Hydrant Limitations

The ISO fire flow tests are conducted by opening multiple fire hydrants at one time. If large enough main lines are present, individual fire hydrants can typically provide flows in the range of 800 to 1,200 gpm from a small port and nearly 2,000 gpm from both small ports and the larger "pumper" port, assuming the hydrant has a large port. During a fire there will be some water use from others on the system, so the actual available flow in the distribution system will be less due to other uses and pipeline pressure losses resulting from higher flows.

Generally, the City's system provides adequate fire flows. The discussion presented herein is intended to provide caution concerning available fire flows from the City's distribution system and fire hydrants.

Fire Hydrant Coverage

OFC outlines maximum recommended fire hydrant spacing depending on several factors, such as fire flow requirements of the area, the number of fire hydrants in the area, if the area is on a dead-end street or has limited access, etc. As required by the 2019 OFC, the maximum spacing between any two hydrants for a fire flow requirement of 1,750 gpm or less is 500 feet, and as little as 350 feet for a fire flow requirement of 3,500 to 4,000 gpm. Per the OFC, fire flow requirements are also based on building area and type of construction, which can further reduce hydrant spacing. The maximum required distance from any point of a street or road frontage to a hydrant is 250 feet for fire flows of 1,750 gpm or less and 210 feet for fire flows of 3,500 to 4,000 gpm.

The City of Echo's existing fire hydrants, as identified on the Existing Water System Map, are typically spaced 300 to 400 feet apart in the area of the City west of Thielsen Street and 400 to 500 feet apart in the area east of Thielsen Street.

The spacing of the City of Echo's existing hydrants was generally analyzed to identify areas not covered in accordance with the maximum spacing and frontage distance to a fire hydrant as recommended in the OFC. It should be recognized that this analysis was completed for general compliance to the maximum recommended spacing and frontage distance to a hydrant. The City may wish to reduce these requirements, depending on the fire flow demands of a particular area, to more stringent requirements of the OFC or as recommended by the City's fire chief. This analysis is intended to provide the City a basic idea of areas lacking fire coverage.

In general, the City has good fire coverage for most developed areas inside the city limits. The primary areas of inadequate fire hydrant coverage are as follows:

- **Cemetery Area** - Two single-family residential structures are located east of the cemetery that do not have adequately sized water mains or fire hydrants for fire protection in the vicinity.
- **Smith Addition** - Inadequate coverage is provided by the existing fire hydrants in the developed area of Smith Addition (Golf Course Road and Smith Drive).
- **Thielsen Street** - Homes fronting the east side of Thielsen Street from approximately Willow Street to Gerone Street are outside fire hydrant coverage areas.
- **Main Street** - A small area is outside a fire hydrant coverage area on Main Street in the vicinity of the Union Pacific Railroad (UPRR) right-of-way (ROW).
- **College Street** - There is need for an additional fire hydrant at College Street and Garfield Street to provide coverage for the school and provide some additional redundancy.
- **South City** - One single-family residence is located east of Jane Street with no public access. The house does not have an adequately sized water main or fire hydrant for fire protection in the vicinity.

A few other areas within the distribution system do not have adequate hydrant spacing. It is recommended the City consider installing fire hydrants in the areas needing improved coverage as funds permit or as part of an overall water system improvements project. In addition, old fire hydrants past their design life should be replaced. All fire hydrant installations should be reviewed and approved by the City's fire chief, where possible.

Distribution System Analysis

Undersized Main Lines

Many cities have adopted minimum water main line size standards of at least 6-inch diameter and, often, 8-inch diameter. The significant capacity advantages of an 8-inch diameter main line compared to a 6-inch line normally outweigh the small additional cost to install an 8-inch line.

For the purposes of this WSMP Update, undersized mains have been identified as those mains that do not allow the fire demand and minimum pressure criteria shown on Table 2-2 in Chapter 2 to be met. Several areas within the City's distribution system have undersized main lines. The most significant areas are summarized hereafter:

- **Sprague Street** - A 4-inch diameter PVC line extends from Front Street to Bonanza Street. The 4-inch line serves two fire hydrants.
- **Bonanza Street** - A 4-inch diameter PVC line extends south from Sprague Street approximately 170 feet. The 4-inch line serves a fire hydrant.
- **Thielsen Street (1)** - A 4-inch diameter PVC line extends north from Willow Street approximately 600 feet. The 4-inch line serves a fire hydrant.

- **Thielsen Street (2)** - A 4-inch diameter PVC line extends south from the hydrant in Thielsen Street (1) above approximately 350 feet. The 4-inch line serves a future proposed fire hydrant.
- **Prescott Street** - A 4-inch diameter PVC line extends from Bridge Street to Buckley Street. The 4-inch line serves a fire hydrant.
- **Perry Street** - A 4-inch diameter PVC line extends from Hiestand Street to Garfield Street. The 4-inch line serves a future proposed fire hydrant.
- **Garfield Street** - A 4-inch diameter PVC line extends from Perry Street to College Street. The 4-inch line serves a future proposed fire hydrant.

Dead-End Main Lines

The City of Echo's distribution system is fairly well looped. However, a few areas in the distribution system have dead-end main lines. For the most part, these dead-end main lines are present at main line extensions toward areas not currently served by the distribution system. It is difficult to eliminate all dead-end water main lines from a system. Physical limitations, such as stream crossings, undeveloped land, or other limitations, such as no customers in the area, can result in dead-end main lines. Often these lines are eventually looped as expansion occurs. The main areas with dead-end lines are as follows:

- **Main Street/Buckley Street** - A 4-inch diameter PVC line dead-ends on the east end approximately 120 feet west of the UPRR ROW. This line can be looped east, then southeast along the railroad ROW, then west to the dead-end line on Buckley Street. This is an important improvement since it will improve fire capacity to an existing fire hydrant and to a new fire hydrant.
- **Garfield Street** - A 4-inch diameter PVC line dead-ends approximately 40 feet south of College Street. This line can be looped north to College Street and then east to the existing 6-inch line on Hiestand Street.
- **Thielsen Street** - A 4-inch diameter PVC line dead-ends approximately 600 feet north of Willow Street. This line can be looped by extending north approximately 100 feet to an existing 8-inch line.
- **Halstead Street** - A 6-inch diameter PVC line dead-ends at the easterly limits of Halstead Street. This line can be looped by extending southeast approximately 200 feet then extending northeast and connecting to an existing 6-inch PVC line on the east side of the UPRR ROW.

Note that some of these areas are also included in the undersized main line list.

Water Meter Upgrade

As previously discussed, the City's existing water meters are aging and City staff have expressed concern with their current condition. Water meters typically last between 15 and 20 years before requiring replacement. The majority of the City's water meters are due to be upgraded. Should the City decide to pursue a water system improvements project, it is recommended that new system-wide meters be installed along with a radio read meter system.

A radio read meter system would allow the City to read meters much more efficiently. There are two types of radio read systems. The more basic system allows city staff to drive around the city and read the meters using a mobile instrument by simply driving by the meters. The time to read water meters is basically the time it takes to drive all of the city. The mobile instrument is then taken to City Hall and downloaded to a computer where water meter bills are generated based on water use. The software allows for monitoring of non-typical events, such as abnormally high water use, to help identify potential leaks in service lines and homes. Radio read meter systems can also be set up with towers throughout the service area that can read water meters from tower locations, then transmit the data to City Hall. The tower systems can be activated from City Hall, meaning the City Recorder or City staff can read meters simply with the push of a button, and be used year-round regardless of weather and snow cover. While more investment is needed for a tower-based system, either option would reduce the time it takes to read water meters and would result in more accurate meter readings with the meters upgraded to the latest technology.

Geographic Information System Database Development

The City has considered development of a geographic information system (GIS) database system for the municipal water system. A GIS system establishes a web-based mapping and information tracking system for the City's water utility system assets. The GIS database system is built around an accurate water system map that has water system features, such as valves, hydrants, key features, etc., located very accurately with survey quality coordinates. The intent of this accurate location exercise is so water system features can be located at night, under snowpack, when buried by gravel and dirt, when paved over accidentally, etc. The database also allows the user to populate data within the database for system features, such as valve size and type, when last exercised, etc. Water system operators have found properly prepared and used GIS database systems become invaluable to the everyday operation, maintenance, and tracking of water system components and performance.

The first step to develop a GIS database system is to convert existing CAD-based water maps into a GIS database map. This conversion process typically involves, at a minimum, the key features of the water system. These features include well and booster pump system locations, reservoir locations, water main lines, valves, hydrants, water meters, PRVs, main line blowoffs, etc. These features are accurately located to prepare a very accurate water system map. The database includes data tables for each feature to allow data to be entered into the system, such as hydrant type, fire flow capacity, when last exercised, painted, etc.

The second step is to develop the online database system for operator and staff use. The online database system allows for water system operators to access water system map information on a laptop computer, tablet, or smartphone. The database is prepared using available aerial imagery so the features can be accurately shown relative to real area features. The GIS database also gives the water system user the ability to enter system data while in the field, using a smartphone, so the water system database can be updated regularly by City staff.

Recommended Distribution System Improvements

In general, the City's distribution system is well looped and only has a few dead-end lines. The existing system has the capacity to supply adequate water service and fire flows to most of the City. The following are recommended improvements to the City's distribution system.

Dead-End and Undersized Main Line Improvements

In general, the City's distribution system is in good condition and only has a few dead-end and undersized main lines. Due to the low quantity of dead-end and undersized main lines, the improvements discussed earlier in this chapter are not considered to be as urgent as a system-wide water meter upgrade or improvements to the City's fire hydrant distribution. Should the City receive funding for an improvements project, the dead-end and undersized main line improvements should be pursued only if enough funding is made available.

Fire Hydrant Installations

Based on the fire hydrant coverage analysis herein, installation of several additional fire hydrants in the City's distribution system is recommended as summarized earlier in this chapter.

Valve Installations

The City's distribution system has several isolation valves. However, there are areas where additional valves would allow for improved main line isolation, improving maintenance activities. It is recommended the City consider installing several main line valves to improve maintenance operations.

Water Meter Upgrade

As discussed earlier, the City's existing water meters are aging and are not in good condition. The City should consider a potential water meter upgrade to bring the City's water meters up to current water meter standards. Implementation of a radio read water meter system would greatly reduce the time it takes to read water meters and would provide a more accurate accounting of water use by customers.

Geographic Information System Database Development

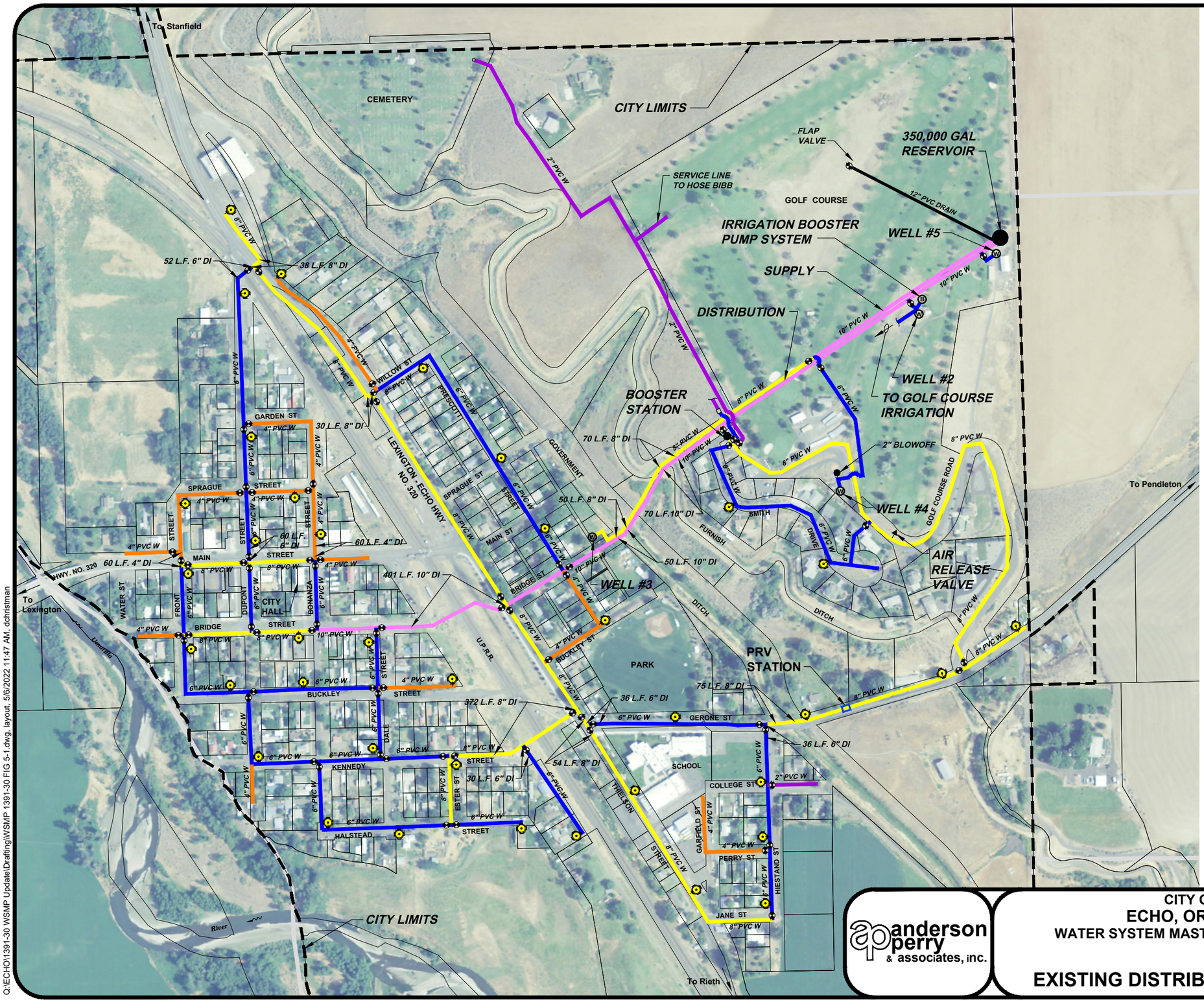
The City would like to implement a GIS database for the water system. It is recommended this system be developed to significantly improve the accuracy and quality of water system maps and database information, and to provide immediate access to water system information by system users while in the field.

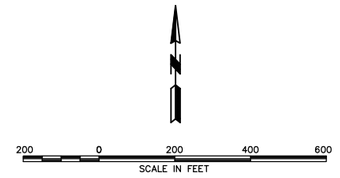
Maintenance Records

An important operational function related to the City's distribution system is to keep accurate records of various system components. These records become valuable as time passes in terms of planning future improvements and replacing old or deteriorated components. It is recommended the City keep accurate records on all water meters installed so, in the future, these meters can be periodically pulled, checked for accuracy, and replaced as needed. The distribution system evaluation in this WSMP Update did not include determining existing fire hydrant, valve, and water meter conditions. It would be wise for the City to keep accurate records on all hydrants, valves, water meters, and other distribution system components. Hydrants should be checked, at least annually, for proper operation, and all water valves should be exercised, at least annually, with records kept on their operating condition, location, etc.

Summary

The City of Echo has a good quality distribution system that provides adequate service to the residents and businesses of Echo. A few recommended improvements, as outlined herein, would help the City to better operate and manage their water system, such as radio read water meters and a GIS database system. Installation of several new hydrants would also improve fire flow coverage in the City, and new valves would allow maintenance to occur more easily. For a detailed discussion of recommended distribution system improvements estimated costs, please see Chapter 6.





LEGEND

- FIRE HYDRANT
- VALVE
- CHECK VALVE
- 2" WATER LINE TYPE AS SHOWN
- 4" WATER LINE TYPE AS SHOWN
- 6" WATER LINE TYPE AS SHOWN
- 8" WATER LINE TYPE AS SHOWN
- 10" WATER LINE TYPE AS SHOWN
- 12" DRAIN LINE TYPE AS SHOWN

NOTES

1. THIS MAP WAS PREPARED FROM PREVIOUS WATER SYSTEM MAPS, RECORD DRAWINGS AND INFORMATION PROVIDED BY THE CITY. ITEMS ARE DEPICTED AS ACCURATELY AS POSSIBLE. WATER LINES MAY BE PRESENT AT LOCATIONS NOT SHOWN ON THIS MAP.
2. WATER SYSTEM FEATURES AND LOCATIONS ARE SCHEMATIC IN NATURE AND SHOULD BE FIELD VERIFIED PRIOR TO CONDUCTING FIELD WORK.

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

EXISTING DISTRIBUTION SYSTEM

FIGURE
5-1

Q:\ECHO\1391-30 WSMP Update\Drafting\WSMP 1391-30 FIG 5-1.dwg, layout, 5/6/2022 11:47 AM, dchristman

Chapter 6 - Recommended Water System Improvements

Introduction

This chapter summarizes the recommendations for the water system and outlines the estimated costs of the proposed water system improvements. Descriptions of the proposed improvements for the water supply system, storage system, and distribution system are summarized in Chapters 3, 4, and 5, respectively.

Summary of Proposed System Improvements

As outlined in previous chapters, a number of system improvements are identified for the City of Echo's water system. The new water supply source from the City of Stanfield, along with the new proposed reservoir and transmission line, are considered to be high priority along with the water system meters and GIS database development. All of the recommended improvements are summarized hereafter.

Water Supply Improvements

The recommended water supply improvements include securing additional supply from the City of Stanfield water system and constructing a new well pump station for both Wells No. 4 and 5, including standby power capabilities. The year 2021 estimated costs for these items are summarized on Figures 6-1, 6-2, and 6-3. Recommended water supply improvements include the following:

1. The City of Echo needs additional water supply to help meet current and future water system demands. While both Wells No. 4 and 5 can meet current demands, both need to operate during higher demand periods, with no reliable backup water source. It is desirable for a municipal water system to have an additional supply source in the event a failure or other issue occurs with a main supply source. The City of Echo is negotiating with the City of Stanfield to secure water from Stanfield's well source located adjacent to the Stanfield reservoir near the Pilot Travel Center. The City of Echo will complete water rights work to add Stanfield's well as an additional point of appropriation for the City of Echo's well permit capacity. A new booster pump and necessary piping, including a transmission line from the Stanfield well site to the City of Echo's proposed reservoir site north of the City will be constructed. This new booster pump system and transmission line will provide an additional supply source for the City of Echo and will be used primarily to fill the City's new storage reservoir, discussed later in this chapter. The total estimated 2021 cost for the Stanfield water supply system and transmission line is $820,000, as summarized on Figure 6-1.
2. The City's main water supply well is Well No. 5, which is located adjacent to the existing 350,000-gallon storage reservoir on the east side of the City, near the golf course. The current building associated with Well No. 5 is in poor condition and needs to be replaced. In addition, installation of standby power capabilities at Well No. 5 would provide the City of Echo with their main, higher capacity supply well during power outage conditions. A new well pump station with a standby generator and a new

chlorination system will be constructed for Well No. 5. This pump station will also house a replacement booster pump station to serve the higher elevation areas of Echo on the east side of the City. The booster pump system is described later in this chapter. The new Well No. 5 pump station will also house piping and metering for Well No. 4, also discussed later in this chapter. The new well pump station will serve both Wells No. 4 and 5, will contain the new booster pump system, and will contain standby power capable of running Well No. 5 and the booster pump system. The total estimated 2021 cost for the Well No. 5 pump station and booster pump system is $1,485,000, as summarized on Figure 6-2.

3. The existing well pump station at Well No. 4 is very inadequate to properly support operation of Well No. 4. Well No. 4 has a dedicated transmission line to the 350,000-gallon reservoir, and the chlorination system at Well No. 5 is used to add chlorine to the Well No. 4 water when it operates. Rather than invest in a new pump station at Well No. 4, the needed piping and flowmetering for Well No. 4 will be added to the Well No. 5 pump station. The existing Well No. 4 pump station will be demolished, and a new weatherproof power supply and wellhead vault will be constructed at Well No. 4. The Well No. 4 improvements will make the Well No. 4 wellhead more secure and safer to operate. The total estimated 2021 cost for the Well No. 4 improvements is $170,000, as summarized on Figure 6-3.

Water Storage Improvements

The recommended water storage improvements include constructing a new 500,000-gallon storage reservoir and transmission line and recoating the existing 350,000-gallon storage reservoir. The year 2021 estimated costs for these items are summarized on Figures 6-4 and 6-5. Recommended water storage improvements include the following:

1. The City of Echo needs additional water storage capacity to help meet current as well as anticipated future water storage needs. Constructing a new water storage reservoir at a different location than the existing reservoir, along with a new transmission line, would provide the City with considerably more storage capacity, and with storage and transmission system redundancy. The City would be able to have a storage reservoir and/or transmission line out of service while still providing full water service to the City. The City plans to construct a new 500,000-gallon storage reservoir north of Echo. The new reservoir will also have a new 12-inch diameter transmission line extending from the reservoir to the City of Echo's existing distribution system. The total estimated 2021 cost for the new 500,000-gallon reservoir and transmission line is $2,616,000, as summarized on Figure 6-4.
2. The City of Echo's existing 350,000-gallon steel reservoir is in relatively good condition. The reservoir needs a new coating system to help ensure the reservoir remains in good service condition into the future. The City intends to sandblast and repaint the interior and exterior of the existing reservoir. With a new reservoir constructed and in service, the existing reservoir will be able to be taken out of service for the repainting work to occur. The total estimated 2021 cost for recoating the existing 350,000-gallon reservoir is $390,000, as summarized on Figure 6-5.

Water Distribution System Improvements

The City's water distribution system is in relatively good condition, and no major piping related improvements are recommended. Chapter 5 of this Water System Master Plan Update outlines areas of potentially undersized main lines and a few areas with dead-end lines. If any of these areas require upgrades in the future due to increased water system demands or pipe condition deterioration, it is recommended the pipelines be replaced with at least a minimum 8-inch diameter main line.

The recommended distribution system improvements include an upgrade of the City's water meters and installation of an estimated 20 fire hydrants in areas lacking sufficient fire hydrant coverage and in areas where old hydrants need upgraded. In addition, an estimated 35 new 8-inch valves are needed to replace older valves and to provide improved piping isolation capabilities. The existing booster pump system that serves the higher elevation area on the east side of Echo needs to be completely replaced. The year 2021 estimated costs for these items (except the booster pump system), are summarized on Figure 6-6. Recommended distribution system improvements include the following:

1. The City utilizes an existing booster pump system, located in a buried vault, to serve the higher elevation residential area on the east side of the City. The booster pump system has experienced various electrical and controls issues in recent years, and some of the pumps are not in operational condition. The booster pump system needs replaced with an aboveground booster pump station where the pumps, piping, valves, electrical, etc., can be properly housed in a structure to provide for improved operating conditions as well as significantly improved conditions for maintenance. The City will construct the new booster pump system within the Well No. 5 pump station discussed earlier in this chapter. A new water main line will need to be extended from the booster pump station to the distribution system grid on Golf Course Road. The costs for the new booster pump system and water line are included in the total estimated costs for the Well No. 5 pump station summarized on Figure 6-2.
2. The City's water service meters were installed in 2004. Water meters typically last between 15 and 20 years before requiring replacement, so the existing meters are either at or very close to the end of their service life. The City needs to upgrade their water meters to a new radio read water meter system. The new water meter upgrade will allow the City to read meters from City Hall, saving considerable time each month. The distribution system also needs a few additional fire hydrants to provide improved hydrant coverage and to replace some of the older fire hydrants. The distribution system also needs some existing valves replaced as well as new valves installed to provide improved system isolation during water main line work. The total estimated 2021 cost for a new radio read meter system, along with several new hydrants and main line valves, is $680,000 as summarized on Figure 6-6.

Cost Summary

The year 2021 estimated costs for the improvements recommended in this chapter are outlined on Figures 6-1 through 6-6. The overall estimated project costs for the water system improvements are summarized on Figure 6-7. The overall cost summary included on Figure 6-7 includes other cost-related

items that typically occur with a larger infrastructure project, such as cultural resources clearances, permitting, Operation and Maintenance (O&M) Manuals, Record Drawings, GIS database work, etc.

The total project costs include construction, administrative, legal, engineering, and contingencies. The year 2021 estimated costs presented in detail on Figure 6-7 are briefly summarized hereafter:

• Stanfield water supply system	$820,000
• Well No. 5/booster pump station	$1,485,000
• Well No. 4 improvements	$170,000
• 500,000-gallon reservoir and transmission line	$2,616,000
• Recoat existing 350,000-gallon reservoir	$390,000
• Meters, hydrants, valves	$680,000
Total Year 2021 Estimated Costs	$6,186,000
Total Year 2023 Estimated Costs	$ 6,820,000

The year 2021 estimated costs were projected to the year 2023 assuming an annual inflation rate of 5 percent to account for regularly increasing project costs. If the City does not complete the proposed improvements by 2023, it is recommended the estimated costs be increased by an annual inflation rate to account for potential increases in project costs to the year that construction occurs.

General Operation and Maintenance Recommendations

As the City of Echo continues to develop and expand its water system, diligent O&M activities for the various system components will be critical to providing a reliable water system that is operated efficiently. One of the most valuable tools in analyzing present trends and projecting future needs of a water system and for general equipment upkeep is to have accurate and complete records. Data should be kept by the City on such items as daily flows from master meters, water quality tests, as-built records on all underground piping, service line and tap locations, etc. Methodically kept records will be a tremendous asset to the City in operating and maintaining the water system.

The following recommendations are intended to provide general guidance to the City and are not intended to constitute a comprehensive list of O&M activities related to the City's water system. Several of the recommendations are related to the recommended improvements previously discussed in this chapter. The recommended O&M activities and suggested recurrence intervals are as follows:

- Obtain water quality tests as required by regulations and submit the results to the Oregon Health Authority - Drinking Water Services.
- Record daily water meter readings at every supply well. Try to record the readings at the same time of day so the data from each well are comparable over equal time periods.
- Periodically record static and pumping water levels at each supply well.
- Record daily chemical consumption to track chemical use relative to water flow data.
- Keep maintenance records on all valves, fire hydrants, and miscellaneous system components in the City.

- Exercise fire hydrants once per year and record information on their condition.
- Exercise valves once per year and record operation data and any problems experienced.
- Develop an annual replacement schedule for individual service meters in the system.
- Exercise pumps per the manufacturer's recommendations.
- Clean and inspect the reservoir every 5 to 7 years, or as often as required.
- Annually review water loss to identify potential leaks or improperly operating water meters.

Implementation and continued practice of these measures, many of which the City of Echo already completes, should help the City's water system to continue to serve the community for many years.

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
STANFIELD WATER SUPPLY SYSTEM
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 29,000	All Req'd	$ 29,000
2	Booster Pump Station Improvements	LS	180,000	All Req'd	180,000
3	6-inch Transmission Line	LF	50	3,300	165,000
4	Interstate 84 Bores	LS	200,000	All Req'd	200,000
5	6-inch Valve	EA	1,500	4	6,000
6	Surface Restoration	SY	10	2,000	20,000
				Total Estimated Construction Cost	**$ 600,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	210,000
				Water Rights Work	10,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 820,000**

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
STANFIELD WATER
SUPPLY SYSTEM

FIGURE
6-1

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
WELL NO. 5 / BOOSTER PUMP STATION
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 100,100	All Req'd	$ 100,100
2	Site Work, Gravel, Fencing	LS	35,000	All Req'd	35,000
3	Well Pump, Motor, Column, etc.	LS	65,000	All Req'd	65,000
4	Pump Station Building	LS	348,000	All Req'd	348,000
5	Building Piping	LS	80,000	All Req'd	80,000
6	Building Electrical	LS	165,000	All Req'd	165,000
7	Standby Generator	LS	75,000	All Req'd	75,000
8	Booster Pumps	LS	115,000	All Req'd	115,000
9	Control System	LS	50,000	All Req'd	50,000
10	Piping (8-inch)	LF	55	1,100	60,500
11	8-inch Valve	EA	1,600	4	6,400
				Total Estimated Construction Cost	**$ 1,100,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	385,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 1,485,000**

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CITY OF
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WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
WELL NO. 5 / BOOSTER
PUMP STATION

FIGURE
6-2

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
WELL NO. 4 IMPROVEMENTS
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 6,300	All Req'd	$ 6,300
2	Demolition	LS	15,000	All Req'd	15,000
3	Wellhead Vault/Improvements	LS	40,000	All Req'd	40,000
4	Exterior Electrical Panel	LS	45,000	All Req'd	45,000
5	Controls	LS	19,700	All Req'd	19,700
				Total Estimated Construction Cost	**$ 126,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	44,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 170,000**

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

ESTIMATED COST
WELL NO. 4 IMPROVEMENTS

FIGURE
6-3

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
500,000-GALLON RESERVOIR AND TRANSMISSION LINE
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 99,200	All Req'd	$ 99,200
2	500,000-gallon Reservoir	LS	900,000	All Req'd	900,000
3	Site Work, Piping, Gravel, Fencing	LS	175,000	All Req'd	175,000
4	Controls	LS	100,000	All Req'd	100,000
5	Access Road	LS	20,000	All Req'd	20,000
6	12-inch Transmission Line	LF	100	4,500	450,000
7	12-inch Valve	EA	1,800	6	10,800
8	Surface Restoration	SY	10	3,300	33,000
9	Canal Crossing	EA	75,000	2	150,000
				Total Estimated Construction Cost	**$ 1,938,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	678,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 2,616,000**

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CITY OF
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WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
500,000-GALLON RESERVOIR AND
TRANSMISSION LINE

FIGURE
6-4

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
RECOAT EXISTING 350,000-GALLON RESERVOIR
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 14,500	All Req'd	$ 14,500
2	Clean, Sandblast, Recoat Interior and Exterior of Existing 350,000-gallon Reservoir	LS	259,500	All Req'd	259,500
3	Control System	LS	15,000	All Req'd	15,000
				Total Estimated Construction Cost	**$ 289,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	101,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 390,000**

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CITY OF
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WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
RECOAT EXISTING
350,000-GALLON RESERVOIR

FIGURE
6-5

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
ESTIMATED COST
METERS, HYDRANTS, VALVES
(YEAR 2021 COSTS)

NO.	DESCRIPTION	UNIT	UNIT PRICE	ESTIMATED QUANTITY	TOTAL PRICE
1	Mobilization (5%)	LS	$ 25,000	All Req'd	$ 25,000
2	Radio Read Meter	EA	650	290	188,500
3	Towers/Software, Equipment, etc.	LS	91,500	All Req'd	91,500
4	Fire Hydrant Assembly	EA	4,500	20	90,000
5	6-inch Water Line	LF	50	600	30,000
6	8-inch Valve	EA	1,400	35	49,000
7	Gravel Surface Restoration	SY	20	500	10,000
8	Asphalt Surface Restoration	SY	50	400	20,000
				Total Estimated Construction Cost	**$ 504,000**
				Administration, Legal, Engineering, and Contingencies @ 35%	176,000
				TOTAL ESTIMATED PROJECT COST (2021)	**$ 680,000**

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

ESTIMATED COST
METERS, HYDRANTS, VALVES

FIGURE
6-6

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
SUMMARY OF ESTIMATED COSTS
WATER SYSTEM IMPROVEMENTS

FIGURE NO.	DESCRIPTION	2021 ESTIMATED CONSTRUCTION COST	2021 CUMULATIVE PROJECT ESTIMATED COST
Supply System Improvements			
6-1	Stanfield Water Supply System	600,000	$ 600,000
6-2	Well No. 5 / Booster Pump Station	1,100,000	1,700,000
6-3	Well No. 4 Improvements	126,000	1,826,000
Storage/Transmission Improvements			
6-4	500,000-gallon Reservoir and Transmission Line	1,938,000	3,764,000
6-5	Recoat Existing 350,000-gallon Reservoir	289,000	4,053,000
Distribution System Improvements			
6-6	Meters, Hydrants, Valves	504,000	4,557,000
Other Items			
	Legal	20,000	
	Water Rights	10,000	
	GIS Services	25,000	
	Permitting	35,000	
	Cultural Resources Evaluation/Monitoring	45,000	
	Operation and Maintenance Manual/ Record Drawings	20,000	
	Design Engineering	440,000	
	Other Engineering	40,000	
	Construction Engineering	510,000	
	Land and Right-of-Way	30,000	
	Construction Contingency	454,000	
	Subtotal Other Items	**$ 1,629,000**	
	Total Estimated Cost (Year 2021)	**$ 6,186,000**	
	Total Estimated Cost (Year 2023)	**$ 6,820,000**	

Note: 2021 costs projected to year 2023 assuming 5 percent annual inflation.

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE

SUMMARY OF ESTIMATED COSTS
WATER SYSTEM IMPROVEMENTS

FIGURE 6-7

Chapter 7 - Project Financing and Implementation

Introduction

This chapter evaluates the financial status of the City of Echo's Water Department and outlines alternatives for financing the City's water system improvements, should the City elect to pursue an improvements project. A summary of state and federal funding programs is presented, including a review of funding options available to the City for water system improvements. To construct some or all of the proposed improvements, a financing plan acceptable to the City of Echo should be developed to complete the improvements. Because of the estimated cost of the improvements, financing resources are anticipated to include a low interest loan coupled with grant funds, if available.

Although a detailed analysis of Echo's current water rate structure is beyond the scope of this Water System Master Plan (WSMP) Update, some discussion of the existing rate structure and evaluation of current and future water system budget is included for the purpose of supporting calculations for funding scenarios. As a general rule, most utility rate structures include funding for day-to-day operation and maintenance (O&M) items, payroll costs for staff, and a set-aside for both equipment replacement and future improvements. A summary of the current water rate structure is presented hereafter.

Current Water Use Rates and Revenue

The O&M of the existing water system is financed through the City's annual budget. Water system revenue is obtained primarily from water user fees. A copy of the City of Echo's water rate resolution is presented in Appendix J. The water rates (per month) in effect at the time this WSMP Update was developed are summarized on Table 7-1.

TABLE 7-1
MONTHLY WATER RATE INFORMATION

Usage Type	Allowable Use for Base Fee (gallons)	Monthly Cost	Out of Town Monthly Cost
Residential	5,000	$33.00	$66.00
Commercial	5,000	$33.00	$66.00

Note: Overage use per 1,000 gallons per month beyond the base use of 5,000 gallons is $1 per month.

The City of Echo's water accounts, as of 2021, are summarized on Table 7-2.

TABLE 7-2
WATER ACCOUNT INFORMATION

Account Type	Number of Accounts	Percent of Total Accounts
Residential	253	91.0
Commercial	17	6.1
Industrial	0	0
Public	7	2.5
Golf Course	1	0.4
TOTAL	**278**	**100.0**

As shown on Table 7-2, residential water users account for approximately 91.0 percent of the total water users, while commercial users account for approximately 6.1 percent.

The revenue generated from the City's water rates and connection fees is presented on Table 7-3 below. Water rate revenue generated from water rates only in fiscal year 2019-20 was $155,970. Assuming an annual water revenue amount of $155,970 for fiscal year 2019-20 and assuming 278 total connections, the City currently has an average monthly water cost of approximately $46.75 per connection.

TABLE 7-3
WATER DEPARTMENT REVENUE

Fiscal Year	Total Revenue from Water Rates and Connection Fees
2017-18	152,124
2018-19	153,400
2019-20	157,477

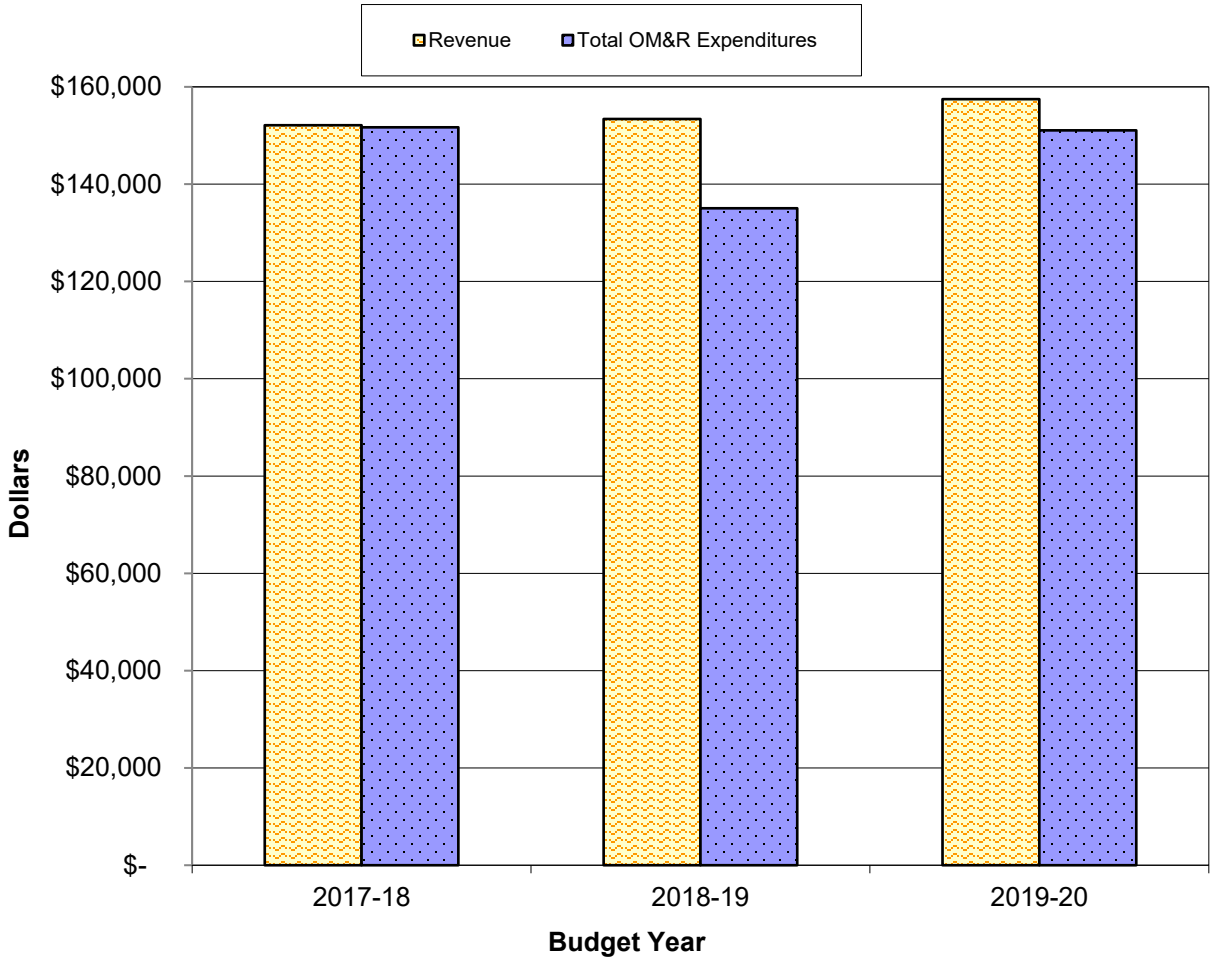
Current Financial Status

The annual cost of operating and maintaining the City's water system is summarized on Figure 7-1. The costs presented were obtained from the City's financial statements and include all costs for the water system, such as operation, maintenance, and replacement (OM&R), staff payroll, reserve fund allocations, and capital outlay expenses.

Historical and Projected Budget Trends

Based on information obtained from the City, Water Department revenue has exceeded expenditures for the last three years. Chart 7-1 is a graphical plot of the City of Echo's water system budget, showing revenue and expenditures. With the proposed improvements, O&M expenditures will increase. These increases must be reflected in future budgeting. To account for these increases, the future annual O&M budget has been set at $165,000. This annual O&M budget may need to be increased each year to cover inflation and other rising costs.

CHART 7-1
HISTORICAL AND PROJECTED WATER BUDGET



Transfers to Other Funds

The City routinely allocates funds to a water reserve account for anticipated water system maintenance and replacement. It is recommended the City continue this practice, and, if possible, increase the annual allocation to the reserve fund. This is an excellent practice that will help with future water system expenses, emergencies, and equipment replacement such as fire hydrants, well pumps, electrical controls, pipeline failures, etc. Pump replacement, water meter repairs, line repairs, hydrant upgrades, etc., are all items that may require the use of reserve funds. Typically, reserve and replacement funds are not sufficient to fund major system improvements such as a new well, new pump station, new reservoir, etc.

Existing Debt

The City currently has no debt on the water system.

Water System Improvements Funding

To pursue the water system improvements discussed in Chapter 6, the City will need to ensure sufficient funding for existing O&M costs is in place prior to seeking any outside funding assistance for improvements. Revenue has exceeded expenditures over recent years. With proposed improvements, a water rate increase is needed to generate adequate revenue to cover expenditures. A number of state and federal grant and loan programs can provide assistance for municipal improvement projects to cities, counties, and utility districts. These programs offer various levels of funding aimed at different types of projects. These include programs administered by Rural Development (RD) under the U.S. Department of Agriculture (USDA), the U.S. Economic Development Administration (EDA), Business Oregon, and others.

These agencies can provide low interest loan funding and possibly grant funding for assisting rural communities on public works projects. Some of the funding programs provide funding only if the improvements address documented water quality compliance issues. There are potential opportunities for low interest loan funds, possibly coupled with grant funds, for completion of many of the City's recommended water system improvements.

Summary of Potential Funding Programs

The following section briefly summarizes the primary funding programs available to assist the City with a water system improvements project. Most of these agencies will require an increase in water rates to support a loan for water system improvements, both as a condition of receiving monies and prior to being considered for special (lower) interest rates and/or grant funds. It should be noted that the monthly user rates discussed in this section can represent a combination of monthly usage fees and taxes.

Federal Grant and Loan Programs

U.S. Department of Agriculture Rural Development

The USDA RD program can provide financial assistance to communities with a population of less than 10,000 through both loans and direct grants. Under the loan program, the agency purchases local bonds. The interest rate for these bonds is dependent on the median household income (MHI) of the community and other factors and varies from year to year based on other economic factors nationally. Due to past changes in the funding environment and an increased competition for funds, RD now sets a limit on the maximum amount of loan dollars a community can request. Currently the maximum loan amount is 25 percent of the total funding available statewide, which would result in a maximum project loan in the range of $4,500,000. The interest rate is currently approximately 3 percent with a repayment period of up to 40 years. Application for this type of funding is a lengthy process involving development of an Environmental Report and a detailed funding application.

The agency presently requires communities to establish average residential user costs in the range of $48 to $50 per month before the community qualifies for grant funds. It should be noted that loans without grant funds may be acquired from RD that may not require rates to reach this level, depending on the results of an RD funding analysis. The user costs must provide sufficient revenue to pay for all system OM&R costs and pay for the local debt service incurred as a result of the project. All project costs above this level may be paid for by grant funds, up to

given limits, which are usually not more than 45 percent of the total project cost. The objective of the RD loan/grant program is to keep the cost for utilities in small, rural communities at a level similar to what other communities are paying.

Another of the agency's requirements is that loan recipients establish a reserve fund of 10 percent of the bond repayment during the first 10 years of the project, which can make the net interest rate somewhat higher. The RD program requires either revenue or general obligation bonds be established through the agency for the project (refer to the Local Financing Options section of this chapter for further discussion). These bonds can usually be purchased for a period of 40 years if grant funding is also received. A loan from RD is likely a good option for the City of Echo to implement water system improvements.

Economic Development Administration

The EDA provides grant and loan funds to public agencies for projects that stimulate the economy of an area. The overall goal of the program is to create or retain jobs. The EDA has invested a great deal of money in Oregon to fund public works improvement projects in areas where new industries were locating or planned to locate in the future. In addition, the agency has a program known as the Public Works Impact Program to fund projects in areas with extremely high rates of unemployment. This program is targeted toward creating additional jobs and reducing the unemployment rate in the area. Unless the City's water system improvements can be linked directly to industrial expansion or job retention, the City will not be in a competitive position to receive funding under these EDA programs.

State Grant and Loan Programs - Business Oregon

Safe Drinking Water Revolving Loan Fund

This is primarily a loan program for the construction and/or improvement of public and private water systems to address regulatory compliance issues. This is accomplished through two separate programs: the Safe Drinking Water Revolving Loan Fund (SDWRLF) for collection, treatment, distribution, and related infrastructure, and the Drinking Water Protection Loan Fund (DWPLF) for protection of sources of drinking water prior to system intake. The SDWRLF program normally lends up to $6 million per project. Loan amounts greater than $6 million may be available. The standard SDWRLF loan term is 20 years or the useful life of project assets, whichever is less. Loan terms up to 30 years may be available for "disadvantaged communities." This program offers subsidized interest rates for all successful projects. Interest rates for a standard loan start at only 80 percent of the state/local bond rate. Interest rates for loans to disadvantaged communities are based on a sliding scale between the interest rate for a standard loan and one percent. Communities may be eligible for some of the principal on their SDWRLF loan to be "forgiven." This Forgivable Loan feature is similar to a grant and is offered to disadvantaged communities. Special consideration, including partial principal forgiveness, is provided to projects qualifying or having Green Project Reserve components. The SDWRLF is a good option for Echo to consider for the proposed water system improvements project.

The DWPLF program normally lends up to $100,000 per project. Loan amounts greater than $100,000 may be available. A grant may be available from the DWPLF depending on available funds.

Water/Wastewater Financing Program

This is a loan and grant program that provides for the design and construction of public infrastructure when needed to ensure compliance with the Safe Drinking Water Act or the Clean Water Act. To be eligible, a system must have received, or is likely to soon receive, a Notice of Non-Compliance by the appropriate regulatory agency associated with the Safe Drinking Water Act or the Clean Water Act.

While primarily a loan program, grants are available for municipalities that meet the eligibility criteria. The loan/grant amounts are determined by a financial analysis of the applicant's ability to afford a loan (debt capacity, repayment sources, current and projected utility rates, and other factors). The maximum loan term is 25 years or the useful life of the infrastructure financed, whichever is less. Loan amounts are determined by financial review and may be offered through a combination of direct and/or bond funded loans. Loans are generally repaid with utility revenues or voter approved bond issues. A limited tax general obligation pledge may also be required. "Credit worthy" applicants may be funded through the sale of state revenue bonds. The maximum grant is $750,000 per project based on a financial analysis. An applicant is not eligible for grant funds if the applicant's annual MHI is equal to or greater than 100 percent of the state average MHI for the same year.

Community Development Block Grant Program

The primary objective of the program is the development of viable (livable) urban communities by expanding economic opportunities and providing decent housing and a suitable living environment principally for persons of low and moderate income.

This is a grant program. The state receives an annual allocation from Housing and Urban Development (HUD) for the Community Development Block Grant (CDBG) program. Grant funding is subject to applicant need, availability of funds, and any other restrictions in the state's Method of Distribution (i.e., program guidelines). It is not possible to determine how much, if any, grant funds may be awarded prior to an analysis of the application and financial information.

Eligibility for the CDBG program requires a low to moderate percent income of greater than 51 percent. The City of Echo's percentage of low to moderate income is 37.41 percent based on the 2020 HUD Low/Mod Income Summary Data, so funding from the CDBG program is not available to the City. The rate threshold to qualify for grants for this program is now based on a five-year average MHI. Echo's five-year average 2018 MHI was $46,125, which equates to a monthly cost threshold of $48.05. The City's average monthly residential rates would also need to exceed this threshold to qualify for a CDBG grant. The rate requirement and the percentage of low to moderate income referenced by the Infrastructure Finance Authority (IFA) to determine CDBG eligibility are subject to change annually. Therefore, it will be important for the City to periodically monitor these criteria.

Special Public Works Fund

The Special Public Works Fund (SPWF) program was established by the Oregon Legislature in 1985 to provide primarily loan funding for municipally owned infrastructure and other facilities

that support economic and community development in the state. Loans and grants are available to municipalities for planning, designing, purchasing, improving, and constructing municipally owned facilities.

For design and construction projects, loans are primarily available; however, grants are available for and limited to projects that will create and/or retain traded-sector jobs. A traded-sector industry sells its goods or services into nationally or internationally competitive markets. The maximum grant award is $500,000 or 85 percent of the project cost, whichever is less. The grant amount per project is based on up to $5,000 per eligible job created or retained. Loans range in size from less than $100,000 to $10 million. The SPWF is able to offer very attractive interest rates that reflect tax-exempt market rates for very good quality creditors. Loan terms can be up to 25 years or the useful life of the project, whichever is less. Unless the City's project can be tied to job creation, the SPWF is not a potential funding source for the City's proposed water system improvements project.

For Business Oregon Programs - Contact Regional Development Officer

Since program eligibility and funds availability may change from year to year, potential applicants are encouraged to contact their respective Regional Coordinator to obtain the most accurate and up-to-date information for each program.

Preliminary Equivalent Dwelling Unit Analysis

When projecting future revenue for a water system, an Equivalent Dwelling Unit (EDU) analysis is usually completed. One EDU is intended to represent the average residential water use for a given city. As an example, each residential connection in the City of Echo would represent one EDU. A commercial or industrial connection with water use amounts similar to the average residential use amount would also be considered one EDU. A commercial connection such as a cafe, with three times the typical water usage as an average residential connection, would be considered three EDUs.

Completion of a detailed EDU analysis was outside the scope of this WSMP Update. For potential debt capacity calculations, water connections were used hereafter instead of EDUs.

Funding agencies typically use an EDU determination as the basis for estimating future yearly revenues and debt capacity for a city. The EDU determination is intended to equitably distribute water costs among all users. The EDU determination helps funding agencies determine the maximum loan (debt) amount a city can afford to service.

Debt Capacity

To determine the City of Echo's ability to fund a water system improvements project, Figure 7-2 was prepared. Several assumptions were made, as follows:

1. Water user fee revenue is based on the current connections of 278 that result in an average water system monthly cost of $46.75 per connection.
2. The estimated OM&R was determined from the historical trend line shown on Chart 7-1. From the trend line projection on the chart, it can be seen that in the year 2022-23, the City can expect their OM&R costs to be approximately $165,000.

3. Future debt service was calculated based on typical RD financing (3.0 percent interest for a 40-year repayment period), a typical Water/Wastewater loan (at 3.0 percent interest for a 20-year repayment period), a typical SDWRLF loan (at 2.5 percent interest for a 20-year repayment period), and a Disadvantaged Community SDWRLF loan (at 1.0 percent interest for a 30 year repayment period), depending on which financing program is able to assist the City.

The data shown on Figure 7-2 provide a general idea of the amount of debt the City could afford to service at various monthly water rates. The data indicate the City could afford to service a loan in the range of $600,000 to $900,000 with a base residential water rate of approximately $50 per month. The average monthly rate at this base rate would be considerably higher due to overage use by several water system customers. A Disadvantaged Community SDWRLF loan could potentially provide a loan of approximately $1,058,000 with a similar water rate. It is apparent the City will need to secure grant funds and possibly additional outside funding for the project to be financially feasible while keeping rate increases from being too high. The anticipated total costs for the recommended improvements would result in monthly water system costs significantly exceeding reasonable monthly rates. The City of Echo will need to secure additional outside funding assistance, beyond typical funding agency assistance, in order to complete all recommended improvements.

It should be noted that if construction of improvements is delayed until after 2023, project costs could increase and user rates required to support associated loans could, as a result, be higher.

Average monthly water costs of $48 to $50 are currently required by RD to provide a combination of grant and loan monies for projects of this type, which indicates the City may be in a position to receive grant funds from this program once this rate threshold is reached. Currently, IFA is using 1.25 percent of a community's five-year American Community Survey average MHI as the basis for residential monthly water user cost requirements to be eligible for grant funding. In the City of Echo's case, the five-year average MHI is $46,125. This MHI results in a monthly residential water user cost of $48.05. IFA's residential rate requirement is also based on an assumed residential use of 7,500 gallons per month. The City's residential charge for 5,000 gallons of water use is currently $33. With the overage cost of $1 per 1,000 gallons, the City of Echo's current cost for 7,500 gallons of water use, per month, is $35.50. Therefore, in order to reach the 1.25 percent MHI threshold, the City would need to consider raising water rates by approximately $12.50 per month to be potentially eligible for low interest loans and/or grant funds through IFA.

The City could also service similar debt amounts using property taxes, which would result in increased annual property taxes for all City residents, businesses, and industries. Some cities prefer a combination of property taxes and user fees when funding improvement projects to help balance the equality of fee assessments throughout the community (i.e., those customers with higher value properties would pay a higher percentage of the improvements cost on a tax basis than they would with a user fee supporting system improvements).

It is important to note that the estimated loan capacities shown on Figure 7-2 are based on the current estimate of 278 connections while considering the current overage water use. If funding is pursued for a water system improvements project, a more detailed EDU analysis will need to be completed. It should be recognized that this is only a very preliminary analysis and the financial assumptions and figures presented in this WSMP Update should be refined as project implementation proceeds in the future and as agreements are worked out with funding agencies.

Project Funding

One-Stop Meeting and Project Notification and Intake Form

A One-Stop meeting can be a valuable process through which a city can evaluate potential funding scenarios for proposed improvements. One-Stop meetings are typically scheduled in Salem where representatives of IFA and other funding agencies meet with a city to discuss the project and funding needs and identify the funding program best suited for the project. To avoid requiring city representatives to travel to Salem, IFA can hold these meetings by teleconference. IFA then invites a city to submit a Project Notification and Intake Form (PNIF) to outline a city's project, including the needs, project requirements, affected area, estimated project cost, time frame, schedule, etc. IFA evaluates the project based on information presented on the PNIF to determine the best funding program suited to the project.

At the conclusion of a One-Stop meeting, a funding agency best suited to meet a city's needs is identified. Then, this funding agency works with the city to help prepare a funding application for their program. It is recommended that the City of Echo attend a One-Stop meeting to evaluate potential project funding sources.

Local Financing Options

Depending on the ultimate project scope and agency from which the City may obtain loan and/or grant funds, the City may need to develop authorization to incur debt for the needed project improvements. The need to develop authorization to incur debt depends on funding agency requirements and provisions in the City Charter. Bonding is not normally required by most state funding programs such as the SDWRLF; however, bonding is required by RD.

There are generally two options the City may use for its bonding authority: general obligation bonds or revenue bonds. General obligation bonds require a vote of the people to give the City the authority to repay the debt service through tax assessments, water rate revenue, or a combination of both. The taxing authority of the City provides the guarantee for the debt. Revenue bonds are financed through revenues of the water system. Authority to issue revenue bonds can come in two forms. One would be through a local bond election similar to that needed to sell a general obligation bond, and the second would be through Council action authorizing the sale of revenue bonds, if the City Charter allows. If citizens do not object to the bonding authority resolution during a 60-day remonstrance period, the City would have authority to sell these revenue bonds.

It should be noted that Oregon law currently requires a 50 percent voter turnout to pass a property tax measure, unless the election is held in November of an even-numbered year. November elections in even-numbered years require only a majority of those who voted to pass a property tax measure. Due to current tax measure limitations in the State of Oregon, careful consultation with experienced, licensed bonding attorneys should be made if the City begins the process of obtaining bonding authority for the proposed water system improvements.

Future Water Rate Adjustments

Water Department expenditures typically increase every year due to inflation. Some cities have implemented an automatic annual water rate increase to help offset the negative budget effects that occur due to increasing department costs. Such an increase could be tied to a published annual inflation

rate from an official source, or a set percentage increase per year could be adopted so it automatically occurs each year. Typical average inflation is usually in the 3 to 4 percent range per year. However, inflation can vary widely depending on economic conditions and other factors. For comparison purposes, the City's current water rate, for a volume of 5,000 gallons, is $33 per month per residential connection. Three percent of this rate would equate to $0.99 per year. Most citizens would accept an automatic rate increase each year if it were in this range, resulting in less impact when compared to a higher increase that is completed less frequently. It is recommended the City consider an annual inflationary increase to the base water rate so the Water Department revenue can more easily keep up with increasing operational costs.

Project Development Action Items and Implementation Plan

The following project development action items and proposed Implementation Plan will need to be made by the City of Echo to implement the desired water system improvements project. The steps outlined are general in nature and include the major steps that need to be undertaken. It should be noted that the steps outlined hereafter may be different if the City elects to delay the project and pursue improvements in the future.

Project Development Action Items

1. The City will need to adopt this WSMP Update and the recommended improvements.
2. The City will need to update the Comprehensive Plan and other planning documents, as required, to reference the newly adopted WSMP Update.
3. The City will need to contact regional funding representatives to discuss potential funding options for the proposed improvements.
4. The City will need to hold public information meetings to inform its citizens of the need for and scope of the project, to answer questions, and to explain the need for increases in user fees.
5. Working with the best identified funding opportunity and agency, the City will need to develop a funding plan for the desired improvements.
6. The City will need to prepare funding applications for the water system improvements project and submit them to the appropriate funding agencies. The City will need to budget appropriate up-front funds to go through the project development and funding application process.

Implementation Plan

Should the City wish to proceed with the identified water system improvements, the Implementation Plan shown below on Table 7-4 outlines the key steps the City would need to undertake. It is important to note that it may take three to four years from the date the City decides to proceed with an improvements project until the project is completed and serving the community. The following Implementation Plan uses winter 2021-22 as a starting date and assumes a three-year implementation schedule, which is aggressive.

TABLE 7-4
IMPLEMENTATION PLAN

Item		Completion Date
1.	Finalize and adopt this WSMP Update.	Winter 2021-22
2.	Initiate funding discussions with IFA and RD.	Spring 2022
3.	Submit funding application(s) to agencies.	Summer 2022
4.	Finalize project funding.	Fall and Winter 2022
5.	Design improvements.	Spring to Fall 2023
6.	Advertise, bid, and award improvements.	Winter 2023/24
7.	Construct improvements.	Spring to Late Summer 2024
8.	Close out project.	Fall 2024

The key to implementing the City of Echo's water system improvements is the ability of the City to acquire funding that will allow water rates to remain as low as possible. The City should work closely with its citizens through public meetings to inform them of the system needs and the necessity for increased water user costs. If a project in the range of the estimated year 2023 improvements cost of $6,820,000 is pursued, it appears the City will need to plan on raising average residential water costs to at least $50 per month, depending on potential low interest loan and grant fund availability, to help fund the proposed improvements. It should be noted that these average monthly water costs include base rates and overage rates. Assessing property taxes to help fund the water system improvements would reduce this rate requirement.

As discussed earlier in this WSMP Update, the City of Echo has not completed major water system improvements in approximately 27 years. Significant infrastructure improvement projects typically occur every 20 to 25 years to address system deterioration, growth, and increased demands. Improvements can be necessary sooner depending on system needs. Completion of the preferred water supply improvements will address the current lack of supply reliability and will allow utilization of the Stanfield water supply source. Overall, the proposed water system improvements will provide a much improved and more reliable water system that should serve the City of Echo for many years.

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
HISTORICAL WATER DEPARTMENT FUND

Fiscal Year	Revenue			Expenditures					Net Operating Income (Loss)
	Fee Revenue	Miscellaneous Income	Total Revenue	Personnel Services	Materials and Services	Capital Outlay	Transfer to Reserve	Total OM&R Expenditures[1]	
2017-18	$ 148,865	$ 3,259	$ 152,124	$ 79,403	$ 59,920	$ 7,359	$ 5,000	$ 151,682	$ 442
2018-19	$ 149,931	$ 3,469	$ 153,400	$ 76,140	$ 48,923	$ 6,970	$ 3,000	$ 135,033	$ 18,367
2019-20	$ 155,970	$ 1,507	$ 157,477	$ 82,083	$ 57,966	$ 3,000	$ 8,000	$ 151,049	$ 6,428

Notes:
[1]OM&R refers to Operation, Maintenance, and Replacement.

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
HISTORICAL WATER
DEPARTMENT FUND

FIGURE
7-1

CITY OF ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
PRELIMINARY WATER RATE ANALYSIS FOR LOAN CAPACITY

Rates		Expenditures		Financing Options			
Month Base Rate[1]	Revenue[2]	Estimated OM&R Costs[3]	Revenue Available for Future Debt Service	Rural Development Loan Capacity[4]	Water/ Wastewater Loan Capacity[5]	SDWRLF Standard Loan Capacity[6]	SDWRLF Disadvantaged Community Loan Capacity[7]
$35	$155,958	$165,000	$0	$0	$0	$0	$0
$40	$172,638	$165,000	$7,638	$177,000	$114,000	$119,000	$197,000
$45	$189,318	$165,000	$24,318	$562,000	$362,000	$379,000	$628,000
$50	$205,998	$165,000	$40,998	$948,000	$610,000	$639,000	$1,058,000
$55	$222,678	$165,000	$57,678	$1,333,000	$858,000	$899,000	$1,489,000
$60	$239,358	$165,000	$74,358	$1,719,000	$1,106,000	$1,159,000	$1,919,000

[1] The current base rate of $33.00 for 5,000 gallons results in an average monthly cost of $46.75 per connection for fiscal year 2020-21 (based on 278 water service accounts and a water sales revenue of $155,970).

[2] Assumes 278 accounts with an average monthly water cost of approximately $46.75. Values rounded to the nearest $100.

[3] Projected budget year 2022-23 OM&R cost of $160,000. See discussion in Chapter 7.

[4] Assumes loan funding at 3.0 percent for 40 years (loan capacity determined after 10 percent reserve payment removed from revenue available for debt service). Values rounded to nearest $1,000.

[5] Assumes loan funding at 3.0 percent for 20 years. Values rounded to the nearest $1,000.

[6] Assumes loan funding at 2.5 percent for 20 years. Values rounded to the nearest $1,000.

[7] Assumes loan funding at 1.0 percent for 30 years. Values rounded to the nearest $1,000.

OM&R = Operation, Maintenance, and Replacement.
SDWRLF = Safe Drinking Water Revolving Loan Fund

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CITY OF
ECHO, OREGON
WATER SYSTEM MASTER PLAN UPDATE
PRELIMINARY WATER RATE ANALYSIS FOR LOAN CAPACITY

FIGURE
7-2

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Appendix F	Oregon Health Authority - Drinking Water Services Water Quality Testing Summaries
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APPENDIX A
2020 Consumer Confidence Report

Oregon Health Authority

CCR CERTIFICATION FORM

OHA Drinking Water Services

Submit to OHA-DWS at Time of CCR Delivery or No Later than October 1 *see footnote

Community Water System Name:

PWS ID No: 41- 00270 For calendar year: 2020

The community water system named above hereby confirms that its Consumer Confidence Report has been distributed to customers (and appropriate notices of availability have been given). Further, the system certifies that the information contained in the report is correct and consistent with the compliance monitoring data previously submitted to the primacy agency.

CCR certified by name: Chad Echo Title: Public Works Director
Phone No: (541) 376-6038
Date CCR certified: 4-25-2021 Date CCR distributed to customers: 4-26-2021

CCR Delivery Certification (check all items below that apply)

- [x] Paper CCR was distributed by mail or other direct delivery method to all bill-paying customers
- [x] Electronic delivery. Check box below and describe how customers may request a paper copy:
  - [x] Notification ([x] mail or [ ] email - check all that apply) that CCR is available on website: _____
  - [ ] CCR sent as an attachment to email (for example, portable document format-PDF)
  - [x] CCR sent as an embedded image in body of email
- [x] "Good faith" efforts were used to reach non-bill paying consumers.
  Those efforts may include a mix of the following methods, as recommended by OHA-DWS:
  - [x] Posting the CCR on a publicly accessible Internet site at website: _____ (required for systems serving at least 100,000 persons)
  - [x] Mailing the CCR to postal patrons within the service area
  - [x] Mailing a notification (for example, postcard) to postal patrons within the service area that the CCR is available on website: _____
  - [x] Advertising availability of the CCR in news media
  - [x] Publication of CCR in local newspaper
  - [x] Posting the CCR in public places. Locations: _____
  - [x] Delivery of multiple copies to single bill addresses serving several people such as: apartments, businesses, and large private employers
  - [x] Delivery to community organizations
  - [x] Electronic newsletter or listserv, or notice of availability via social media outlets

Email: dwp.dmce@state.or.us **Mail:** OHA-Drinking Water Services P.O. Box 14350, Portland, OR 97293-0350 **Fax:** (971) 673-0694

* If the CCR has been distributed, it is recommended that this form be sent to Drinking Water Services at the same time a copy of the CCR is sent to the program; but by rule, the certification form is due no later than Oct 1 annually.

2020Annual Drinking Water Report

City of Echo

April 25th 2021

We're pleased to present to you this year's Annual Quality Water Report. This report is designed to inform you about the quality water and services we deliver to you every day. Our constant goal is to provide you with a safe and dependable supply of drinking water. We want you to understand the efforts we make to continually improve the water treatment process and protect our water resources. We are committed to ensuring the quality of your water. Our water source is ground water from the Reservoir Well #5 UMAT5970 and The Golf Course well #4 UMAT5842.

I'm pleased to report that our drinking water is safe and meets federal and state requirements.

If you have any questions about this report or concerning your water utility, please contact Justin Northern, our certified drinking water operator at (541) 376-6038. We want our valued customers to be informed about their water utility. If you want to learn more, please contact us for the next regularly scheduled meeting date, time and location.

The City of Echo routinely monitors for constituents in your drinking water according to Federal and State laws. This table shows the results of our monitoring for the period of January 1st to December 31st, 2020. As water travels over the land or underground, it can pick up substances or contaminants such as microbes, inorganic and organic chemicals, and radioactive substances. All drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some constituents. It's important to remember that the presence of these constituents does not necessarily pose a health risk.

In this table you will find many terms and abbreviations you might not be familiar with. To help you better understand these terms we've provided the following definitions:

Non-Detects (ND) - laboratory analysis indicates that the constituent is not present.

Parts per million (ppm) or Milligrams per liter (mg/l) - one part per million corresponds to one minute in two years or a single penny in $10,000.

Parts per billion (ppb) or Micrograms per liter - one part per billion corresponds to one minute in 2,000 years, or a single penny in $10,000,000.

Parts per trillion (ppt) or Nanograms per liter (nanograms/l) - one part per trillion corresponds to one minute in 2,000,000 years, or a single penny in $10,000,000,000.

Parts per quadrillion (ppq) or Picograms per liter (picograms/l) - one part per quadrillion corresponds to one minute in 2,000,000,000 years or one penny in $10,000,000,000,000.

Picocuries per liter (pCi/L) - picocuries per liter is a measure of the radioactivity in water.

Millirems per year (mrem/yr) - measure of radiation absorbed by the body.

Million Fibers per Liter (MFL) - million fibers per liter is a measure of the presence of asbestos fibers that are longer than 10 micrometers.

Nephelometric Turbidity Unit (NTU) - nephelometric turbidity unit is a measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

Action Level - the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT) - (mandatory language) A treatment technique is a required process intended to reduce the level of a contaminant in drinking water.

Maximum Contaminant Level (MCL) - (mandatory language) The "Maximum Allowed" (MCL) is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) - (mandatory language) The "Goal"(MCLG) is the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfectant Level (MRDL) – (mandatory language) The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) – (mandatory language) The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

TEST RESULTS						
Contaminant	Violation Y/N	Level Detected	Unit Measurement	MCLG	MCL	Likely Source of Contamination
Microbiological Contaminants						
1. Total Coliform Bacteria	N	Absent	Present/ Absent	0	presence of coliform bacteria in 5% of monthly samples	Naturally present in the environment
2. Fecal coliform and *E.coli*	N	Absent	Present/ Absent	0	a routine sample and repeat sample are total coliform positive, and one is also fecal coliform or *E. coli* positive	Human and animal fecal waste
3. Turbidity	N			n/a	TT	Soil runoff
Radioactive Contaminants						
4. Beta/photon emitters	N		mrem/yr	0	4	Decay of natural and man-made deposits
5. Alpha emitters	N	ND	pCi/l	0	15	Erosion of natural deposits
6. Combined radium	N		pCi/l	0	5	Erosion of natural deposits
7. Uranium1	N	0.0006	µg/L	01	301	Erosion of natural deposits
Inorganic Contaminants						
8. Antimony	N		ppb	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder
9. Arsenic	N		ppb	n/a	.01	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes
10. Asbestos	N	N	MFL	7	7	Decay of asbestos cement water mains; erosion of natural deposits
11. Barium	N		ppm	2	2	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
12. Beryllium	N		ppb	4	4	Discharge from metal refineries and coal-burning factories; discharge from electrical, aerospace, and defense industries
13. Cadmium	N		ppb	5	5	Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints

14. Chromium	N		ppb	100	100	Discharge from steel and pulp mills; erosion of natural deposits
15. Copper	N		ppm	1.3	AL=1.3	Corrosion of household plumbing systems; erosion of natural deposits; leaching from wood preservatives
16. Cyanide	N		ppb	200	200	Discharge from steel/metal factories; discharge from plastic and fertilizer factories
17. Fluoride	N		ppm	4	4	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
18. Lead	N		ppb	0	AL=15	Corrosion of household plumbing systems, erosion of natural deposits
19. Mercury (inorganic)	N		ppb	2	2	Erosion of natural deposits; discharge from refineries and factories; runoff from landfills; runoff from cropland
20. Nitrate (as Nitrogen)	N	ND	ppm	10	10	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
21. Nitrite (as Nitrogen)	N		ppm	1	1	Runoff from fertilizer use; leaching from septic tanks, sewage; erosion of natural deposits
22. Selenium	N		ppb	50	50	Discharge from petroleum and metal refineries; erosion of natural deposits; discharge from mines
23. Thallium	N		ppb	0.5	2	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories
Synthetic Organic Contaminants including Pesticides and Herbicides						
24. 2,4-D	N	ND	ppb	70	70	Runoff from herbicide used on row crops
25. 2,4,5-TP (Silvex)	N	ND	ppb	50	50	Residue of banned herbicide
26. Acrylamide	N	ND		0	TT	Added to water during sewage/wastewater treatment
27. Alachlor	N	ND	ppb	0	2	Runoff from herbicide used on row crops
28. Atrazine	N	ND	ppb	3	3	Runoff from herbicide used on row crops
29. Benzo(a)pyrene (PAH)	N	ND	nanograms/l	0	200	Leaching from linings of water storage tanks and distribution lines
30. Carbofuran	N	ND	ppb	40	40	Leaching of soil fumigant used on rice and alfalfa
31. Chlordane	N	ND	ppb	0	2	Residue of banned termiticide
32. Dalapon	N	ND	ppb	200	200	Runoff from herbicide used on rights of way
33. Di(2-ethylhexyl) adipate	N	ND	ppb	400	400	Discharge from chemical factories
34. Di(2-ethylhexyl) phthalate	N	ND	ppb	0	6	Discharge from rubber and chemical factories
35. Dibromochloropropane	N	ND	nanograms/l	0	200	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards
36. Dinoseb	N	ND	ppb	7	7	Runoff from herbicide used on soybeans and vegetables
37. Diquat	N	ND	ppb	20	20	Runoff from herbicide use

38. Dioxin [2,3,7,8-TCDD]	N	ND	picograms/l	0	30	Emissions from waste incineration and other combustion; discharge from chemical factories
39. Endothall	N	ND	ppb	100	100	Runoff from herbicide use
40. Endrin	N	ND	ppb	2	2	Residue of banned insecticide
41. Epichlorohydrin	N	ND		0	TT	Discharge from industrial chemical factories; an impurity of some water treatment chemicals
42. Ethylene dibromide	N	ND	nanograms/l	0	50	Discharge from petroleum refineries
43. Glyphosate	N	ND	ppb	700	700	Runoff from herbicide use
44. Heptachlor	N	ND	nanograms/1	0	400	Residue of banned termiticide
45. Heptachlor epoxide	N	ND	nanograms/1	0	200	Breakdown of heptachlor
46. Hexachlorobenzene	N	ND	ppb	0	1	Discharge from metal refineries and agricultural chemical factories
47. Hexachlorocyclo-pentadiene	N	ND	ppb	50	50	Discharge from chemical factories
48. Lindane	N	ND	nanograms/l	200	200	Runoff/leaching from insecticide used on cattle, lumber, gardens
49. Methoxychlor	N	ND	ppb	40	40	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock
50. Oxamyl [Vydate]	N	ND	ppb	200	200	Runoff/leaching from insecticide used on apples, potatoes and tomatoes
51. PCBs [Polychlorinated biphenyls]	N	ND	nanograms/l	0	500	Runoff from landfills; discharge of waste chemicals
52. Pentachlorophenol	N	ND	ppb	0	1	Discharge from wood preserving factories
53. Picloram	N	ND	ppb	500	500	Herbicide runoff
54. Simazine	N	ND	ppb	4	4	Herbicide runoff
55. Toxaphene	N	ND	ppb	0	3	Runoff/leaching from insecticide used on cotton and cattle
Volatile Organic Contaminants						
56. Benzene	N	ND	ppb	0	5	Discharge from factories; leaching from gas storage tanks and landfills
57. Carbon tetrachloride	N	ND	ppb	0	5	Discharge from chemical plants and other industrial activities
58. Chlorobenzene	N	ND	ppb	100	100	Discharge from chemical and agricultural chemical factories
59. o-Dichlorobenzene	N	ND	ppb	600	600	Discharge from industrial chemical factories
60. p-Dichlorobenzene	N	ND	ppb	75	75	Discharge from industrial chemical factories
61. 1,2 - Dichloroethane	N	ND	ppb	0	5	Discharge from industrial chemical factories
62. 1,1 - Dichloroethylene	N	ND	ppb	7	7	Discharge from industrial chemical factories
63. cis-1,2-ichloroethylene	N	ND	ppb	70	70	Discharge from industrial chemical factories
64. trans - 1,2 - Dichloroethylene	N	ND	ppb	100	100	Discharge from industrial chemical factories
65. Dichloromethane	N	ND	ppb	0	5	Discharge from pharmaceutical and chemical factories
66. 1,2-	N	ND	ppb	0	5	Discharge from industrial chemical

Dichloropropane						factories
67. Ethylbenzene	N	ND	ppb	700	700	Discharge from petroleum refineries
68. Styrene	N	ND	ppb	100	100	Discharge from rubber and plastic factories; leaching from landfills
69. Tetrachloroethylene	N	ND	ppb	0	5	Leaching from PVC pipes; Discharge from factories and dry cleaners
70. 1,2,4 - Trichlorobenzene	N	ND	ppb	70	70	Discharge from textile-finishing factories
71. 1,1,1 - Trichloroethane	N	ND	ppb	200	200	Discharge from metal degreasing sites and other factories
72. 1,1,2 - Trichloroethane	N	ND	ppb	3	5	Discharge from industrial chemical factories
73. Trichloroethylene	N	ND	ppb	0	5	Discharge from metal degreasing sites and other factories
74. TTHM3 [Total trihalomethanes]	N	TTHM=.002 15 HAA5=ND	ppb	0	80 or 1003	By-product of drinking water chlorination
75. Toluene	N	ND	ppm	1	1	Discharge from petroleum factories
76. Vinyl Chloride	N	ND	ppb	0	2	Leaching from PVC piping; discharge from plastics factories
77. Xylenes	N	ND	ppm	10	10	Discharge from petroleum factories; discharge from chemical factories

Microbiological Contaminants:
(1) Total Coliform. Coliforms are bacteria that are naturally present in the environment and are used as an indicator *that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this* was a warning of potential problems.
(2) Fecal coliform/E.Coli. Fecal coliforms and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, and people with severely compromised immune systems.
(3) Turbidity. Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Radioactive Contaminants:
(4) Beta/photon emitters. Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
(5) Alpha emitters. Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
(6) Combined Radium 226/228. Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
(7) Uranium. Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

Inorganic Contaminants:
(8) Antimony. Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
(9) Arsenic. Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
(10) Asbestos. Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
(11) Barium. Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
(12) Beryllium. Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
(13) Cadmium. Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
(14) Chromium. Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
(15) Copper. Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

(16) Cyanide. Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
(17) Fluoride. Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Children may get mottled teeth.

(18) Lead. Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

(19) Mercury (inorganic). Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.

(20) Nitrate. Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.

(21) Nitrite. Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue-baby syndrome.

(22) Selenium. Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.

(23) Thallium. Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.

Synthetic organic contaminants including pesticides and herbicides:
(24) 2,4-D. Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
(25) 2,4,5-TP (Silvex). Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
(26) Acrylamide. Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
(27) Alachlor. Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
(28) Atrazine. Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
(29) Benzo(a)pyrene [PAH]. Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
(30) Carbofuran. Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
(31) Chlordane. Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
(32) Dalapon. Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
(33) Di (2-ethylhexyl) adipate. Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience general toxic effects or reproductive difficulties.
(34) Di (2-ethylhexyl) phthalate. Some people who drink water containing di (2-ethylhexyl) phthalate in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
(35) Dibromochloropropane (DBCP). Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
(36) Dinoseb. Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
(37) Dioxin (2,3,7,8-TCDD). Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
(38) Diquat. Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
(39) Endothall. Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
(40) Endrin. Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
(41) Epichlorohydrin. Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
(42) Ethylene dibromide. Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
(43) Glyphosate. Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
(44) Heptachlor. Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
(45) Heptachlor epoxide. Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
(46) Hexachlorobenzene. Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.

(47) Hexachlorocyclopentadiene. Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
(48) Lindane. Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
(49) Methoxychlor. Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
(50) Oxamyl [Vydate]. Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
(51) PCBs [Polychlorinated biphenyls]. Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
(52) Pentachlorophenol. Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
(53) Picloram. Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.

(54) Simazine. Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.

(55) Toxaphene. Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.

Volatile Organic Contaminants:
(56) Benzene. Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
(57) Carbon Tetrachloride. Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
(58) Chlorobenzene. Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
(59) o-Dichlorobenzene. Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
(60) p-Dichlorobenzene. Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
(61) 1,2-Dichloroethane. Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
(62)1,1-Dichloroethylene. Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
(63) cis-1,2-Dichloroethylene. Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
(64) trans-1,2-Dicholoroethylene. Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
(65) Dichloromethane. Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
(66) 1,2-Dichloropropane. Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
(67) Ethylbenzene. Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
(68) Styrene. Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
(69) Tetrachloroethylene. Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
(70) 1,2,4-Trichlorobenzene. Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
(71) 1,1,1,-Trichloroethane. Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
(72) 1,1,2-Trichloroethane. Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
(73) Trichloroethylene. Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
(74) TTHMs [Total Trihalomethanes]. Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
(75) Toluene. Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
(76) Vinyl Chloride. Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
(77) Xylenes. Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

What does this mean?

All sources of drinking water are subject to potential contamination by substances that are naturally occurring or man-made. These substances can be microbes, inorganic or organic chemicals and radioactive substances. All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline at 1-800-426-4791.

"If present, elevated levels of Lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The City of Echo Water System is responsible for providing high quality of drinking water, but cannot control the variety of components used in plumbing .components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on Lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline, or at http://www.epa.gov//safewater/lead."

APPENDIX B
Oregon Health Authority - Drinking Water Services Sanitary Survey

PUBLIC HEALTH DIVISION
Center for Health Protection, Drinking Water Services
Kate Brown, Governor

Oregon Health Authority

800 NE Oregon Street, Suite #640
Portland, OR 97232-2162
(971) 673-0459
(971) 673-0694 – FAX
http://healthoregon.org/dwp

November 15, 2018

Darin Tuil, Public Works Director
City of Echo
P.O. Box 9
Echo, OR 97826

Re: Water System Survey, City of Echo, PWS ID # 00270

Dear Mr. Tuil:

Thank you for your time and assistance, in addition to that of Diane Berry, in conducting a **Water System Survey at the City of Echo on October 30, 2018**. The main purpose of the survey is to evaluate the entire water system in terms of supplying safe drinking water to the public. I have enclosed a copy of the report for your records. Please let me know if any corrections need to be made.

The first page of the report lists significant deficiencies and rule violations in the system that will have to be corrected as soon as possible. You must contact me within 30 days and correct all deficiencies and violations by **March 21, 2019** or be on an approved schedule for correction. Once the deficiencies and rule violations are corrected, you will need to send written verification that they have been corrected and the dates of correction.

Please send all written verification of deficiency corrections to me at either james.b.nusrala@state.or.us or:

James Nusrala
OHA – Drinking Water Services
800 NE Oregon Street, Suite 640
Portland, OR 97232-2162

If the water system fails to take action within the required time frame, notification must be provided to all persons served by the water system. A repeat public notice will be required every three months until all deficiencies are corrected or the water system is in compliance with an approved corrective action plan. A copy of the public notice must be forwarded to DMCE at PO Box 14450, Portland, OR 97293-0450. You may also fax the report to (971) 673-0694 or email to dwp.dmce@state.or.us.

The significant deficiency noted is as follows:

Source:

1. **The sanitary hazard requirement within the 100-foot setback of well #5 is not met.** Chemical pesticide containing 2,4-D, a regulated contaminant, is applied to the nearby golf course, that is located approximately 25 feet to the west of well #5. Either provide written documentation that no chemical pesticide spraying occurs within 100 feet of the well, or apply for a construction standard waiver from Drinking Water Services (DWS) for the sanitary hazard setback. Contact me for information regarding a waiver.

In addition, I have the following comments and recommendations:

1. DWS has established criteria for determining whether a system should be considered to have "outstanding performance." Systems that are designated outstanding performers may have their water system survey frequency reduced from every 3 years to every 5 years. Although your water system did not meet the established criteria, please review the enclosed handout to see what steps you can take in the future towards receiving this designation.
2. Inspect the casing at well #4 regularly to ensure that it continues to be watertight. Access to viewing the wellhead is currently difficult.
3. Request written documentation from your vendor that your chlorine solution is appropriate for drinking water use with certification to the National Sanitation Foundation (NSF) Standard 60 or equivalent, for review during the subsequent inspection. As we discussed, we verified that your Hasachlor 12.5 % sodium hypochlorite is NSF Standard 60 certified after the survey, even though the containers and shipped boxes did not include such labeling.
4. Inspect the rooftop screened vents and hatch of the reservoir regularly (at least annually) to ensure that they continue to be watertight and protective of your finished water.
5. Review the attached Table 42 for cross connection premises representing a high hazard. During the survey you indicated some of the premises identified as high hazards in your cross connection annual summary report (ASR) may not indeed by high hazards. Use the comments section in the ASR to explain any differences between the number of high hazard premises and the total number of reduced pressure assemblies or air gaps, either of which are sufficient for high hazards.
6. Monitor for chemicals (nitrate, Inorganic Compounds, etc.) at the entry point sample tap after chlorination and storage at or just prior to the first customer, as opposed to the current location in your distribution system.
7. Update your operations and maintenance manual to include any relatively new components of your water system, such as well #5.

8. As we discussed your coliform sampling plan can be updated to indicate that three rather than four repeat samples are required within 24 hours of a routine total coliform-positive result. Also, only your one routine sample is required the month after a routine positive.
9. Remember to notify each resident in writing of their lead results with health effects, and certify to DWS by the end of the calendar year that this occurred with a copy of one letter. See attached template letter if the results continue to be below the action levels, and the certification form.
10. Contact DWS for any questions if you need to add or change any lead and copper sampling sites.
11. Include the date of most recent chemical detects in your consumer confidence report.
12. Monitoring for arsenic has been reduced from once every three to once every nine years, with three results under the Maximum Contaminant Level (MCL).
13. Monitoring for disinfection byproducts (DBP) has been reduced to one sample in June at the 10 West Main Location, the site with the highest DBP levels. The City's recent results from two annual samples were each less than 0.040 mg/L total trihalomethanes and 0.030 mg/L haloacetic acids.
14. A summary of your monitoring requirements can be found on page 11. Please maintain a copy of this page and refer to it for future monitoring scheduling.

If you have any questions or concerns, or would like this in an alternate format, please contact me at (971) 673-0459, or james.b.nusrala@state.or.us. Your cooperation is appreciated.

Sincerely,

James Nusrala, P.E.
Regional Engineer
Drinking Water Services
Enclosures:
Outstanding performer criteria
Table 42, High Hazard Table (Cross connection premises requiring isolation by an approved air gap or a reduced pressure assembly)
Lead consumer notification letter template and certification
cc: Amy Word, DWS-Pendleton

Deficiency Summary

Surveyor: James Nusrala

Date Corrective Action Plan is due: March 21, 2019 **County:** Umatilla

Yes	No	Significant Deficiencies and Rule Violations:	Date to be corrected	Date corrected
☒	☐	**Source:**		
		Well construction: Well #5 sanitary hazards within 100-foot setback (application of pesticide on golf course containing 2-4-D)		
		Spring/other source: N/A		
☐	☒	**Treatment:**		
		Surface water treatment: N/A		
		Disinfection: No significant deficiencies or rule violations noted.	N/A	
		Other treatment: N/A		
☐	☒	**Finished Water Storage:** No significant deficiencies or rule violations noted.	N/A	
☐	☒	**Distribution:** No significant deficiencies or rule violations noted.	N/A	
☐	☒	**Monitoring:** No significant deficiencies or rule violations noted.	N/A	
☐	☒	**Management & Operations:** No significant deficiencies or rule violations noted.	N/A	
☐	☒	**Operator Certification:** No significant deficiencies or rule violations noted.	N/A	
☐	☒	**Other Rule Violations:** No significant deficiencies or rule violations noted.	N/A	

Comments:
See letter dated November 15, 2018 for details, and comments and recommendations.

☒ Source Deficiencies:

Well Construction Deficiencies:
- ☐⊕ Sanitary seal and casing not watertight
- ☒⊕ Does not meet setbacks from hazards
- ☐⊕ Wellhead not protected from flooding
- ☐⊕ No raw water sample tap
- ☐⊕ No treated sample tap (if applicable)
- ☐⊕ No screen on existing well vent

Spring Source Deficiencies:
- ☐⊕ Springbox not impervious durable material
- ☐⊕ No watertight access hatch/entry
- ☐⊕ No screened overflow
- ☐⊕ Does not meet setbacks from hazards
- ☐⊕ No raw water sample tap
- ☐⊕ No treated sample tap (if applicable)

☐ Treatment Deficiencies/Violations:

Surface Water Treatment Deficiencies:
- ☐+ Turbidity standards not met - *0030(3)*
- ☐+ Turbidimeters not calibrated per manufacturer or at least quarterly - *0036(5)(b)(A)(ii)*
- ☐⊕ Incorrect location for turbidity monitoring
- ☐⊕ If serving > 3,300 people no alarm or auto plant shut off for low chlorine residual
- ☐+ For conventional or direct filtration: No alarm or plant shut off for high turbidity
- ☐⊕ For conventional filtration: Settled water not measured daily
- ☐⊕ For conventional or direct filtration: Turbidity profile not conducted on individual filters at least quarterly
- ☐⊕ For cartridge filtration: Filters not changed according to mfg. rec. pressure differential
- ☐⊕ For cartridge filtration: No pressure gauges before and after cartridge filter
- ☐+ For membrane filtration: Direct integrity testing does not meet requirements under -0036(5)(d)
- ☐+ For membrane filtration: Turbidimeter not present on each unit *-0036(5)(d)(C) or -0050(4)(c)(G)*
- ☐+ For membrane filtration: O&M manual doesn't include a diagnosis/repair plan *-0065(4)(c)*
- ☐⊕ For diatomaceous earth filtration: Body feed not added with influent flow

Disinfection Deficiencies/Violations:
- ☐+ DPD/EPA approved method not used - *0036(9)(e)*
- ☐+ Free chlorine residual not maintained - *0032(3/5)*
- ☐+ Chlorine not measured & recorded - *0036(9)*
- ☐+ Minimum CT required not met all times - *0032(3/5)*
- ☐⊕ No means to adequately determine flow rate on contact chamber effluent line
- ☐+ pH, Temperature, and chlorine residual not measured daily at first user - *0036(5)(a/b)*
- ☐⊕ Failure to calculate CT values correctly
- ☐⊕ No means to adequately determine disinfection contact time under peak flow and minimum storage conditions

UV Disinfection Violations (OAR 333-0050(5)(k)):
- ☐+ Bypass around UV system
- ☐+ Lamp sleeve not cleaned
- ☐+ Lamp not replaced per manufacturer
- ☐+ No intensity sensor with alarm or shut-off

Other Treatment Violations:
- ☐+ Non-NSF approved chemicals - *0087(6)*
- ☐+ Corrosion control parameters not met - *0034*

☐ Distribution System Violations:
- ☐+ System pressure < 20 psi - *0025(7)*

Cross Connection (OAR 333-061-0070):
- ☐+ No ordinance or enabling authority (CWS)
- ☐+ Annual Summary Report not issued (CWS)
- ☐+ Testing records not current (CWS, NTNC, TNC)
- ☐+ No Cross Connection Control Specialist (CWS ≥ 300 connections)

☐ Finished Water Storage Deficiencies:
- ☐⊕ Hatch not locked or adequately secured
- ☐⊕ Roof and access hatch not watertight
- ☐⊕ No flap valve, screen, or equivalent on drain
- ☐⊕ No screened vent

☐ Monitoring Violations:
- ☐+ Monitoring not current - *0025(1)*
- ☐+ Unaddressed MCL violations or LCR AL exceedances - *0030*
- ☐+ No Coliform Sampling Plan - *0036(6)(a)(I)*

☐ Management & Operations Violations:
- ☐+ No operations and maintenance manual - *0065(4)*
- ☐+ Emergency response plan not completed - *0064(1)*
- ☐+ Major modifications not approved (plan review) - *0050*
- ☐+ Master plan not current (≥ 300 con.) - *0060(5)*
- ☐+ Annual CCR not distributed (CWS) - *0043(1)(a)*
- ☐+ PNC or out of compliance with AO
- ☐+ Public notice not issued as required - *0042*

☐ Operator Certification Violations:
- ☐+ No certified operator at required level - *0065(2)*
- ☐+ No protocol for under certified operator - *0225(2)*

☐ Other Rule Violations: _____

⊕ Significant deficiency per OAR 333-061-0076
+ Rule violation per OAR 333-061-XXX

Inventory and Narrative

☐ **Outstanding Performer**					
Type:		**Status**	**Size**	**Season:**	☒ All year ☐ Seasonal
☒ Community (C) ☐ Non-Transient Non-Community (NTNC) ☐ Transient Non-Community (TNC) ☐ Non-EPA (NP)		Population:	715	Begins: (mm/dd)	/
		Connections:	249	Ends: (mm/dd)	/
License:	☒ Not Lic. ☐ Health Dept. ☐ Ag			**Service Area Characteristics:**	MU
Responsible Agency:	☐ State ☐ County ☐ Ag			**Owner Type:**	4
Minimum WS Certification Requirements:	WD: 1 WT: N/A ☐ FE ☐ Small WS ☐ N/A				

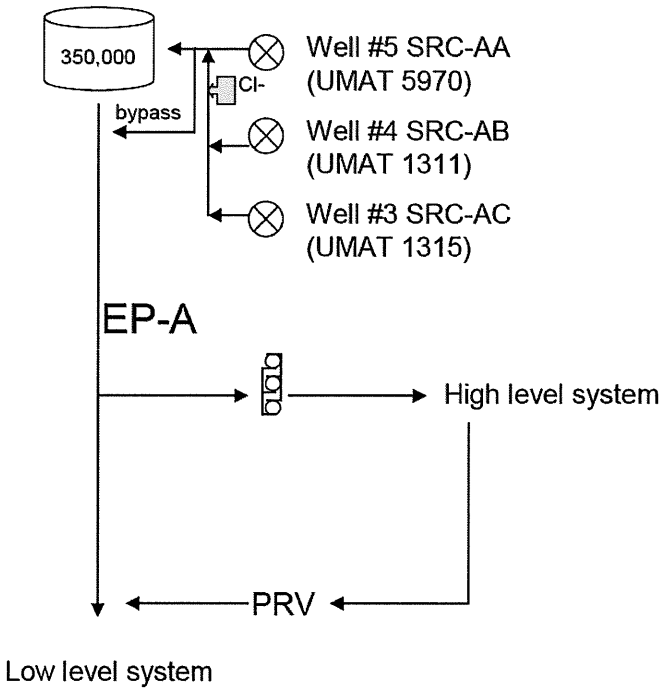
Primary Administrative Contact (Mailing Address):			
Contact Name:	Darin Tuil	Phone:	(541) 376-8411
Title:	Public Works Director	Cell:	(541) 240-0604
Street Address:	P.O. Box 9	Emergency #:	( )
City/State/Zip:	Echo, OR 97826	Email:	pwdtuil@centurytel.net
Legal/Owner Address:			
Contact Name:	Diane Berry	Phone:	(541) 376-8411
Title:	City Administrator	Cell:	( )
Street Address:	P.O. Box 9	Emergency #:	( )
City/State/Zip:	Echo, OR 97826	Email:	ecpl@centurytel.net
System Physical Address:			
Contact Name:	Darin Tuil	Phone:	(541) 376-8411
Title:	Public Works Director	Cell:	( )
Street Address:	20 S. Bonanza	Emergency #:	( )
City/State/Zip:	Echo, OR 97826	Email:	pwdtuil@centurytel.net

Emergency Systems Available:				
Name:	N/A	**PWS ID#:**	**41**	

Narrative:

The City uses wells #4 and #5 as their primary sources. Well #3 is considered an emergency source, but it has not been used in in the last five years, with no plans to use it in the future. The City has an agreement with Desert Springs Bottled Water Company to provide potable water to the community in the event of an emergency. System chlorinates for residual maintenance purposes. System has a booster pump station and a 350,000 gallon storage reservoir.

Water System Schematic



Source Information

ID	Entry Points (Location where water enters distribution and is sampled)	Source Type (Ground, Surface, GWUDI, Purchased ground, Purchased surface)	Availability (Permanent, Seasonal*, Emergency) *If seasonal, indicate begin/end dates	Begin (M/D)		End (M/D)	
A	EP for Wells	Ground	Permanent				

ID	Sources (Contributing to Entry Point)	Land Use*	Capacity (GPM)	Source Type (Ground, Surface, GWUDI, Purchased ground, Purchased surface)	Availability (Permanent, Seasonal, Emergency, Abandoned, Disconnected)
AA	Well #5 (Reservoir)	B,M	640	Ground	Permanent
AB	Well #4 (Golf Course)	B,M	300	Ground	Permanent
AC	Well #3 (Bridge Street)	G	250	Ground	Emergency

*Land Use Codes: (A) **Pristine Forest** (B) **Irrigated Crops** (C) **Non-Irrigated Crops** (D) **Pasture** (E) **Light Industry** (F) **Heavy Industry** (G) **Urban-Sewered Area** (H) **Rural On-Site Sewage Disposal** (I) **Urban On-Site Sewage Disposal** (J) **Rangeland** (K) **Managed Forest** (L) **Commercial** (M) **Recreational Use**

Yes	No	
☒	☐	Has the water system implemented strategies to protect their drinking water sources? (e.g., posting source area signs, notifying residents of hazardous waste collection events, provide residents information about maintaining their septic systems, abandoning unused wells, etc.)
☒	☐	Is the water system interested in protecting their drinking water sources from contamination? If yes, contact regional geologist at 541-726-2587.

Comments:
Wells #4 and #5 run concurrently at all times. The City either runs both wells at the same time, or not at all.
No plans to use emergency well #3.
Wells #4 and #5 draw from a confined Columbia River basalt aquifer. Construction is considered adequate for both wells, indicated in the 2002 SWA report.
City keeps all contaminants at least 1000 feet away from the two wells. City interested in any updated source water protection information from DWS, given changes in potential contaminant sources since the 2002 original report.

Well Information

Source ID#: SRC-	AA		AB		AC							
Source Name:	Well #5		Well #4		Well #3							
Well log available?*	☒ Y ☐ N		☒ Y ☐ N		☒ Y ☐ N		☐ Y ☐ N		☐ Y ☐ N		☐ Y ☐ N	
Well log ID (e.g., COLU123, L12345)	UMAT 5970		UMAT 1311/ 5842		UMAT 1315							
	Yes	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Well active?	☒	☐	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐
Pitless adaptor?	☒	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
● Sanitary seal & casing watertight?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Raw water sample tap?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Treated water sample tap? ☐N/A	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● If vented, properly screened?	☒	☐	No vent		☐	☐	☐	☐	☐	☐	☐	☐
● Wellhead protected from flooding?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Concrete slab around casing?	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Casing height ≥12-in. above slab/grade?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Flowmeter?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pressure gauge?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pump to waste piping?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Well meets setbacks from hazards?	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
If no, identify list of hazard(s) within the setback and the distance to the hazard. HAZARD:	Pesticide application on golf course											
DISTANCE (ft.):	25											
Protective housing?	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
If yes, does it have:												
Heat?	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Light?	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Floor drain?	☐	☒	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Well pump removal provision?	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pump Type: (vertical turbine, submersible, centrifugal, shallow jet, deep jet)	SU		SU									
Bearing lubrication: (oil, or water)	water		water									
Pumping capacity (gpm)	640		300									

*If no well log available, record any known information regarding depth of well, depth of grout seal, year of installation, or casing diameter in the comments section below.

Comments:

Well #5 100-foot sanitary hazard not met: Pesticide containing 2,4-D (regulated synthetic organic) applied on golf course, within 25 feet of well. Must ensure no chemical spraying within 100 feet of well or apply for a construction standard waiver from the setback requirement.
Well #5 uses a nearby hydrant to waste well, if necessary. Well #5 well casing bolt caps all in place (recommendation from last survey met). Well #5 is protected from vehicles by gated, secured access on road to well.
Recommend regular inspections of well #4 casing – access is limited, area could use some cleaning around well.
Well #4 was deepened in 1993, with the well deepening log, UMAT 5842.
Well #3 not inspected. No plans to use emergency well and not used in last several surveys.

Potential Sanitary Hazards

(From OAR 333-061-0050(2)(a)(E))

The following sanitary hazards are not allowed within 100 feet of a well or spring:

- Any existing or proposed pit privy
- Subsurface sewage disposal drain field
- Cesspool
- Solid Waste disposal site
- Pressure sewer line
- Buried fuel storage tank
- Animal yard, feedlot, or animal waste storage
- Untreated storm water or gray water disposal
- Chemical (including solvent, pesticides, and fertilizers)storage, usage, or application)
- Fuel transfer or storage
- Mineral resource extraction
- Vehicle or machinery maintenance or long term storage
- Junk / auto / scrap yard
- Cemetery
- Unapproved well
- Well that has not been properly abandoned or of unknown or suspect construction
- Source of pathogenic organisms
- Any other similar public health hazards

The following are not allowed within 50 feet of a well or spring:

- Gravity sewer line
- Septic Tank

Exemptions to these setbacks must be listed and documented within the plan approval letter and in an approved construction waiver standard.

If a surface water source is located within 500 feet of a well or spring, please note the water body name and the distance to the well or spring. All groundwater sources within 500 feet to a surface water source should be considered for potential surface water influence. Check the file for correspondence. If a review has been done indicate results in comment section. If not, contact the Springfield office 541-726-2587.

Disinfection

No #	Disinfection Method (Chlorine Gas, Sodium Hypochlorite, On-site Generated Sodium Hypochlorite, Calcium Hypochlorite, Chloramines, Ozone, UV, Mixed Oxidants, Other)	Location	Disinfection Source Water	Residual Maintenance	Other Purpose	Proportional to Flow	Dosage Recorded
1	Sodium hypochlorite	Well #4 building	☐	☒	N/A	☒	☒
			☐	☐		☐	☐
			☐	☐		☐	☐

Chlorine residuals ☐ N/A

Yes	No	
☒	☐	• Is a DPD or other EPA approved method used? Digital colorimeter
☒	☐	• NSF 60/61 certified (or equivalent)? – see below
☐	☐	• Are entry point residuals recorded at least once per day (SWTR, GWR 4-log)? ☒N/A
☐	☐	• Is entry point residual monitoring continuous if population > 3,300 (SWTR, GWR 4-log)? ☒N/A
☒	☐	• Are distribution residuals recorded at least twice weekly? – 5 times a week
☐	☐	Are on-line chlorine analyzers verified weekly with DPD type or EPA approved test kit? ☒N/A

Chlorine gas ☒ N/A

Yes	No		Yes	No	
☐	☐	Separate room for gas storage and feeder?	☐	☐	Gas cylinders properly secured?
☐	☐	Fan with on/off switch outside?	☐	☐	Door that opens out?
☐	☐	Vent located next to the floor?	☐	☐	Self-contained breathing apparatus?
☐	☐	Door with a window?	☐	☐	Air scrubber system?

UV ☒ N/A

Yes	No	
☐	☐	• Does all water contact UV (no bypass)?
☐	☐	• Is lamp sleeve cleaned?
☐	☐	• Is lamp replaced per manufacturer?
☐	☐	• Intensity sensor with alarm or shut-off?

CT evaluation for disinfection ☒ N/A

Disinfection Requirement:
☐ (sw) 0.5 log inactivation Giardia ☐ (sw) 1.0 log inactivation Giardia
☐ (gw) 4.0 log inactivation viruses ☐ (sw) log inactivation Crypto: _____
☐ (gw) Minimum chlorine residual: _____ mg/l

Yes	No	
☐	☐	• Does the contact chamber have effluent flow meter or adequate alternative?
		If no, how is peak flow determined for CT calculations? _____
☐	☐	• Has a tracer study been conducted or adequate alternative? Tracer Study Date: _____
		Demand flow (gpm): _____ Baffling factor (%): _____
		Volume used (gal): _____ Results (min): _____
☐	☐	Adequate alternate method for contact time? Describe:

Peak hour demand flow over the past 12 months: gpm = _____

Lowest operating volume over the past 12 months: gallons = _____

Yes	No	
☐	☐	Is tracer study still valid?
☐	☐	• (SW only) Are pH, temp, and chlorine residual measured daily before or at the first user?
☐	☐	• Are CT values being calculated correctly?
☐	☐	• Are CT values met at all times (SWTR, GWR 4-log)?

Comments:
The chlorination is installed on well #4. Both well #4 and well #5 run concurrently – either both or none at all. Chlorinated well #4 is always blended with unchlorinated #5 prior to storage reservoir and entering the distribution system. Chlorine solution is 12.5 % Hasachlor – which is NSF St. 60 certified, but no label on bottle or box. Recommend requesting NSF paperwork from vendor. Solution is mixed neat with no dilution water. He dials in speed and stroke to obtain desired dose. Residuals in distribution are 0.15 – 0.5 mg/L.

Storage and Pressure Tanks

Number	Name	Tank Type (G)round, (E)levated, (P)ressure	Tank Material (Concrete, Steel, Redwood, Plastic, Other)	Year Built	Volume (gal.)
1	Golf Course Reservoir	G	Steel	1980	350,000

Total Volume: 350,000

Reservoir Number:	1									
Reservoir Features	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Fence/gate?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Hatch secured (e.g. locked, bolted, etc.)?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● All tank access points watertight?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Screened vent?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Overflow?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
● Overflow protected (screen/flap/valve)?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drain to daylight?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Water level gauge?	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Bypass piping? (● if used for contact time)	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Alarm for high or low levels?	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Separate inlet/outlet?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Approved interior coating?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Exterior in good condition?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Annual interior/exterior inspection?	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐
Cleaning schedule?	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Continuously disinfected? (● post '81 redwood)	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pressure Tanks										
Accessible for maintenance?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Bypass piping?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Drain?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pressure relief device?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Air bladder/diaphragm?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Valve for adding air?	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments

Inspect rooftop screened vents and hatch regularly (at least annually).
Water level gauge is coming soon.
Interior is lined with epoxy.
Tank is cleaned every 5 years.

Distribution System Information

Service Area and Facility Map

Yes ☒ No ☐

Does the system have a service area and facility map (indicate features on map):

- ☒ Water lines (including size and material)
- ☒ Treatment facilities
- ☒ Storage facilities (reservoirs)
- ☐ Sampling points
- ☒ Sources-wells & withdrawal points
- ☐ Pressure zones
- ☒ Pressure regulating valves
- ☐ Booster pumps

Distribution Data

Yes	No		Comments
☒	☐	• System pressure ≥ 20 psi?	74-120 psi, based on elevation
☒	☐	Water system leakage <10%?	1-4 % leakage, some parks unmetered
☒	☐	Hydrants or blowoffs on all dead ends? ☐ N/A	Flushes dead ends through hydrants
☒	☐	Routine flushing? (How often)	Annually during summer, no complaints received.
☒	☐	Adequate valving?	All except near school
☒	☐	Routine valve turning? (How often)	Occasionally, uses hand tool
☐	☒	Does the distribution system have asbestos cement (AC) pipe?	PVC, some ductile iron

If yes, *verify asbestos sampling is completed on Water Quality Monitoring Page (CWS, NTNC).*

Cross Connection Control (CWS, NTNC, and TNC)

Yes	No	N/A		Comments
☒	☐	☐	• Assemblies tested annually? (CWS, NTNC, TNC)	See below
☒	☐	☐	• Ordinance or enabling authority? (CWS)	DWS has 1996 ordinance
☒	☐	☐	• Annual Summary Report submitted? (CWS)	2017 version received
☐	☐	☒	• Certified Cross Connection Control Specialist? (CWS ≥ 300 connections)	249 connections only

Comments:

2017 version indicates 4 high hazards, but 0 RP's. . . All 9 DC's tested in '17.
City has air gaps on City's water line to high hazards, like the golf course and dump.
City may inadvertently be classifying certain connections as high hazards (school, RV parks), when actually they are not included in the list in Table 42 of OAR 333-061-0070 (high hazards). Review list attached to survey.
City contracts with Mechanix as a tester, who tests the City's and private assemblies.
Tracks annual testing, will send reminders to those needing to test.

Water Quality Monitoring

Contaminant	N/A	Number & Frequency	Next Tests Due
Entry Point Sampling:			
Arsenic	☐	Once every 9 years	2026
Inorganic Chemicals (Including Nitrite) (sw)	☒		
Inorganic Chemicals (Including Nitrite) (gw)	☐	Once every 9 years	2021
Nitrate	☐	Once annually	2019, 2020. . .
Radionuclides (Community Water Systems Only):			
Gross Alpha	☐	Once every 9 years	2020
Radium 226/228	☐	Once every 9 years	2021
Uranium	☐	Once every 9 years	2021
SOCs	☐	Once every 3 years	2020
VOCs (sw)	☒		
VOCs (gw)	☐	Once every 3 years	2020
Distribution System Sampling:			
Coliform Bacteria	☐	Once a month	ongoing
Asbestos (for AC pipe/asbestos geologic areas)	☒		
TTHMs and HAA5s	☐	Once a year in June at 10 West Main	June 2019, June 2020. . .
Lead and Copper # sites: 10	☐	Once every 3 years (June – Sept)	June 1 – Sept 30, 2021
Other Sampling:			
TOC	☒		
Turbidity	☒		
Source Water Coliform	☐	Once a year at well #5 and #4	2019, 2020. . .
Other (specify) _____	☒		

Yes	No	
☒	☐	• Is all required monitoring current?
☐	☒	Are samples collected at the correct locations in the system? – see below

*****Discuss correct sampling locations for all sampling (SRC, EP, DIST)*****

*****Discuss proper way to collect representative samples at all locations*****

*****Discuss possible sample reductions*****

Yes	No	
☐	☐	• Have all MCL violations or LCR AL exceedances been addressed? ☒ N/A No MCLs or ALE's.
☒	☐	DBP's collected at correct locations? ☐ N/A
☒	☐	• Does the system have a written coliform sampling plan?

Does the plan include:

Yes	No		Yes	No	
☒	☐	Sample collection protocol	☒	☐	Rotation schedule
☒	☐	Distribution map	☒	☐	Repeat locations
☒	☐	Sample site locations	☒	☐	Source locations ☐ N/A

Comments:

Collect entry point samples from sample tap at entry point (after chlorination and reservoir at first customer). Currently taking chem's at Darin's house in distribution.
Arsenic can be reduced from 3 to 9 years, given 3 rounds all below MCL of 0.010 mg/L.
DBPs can be reduced from 2 dual samples yearly to 1 dual sample set yearly in June at 10 W. Main St. (the site with the highest levels), as 2018 levels all below ½ MCLs for TTHM and HAA5.
2018 and 2015 lead and copper tests taken at similar addresses – good! Remember to notify customers in writing of their lead results plus health effects and submit lead consumer notification certification plus one letter to DWS.
Both wells #4 and #5 have yearly assessment schedules.

Management & Operations

O&M Manual and Emergency Response Plan

Yes	No	
☒	☐	● Does system have an operation and maintenance manual? – see below
☒	☐	● Does system have an emergency response plan?
☐	☒	Do any system components have auxiliary power?
		If yes, describe: If power out, goes off storage in tank

Operator Certification

Yes	No	N/A	
☒	☐		● Is the DRC identified and certified at the appropriate level?
		☒	If the DRC is a contract operator, how do they work with the system?
☐	☐	☒	● Does system have written protocols for under-certified operators? – only Darin

Plan Review/Master Plan

Yes	No	N/A	
☒	☐	☐	● Have all major modifications been approved by DWS?
☐	☐	☒	● Does the system have a current (<20 yr. old) master plan? (Not required if < 300 connections)
			What year was the plan completed? System has a 2012 approved master plan-not required though

Compliance Status

Yes	No	N/A	
☒	☐		● Is water system in compliance (all orders resolved and not a priority non-complier)?
☐	☐	☒	● Does the system issue public notice as required?
☒	☐	☐	● Are consumer confidence reports sent to users each year?

Comments:
Operations and Maintenance Manual is quite old, needs to be updated to include well #5.
System has no violations.
CCR looks good – include the dates of the most recent chemical detects from the past 5 years.

APPENDIX C
Insurance Services Office, Inc., Fire Hydrant Flow Test Data Summary

INSURANCE SERVICES OFFICE, INC.
111 NORTH CANAL STREET SUITE 950 CHICAGO, ILLINOIS 60606-7270 (312) 930-0070 (800) 444-4554 FAX: (312) 930-9394

February 10, 2010

Diane Berry, City Manager
City of Echo
PO Box 9
Echo, OR 97826

RE: Echo FD, Umatilla County, OR
Public Protection Classification: 6/9
Effective Date: April 1, 2010

Dear Ms. Berry:

We wish to thank you, Fire Chief Gehrke and Water Official Tuel for your cooperation during our recent Public Protection Classification (PPC™) survey. Insurance Services Office (ISO®) has completed its analysis of the structural fire suppression delivery system provided in your community. The resulting classification is indicated above.

Enclosed is a Public Protection Summary Report, which provides a detailed analysis of your fire suppression services. If you would like to know how your community's classification could improve or if you would like to learn about the potential effect of proposed changes to your fire suppression delivery system, please call us at the phone number listed below or visit our website - www.isomitigation.com.

ISO is the leading supplier of data and analytics for the property/casualty insurance industry. Most insurers use PPC classifications for underwriting and calculating premiums for residential, commercial and industrial properties.

The PPC program is not intended to analyze all aspects of a comprehensive structural fire suppression delivery system program. It is not for purposes of determining compliance with any state or local law, nor is it for making loss prevention or life safety recommendations.

If you have any questions about your classification, please let us know.

Sincerely,

Very truly yours,

Public Protection Classification Dept.

Public Protection Classification Dept.
(800) 930-1677 Ext. 6209

cc: Merle Gehrke, Fire Chief
Darin Tuel, Water Supt.

INSURANCE SERVICES OFFICE, INC.

HYDRANT FLOW DATA SUMMARY

City Echo Fd

County Umatilla State Oregon Witnessed by: Insurance Services Office, Inc. Date: September 15, 2009

TEST NO.	TYPE DIST.*	TEST LOCATION	SERVICE	FLOW - GPM $Q=(29.83(C(d^2)p^{0.5}))$				PRESSURE PSI		FLOW -AT 20 PSI		REMARKS***
				INDIVIDUAL HYDRANTS			TOTAL	STATIC	RESID.	NEEDED **	AVAIL.	
1	Comm	Main and Dupont St	City of Echo, Main	1230	0	0	1230	77	63	2250	2600	(B)-(2040 gpm)
2	Res	South Thielson	City of Echo, Main	920	0	0	920	63	35	1000	1200	
3	Comm	South Thielson and Dupont - west	City of Echo, Main	920	920	0	1840	75	59	2000	3600	
4	Comm	College & Hiestand	City of Echo, Main	1430	0	0	1430	70	60	3000	3400	(C)-(2040 gpm)
5	Comm	Bonanaza & Bridge	City of Echo, Main	790	790	0	1580	74	64	1250	3900	

THE ABOVE LISTED NEEDED FIRE FLOWS ARE FOR PROPERTY INSURANCE PREMIUM CALCULATIONS ONLY AND ARE *NOT* INTENDED TO PREDICT THE MAXIMUM AMOUNT OF WATER REQUIRED FOR A LARGE SCALE FIRE CONDITION.

THE AVAILABLE FLOWS ONLY INDICATE THE CONDITIONS THAT EXISTED AT THE TIME AND AT THE LOCATION WHERE TESTS WERE WITNESSED.

*Comm = Commercial; Res = Residential.

**Needed is the rate of flow for a specific duration for a full credit condition. Needed Fire Flows greater than 3,500 gpm are not considered in determining the classification of the city when using the Fire Suppression Rating Schedule.

*** (A)-Limited by available hydrants to gpm shown. Available facilities limit flow to gpm shown plus consumption for the needed duration of (B)-2 hours, (C)-3 hours or (D)-4 hours.

Well No. 2
Irrigation Well
Constructed 1947
Deepened 1964

STATE ENGINEER
Salem, Oregon

UMAT 1314

Well Record

STATE WELL NO. 3N/29-16A(1)
COUNTY Umatilla Co.
APPLICATION NO. U-175

OWNER: City of Echo

MAILING ADDRESS:

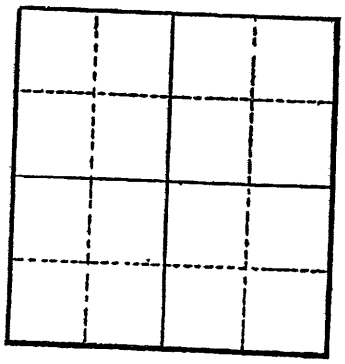
LOCATION OF WELL: Owner's No. 2

CITY AND STATE:

NE ¼ NE ¼ Sec. 16 T. 3 N. R. 29 E. W.M.

Bearing and distance from section or subdivision corner

Altitude at well



Section 16

TYPE OF WELL: drilled Date Constructed 1945-47

Depth drilled 520 Depth cased

CASING RECORD:

12"
10"
8"

FINISH:

AQUIFERS:

WATER LEVEL:

300 ' below land surface

PUMPING EQUIPMENT: Type

Capacity G.P.M. H.P.

WELL TESTS:

Drawdown ft. after hours G.P.M.

Drawdown ft. after hours G.P.M.

USE OF WATER None-abandoned 1951 Temp. °F., 19

SOURCE OF INFORMATION U-175

DRILLER or DIGGER

ADDITIONAL DATA:

Log X Water Level Measurements Chemical Analysis Aquifer Test

REMARKS:

When in use, well furnished about 260 g.p.m.

State Printing 69316

UMAT 1314

STATE ENGINEER
Salem, Oregon

State Well No. 3N/29-16A(1)
County Umatilla Co.
Application No. U-175

Well Log

Owner: City of Echo Owner's No. 2

Driller: Date Drilled 1945-47

CHARACTER OF MATERIAL	(Feet below land surface) From	To	Thickness (feet)
Soil, gravel, and hardpan	0	37	37
Clay, red; and gravel hardpan	37	72	35
Pea gravel and red clay	72	83	11
Rock, blue, hard from 115 to 125 feet	83	125	42
Rock hard	125	257	132
Basalt, hard	257	263	6
Basalt, very hard	263	274	11
Rock, brown	274	278	4
Rock, hard	278	296	18
Basalt, hard gray	296	410	114
Basalt, black	410	437	27
Basalt, black, water at 442 and 490 feet	437	498	61
Rock, and green clay	498	520	22

UMAT 1314

Wagner, N.S., 1949, Ground-water studies in Umatilla and Morrow Counties: Oregon Dept. of Geol. & Min Ind. Bull. 41.

Echo City
Well name

Index number — 77-U
1N-29E-16-M
File number
(Code: Tp., R., Sec., ¼ Sec.)

LOCATION:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Umatilla County
Umatilla Quadrangle
1N Tp. 29E Range 16 Section SE¼ of NE¼ Fractional section

STATISTICS:

Well type-Dug ___ Drilled x Driven ___
Final depth 520'
Elevation (land surface) ___ ft. above ___ below ___
Use status- domestic* ___ industrial ___ irrigation ___ municipal x
*includes stock wells
Well status- abandoned ___ dry hole ___ producer x

City of Echo
Owners name
Address
A. N. Edwards
Original drillers name
Address Lexington, Oregon
Date of drilling Oct. 1945 to Sept. 1947

This record compiled by N.S.W. from data secured from the following sources:
Driller
Deepened ___ re-cased ___ cleaned ___ by ___

Date compiled October 1947
Date ___

Material	Thickness (feet)	Depth (feet)	Remarks
Soil	4	4	Casing log and pump test
Gravel and hardpan	26	30	data entered on last log
Dirt	5	35	sheet.
Loose sand and gravel	2	37	
Red clay	7	44	
Loose gravel	2	46	
Hardpan	6	52	
Rock	4	56	
Red clay	6	62	
Soft red rock	10	72	70 - some water
Soft red rock	5	77	at 75 - last most water
Pea gravel	1½	78½	
Red clay	5	83½	
Hollow rock with boulders	14½	98	
Blue rock, broken and mud	12	110	Some water
Blue rock	5	115	
Hard rock, mud and blue clay			
between layers of boulders	10	125	
Solid rock	8	133	
Broken "cube" basalt	9	142	Very slow drilling
Blue gray basalt	10	152	
Broken "cube basalt" 8" followed by very hard basalt	14	166	
Blue and gray basalt, 8" seam of brown shale followed by	18	184	
Blue and gray basalt	30	214	
Shale and rock in 6" ave. layers	18	232	
Hard, solid clay	7	239	
Green shale	2	241	
Green shale, hard	16	257	Water at 257
Basalt	6	263	
Basalt - extremely hard	11	274	
Blue basalt - alternate soft and hard layers	4	278	
Brown rock	8	286	
Hard basalt	4	290	
Alternate hard rock and clay in 6" to 8" layers	6	296	
Crevices	4	300	Water dropped 28'
Blue rock and some clay layers	28	328	
Hard basalt	62	390	
Extremely hard basalt	16	406	
Seams and crevices in basalt	4	410	Water dropped 50'
Very hard basalt	1	411	
Shale	1	412	
Blue rock with crevices	8	420	
Very hard gray basalt	5	425	
Medium soft blue rock	12	437	
Black basalt	5	442	Water at 442
Boulder and crevice	1	443	Water and some sand. Drilled 5 hours with no penetration.
Black basalt (and water course)	17	460	Water dropped to 220' level
Hard boulders and soft spots	30	490	
Green clay seams a few inches thick between basalt layers	8	498	
Hard basalt	22	520	Bottom of hole
Casing log:			
12½" hole to 169'			
10¾" hole to 169' to 336'			
8½" hole 336' to 520'.			
Cased 169' with 10" casing.			
Pump test with 6" deep well pump at capacity output gave yield of 200 g.p.m.			
Drawdown with above equipment was 60' at 100 g.p.m. - No difference noted with greater yield.			
Temp. H_2O is 67°F.			

Gabert
Well name

Index number — 119-N
2S-23E-32
File number
(Code: Tp., R., Sec., ¼ Sec.)

LOCATION:

D	C	B	A
E	F	G	H
M	L	K	J
N	P	Q	R

Morrow County
Unnamed Quadrangle
2S Tp. 23E Range 32 Section NE¼ Fractional section

STATISTICS:

Well type-Dug ___ Drilled x Driven ___
Final depth 270'
Elevation (land surface) ___ ft. above ___ below ___
Use status- domestic* x industrial ___ irrigation ___ municipal ___
*includes stock wells
Well status- abandoned ___ dry hole ___ producer x

Gabert Holmes
Owners name
Address Portland, Oregon
Fred Nicholson
Original drillers name
Address Ione, Oregon
Date of drilling Summer, 1947

This record compiled by N.S.W. from data secured from the following sources:
Driller and Morrow County Recorder
Deepened ___ re-cased ___ cleaned ___ by ___

Date compiled October 1947
Date ___

Material	Thickness (feet)	Depth (feet)	Remarks
Top soil	2½	2½	5 5/8" hole.
Shelly boulder formation	24½	27	
Soft formation with little clay	8	35	
Blue basalt	34	69	Trace water at 50 feet.
Hard gray basalt	13	82	
Brown porous rock	7	89	
Hard blue rock	7	96	
Black to brown porous rock	14	110	
Moderately hard blue rock	26	136	
Very hard gray rock	19	155	
Hard blue porous basalt	5	160	
Hard solid blue basalt	6	166	
Brown porous rock	6	172	
Moderately hard black rock	8	180	
Gray rock	4	184	
Brown porous rock	10	194	

(continued)

UMAT 1313

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. NOV 27 1964

WATER WELL REPORT
STATE OF OREGON
(Please type or print)

State Well No. 3N/29-16
State Permit No. 6-8546 #2

(1) OWNER:
Name City of Echo
Address Echo, Oregon

(2) LOCATION OF WELL:
County Umatilla Driller's well number
¼ NE ¼ Section 16 T. 3 R. 29 W.M.
Bearing and distance from section or subdivision corner

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

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

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

(6) CASING INSTALLED:
Threaded ☐ Welded ☐
..... " Diam. from ..... ft. to ..... ft. Gage .....
..... " Diam. from ..... ft. to ..... ft. Gage .....
..... " Diam. from ..... ft. to ..... ft. Gage .....

(7) PERFORATIONS:
Perforated? ☐ Yes ☐ No
Type of perforator used
Size of perforations in. by in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

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

(9) CONSTRUCTION:
Well seal—Material used in seal .....
Depth of seal ..... ft. Was a packer used? .....
Diameter of well bore to bottom of seal ..... in.
Were any loose strata cemented off? ☐ Yes ☐ No Depth .....
Was a drive shoe used? ☐ Yes ☐ No
Was well gravel packed? ☐ Yes ☐ No Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.
Did any strata contain unusuable water? ☐ Yes ☐ No
Type of water? depth of strata
Method of sealing strata off

(10) WATER LEVELS:
Static level 315 ft. below land surface Date 6-20-64
Artesian pressure lbs. per square inch Date

(11) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom? Contractor
Yield: 300 gal./min. with 0 ft. drawdown after 5 hrs.
" " " "
" " " "
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No

(12) WELL LOG:
Diameter of well below casing 8
Depth drilled ft. Depth of completed well 820 ft.
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Rock gray hard	495	557
Rock black soft	557	592
Rock gray hard	592	671
Rock gray medium	671	686
Rock gray soft	686	700
Rock red medium	700	704
Rock gray soft	704	715
Rock gray hard	715	731
Rock gray medium	731	739
Rock gray hard	739	761
Rock gray soft	761	782
Rock gray hard	782	798
Rock black soft (water)	798	813
Rock gray hard	813	820

Work started 5-26-64 19 . Completed 6-20-64 19
Date well drilling machine moved off of well 6-21-64 19

(13) PUMP:
Manufacturer's Name .....
Type: ..... H.P. .....

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 Ben Dreyer Drilling Contractor
(Person, firm or corporation) (Type or print)
Address Rt.1 Box 225 Hermiston, Ore.

Drilling Machine Operator's License No. 126
[Signed] Ben Dreyer
(Water Well Contractor)
Contractor's License No. 12 Date 6-25-64, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Well No. 3
Constructed 1951

STATE ENGINEER
Salem, Oregon

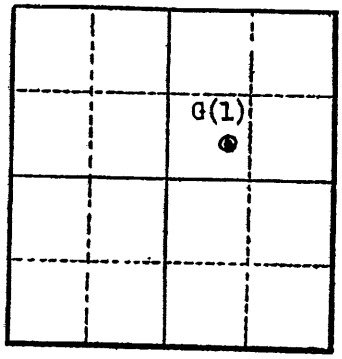
UMAT 1315

Well Record

STATE WELL NO. 3N/29-16G(1)
COUNTY Umatilla
APPLICATION NO. G- 21

OWNER: City of Echo
MAILING ADDRESS:
CITY AND STATE: Echo, Oregon

LOCATION OF WELL: Owner's No. 3
SW ¼ NE ¼ Sec. 16 T. 3 N. R. 29 E. W.M.
Bearing and distance from section or subdivision corner S.39°30'W. 2640' from NE cor. of sec. 16



Altitude at well

TYPE OF WELL: Drilled Date Constructed 1951
Depth drilled 490' Depth cased
Section 16

CASING RECORD:
16 inch
12 inch

FINISH:

AQUIFERS:
Basalt

WATER LEVEL:
95 feet in 1951

PUMPING EQUIPMENT: Type Turbine 12 stage H.P.
Capacity 400 G.P.M.

WELL TESTS:
Drawdown 60 ft. after 6 hours 400 G.P.M.
Drawdown ft. after hours G.P.M.

USE OF WATER Municipal Temp. °F., 19
SOURCE OF INFORMATION USGS G- 64
DRILLER or DIGGER A.A. Durand & Son
ADDITIONAL DATA:
Log X Water Level Measurements Chemical Analysis Aquifer Test

REMARKS:

State Printing 69316

STATE ENGINEER
Salem, Oregon

State Well No. 3N/29-16 G (
County Umatilla
Application No. G - 21

Well Log

Owner: City of ECHO Owner's No. 3

Driller: A. A. Durland & Son Date Drilled 1951

CHARACTER OF MATERIAL	(Feet below land surface) From	To	Thickness (feet)
Soil brown	0	14	14
Gravel, water bearing	14	25	11
Basalt, broken, & gravel	25	32	7
Basalt, hard	32	35	3
Basalt, gray, hard, swl - 10 ft.	35	85	50
Basalt, black, medium hard	85	103	18
Basalt, black, broken	103	116	13
Clay, blue	116	118	2
Basalt, black, broken	118	132	14
Basalt, black, broken, medium hard (137'-138')	132	159	27
Basalt, black, medium hard, broken	159	164	5
Basalt, black, swl - 10 ft.	164	179	15
Basalt, black, broken, & soft clay	179	184	5
Basalt, gray, hard	184	187	3
Basalt, gray, medium hard	187	275	88
Basalt, black, soft, swl - 107 ft.	275	290	15
Basalt, black	290	360	70
Basalt, gray, hard	360	362	2
Basalt, gray, very hard	362	406	44
Basalt, gray, fine	406	430	24
Basalt, black, soft, broken	430	435	5
Basalt, gray, hard, swl - 100 ft.	435	490	55

Well No. 4
Constructed 1974
Deepened 1993

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.

UMAT 1311

RECEIVED
AUG 7 1974
STATE ENGINEER
SALEM, OREGON

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

State Well No. 3N/29E-16
State Permit No. G-8546
Well #4

(1) OWNER:
Name City of Echo
Address Echo, Oregon 97826

(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 ☐
10" Diam. from 0 ft. to 45 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 in. by in.
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) WELL TESTS:
Drawdown is amount water level is lowered below static level
Was a pump test made? ☒ Yes ☐ No If yes, by whom?
Yield: 6.56 gal./min. with 18 ft. drawdown after 13 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 45 ft.
Diameter of well bore to bottom of seal 14 in.
Diameter of well bore below seal 10 in.
Number of sacks of cement used in well seal 20 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:
#4 WSB
County Umatilla Driller's well number
¼ ¼ Section 16 T. 3N. R. 29E. W.M.
Bearing and distance from section or subdivision corner
Tax lot 3200

(11) WATER LEVEL: Completed well.
Depth at which water was first found 353 ft.
Static level 315 ft. below land surface. Date 7-15-74
Artesian pressure lbs. per square inch. Date

(12) WELL LOG:
Diameter of well below casing 10"
Depth drilled 600 ft. Depth of completed well 600 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
Topsoil	0	5	
Claystone	5	20	
Rock, brown	20	37	
Basalt	37	146	
Rock, med. black	146	289	
Basalt	289	341	
Basalt, hard, gray	341	353	
Rock, porous, black	353	415	W.B.
Basalt, black	415	441	
Basalt, hard, gray	441	512	
Rock, black & blue claystone	512	532	
Rock, med. gray	532	548	
Rock, brown	548	554	
Basalt	554	585	
Rock, porous	585	600	W.B.

Work started 5-20 1974 Completed 8-1 1974
Date well drilling machine moved off of well 6-4 1974

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] James T Lentsch (Drilling Machine Operator) Date 8-5, 1974
Drilling Machine Operator's License No. 665

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 TROY GRIFFIN (Person, firm or corporation) (Type or print)
Address 900 HERMISTON AVE, HERMISTON, ORE
[Signed] Troy Griffin (Water Well Contractor)
Contractor's License No. 65 Date 8-1, 1974

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

5

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

UMat 5842

RECEIVED

JUN 29 1993

WATER RESOURCES DEPT.
SALEM, OREGON

3N/29E/16ad

(START CARD) # 46231

(1) OWNER:

Well Number: 4

Name City of Echo

Address P.O. Box 9

City Echo State OR Zip 97826

(2) TYPE OF WORK:

☐ New Well ☒ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☒ Other RC Dual Tube Rotary

(4) PROPOSED USE:

☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes ☐ No ☒ Depth of Completed Well 1043.5 ft.

Explosives used Yes ☐ No ☒ Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10	600	1045	cement	0	~180	75 sks
			cement	~180	>220	100 sks
			cement	<600	951	300 sks*
			had LC between 220 & 600			

How was seal placed: Method ☒*A ☐ B ☐ C ☐ D ☐ E

☒ Other poured & probed

Backfill placed from 1043.5 ft. to 1045 ft. Material slough/pea gravel

LCM Gravel placed from >220 ft. to <600 ft. ~~Size of gravel~~ 38 sks of 6x9 CSSI

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	951	.250	☒	☐	☒	☐
	removed 2 feet of existing:				☐	☐	☐	☐
	10	+2	0	.250	☒	☐	☒	☐
	plate welded between 10 & 8				☐	☐	☐	☐
Liner:	6	937	1043.5	.280	☒	☐	☒	☐
	except at screens				☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☒ Perforations Method factory milled

☒ Screens Type V-shaped wire wrap Material 304SS

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
978.5	1022.5	150	cont.	6	PS	☐	☐
1022.5	1032.5	3/16x3	240			☐	☒
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
see attached plots			1 hr.

Temperature of water approx. 75°F Depth Artesian Flow Found

Was a water analysis done? ☒ Yes By whom Water Food & Research Lab

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 Umatilla Latitude ' " Longitude ' "

Township 3N N or S. Range 29E E or W. WM.

Section 16 SE ¼ NE ¼

Tax Lot 3600 Lot Block Subdivision

Street Address of Well (or nearest address) none assigned-
Golf Course Road, Echo, Oregon

(10) STATIC WATER LEVEL:

195 ft. below land surface. Date 5/19/93

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 382 (SWL on 2/2/93 prior to deepening)

From	To	Estimated Flow Rate	SWL
The most obvious WB zone encountered in the deepened portion of the well was:			
979	1039	see (8)	see(10)

(12) WELL LOG:

Ground elevation 735

Material	From	To	SWL
see attached			

Date started 1/25/93 Completed 5/21/93

(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 well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number 806

Signed David Dowell Date 6/18/93

(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 well construction standards. This report is true to the best of my knowledge and belief.

WWC Number 649

Signed Stephen Schneider Date 6/18/93

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9809C 3/88

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WATER RESOURCES DEPT.
SALEM, OREGON

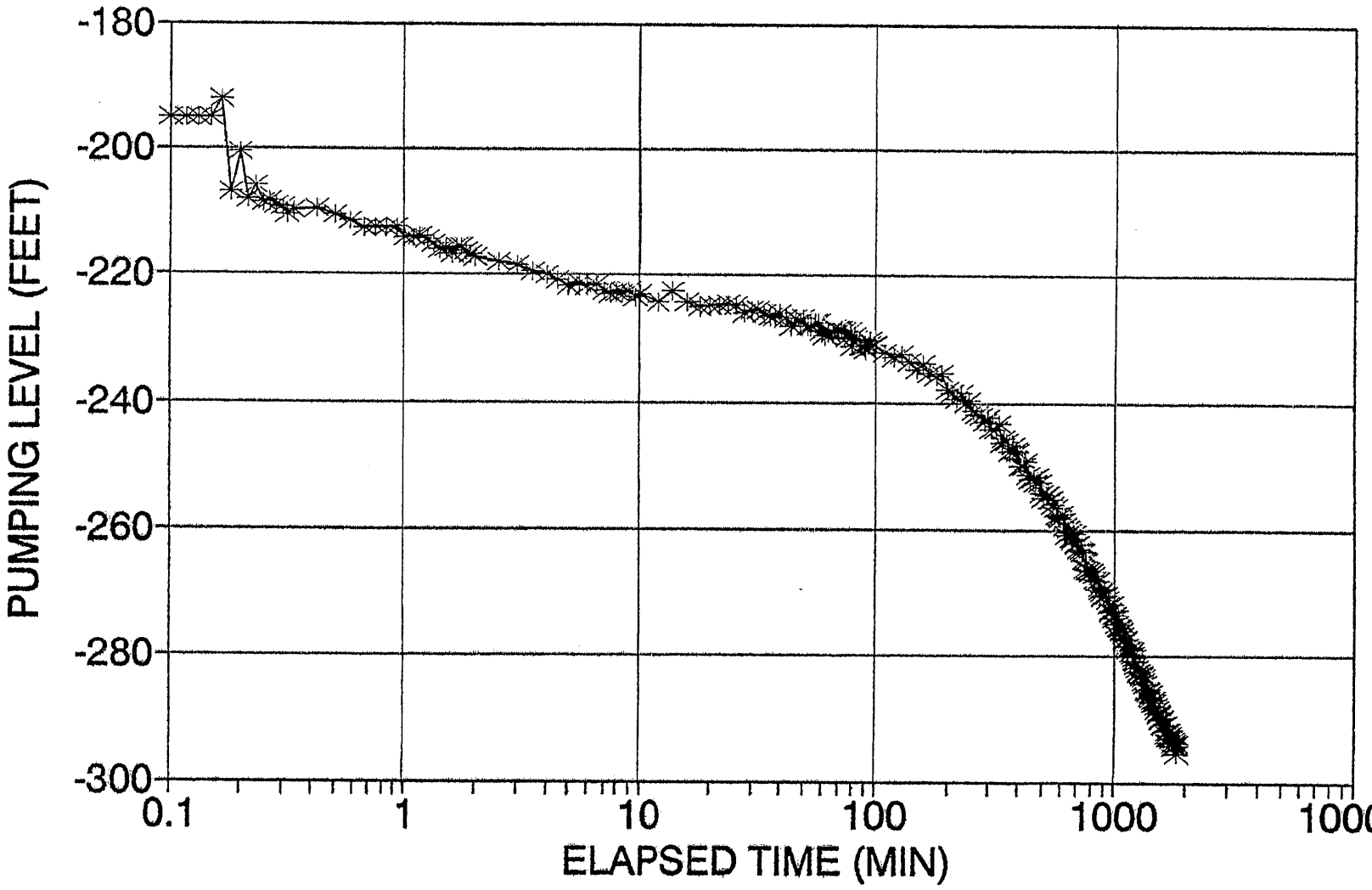
City of Echo
Start Card No. 46231
by Schneider Drilling Co.
May 18, 1993

Depth From	Depth To	Description
600	607	Basalt, multi-color, soft, vesicular
607	612	Basalt, blackish gray, med
612	643	Basalt, gray, hard, fractured
643	655	Basalt, black, med-soft, fractured
655	660	Basalt, black, med, some fractures
660	690	Basalt, gray, hard
690	712	Basalt, grayish black, med, vesicular
712	725	Basalt, black, fractured
725	757	Basalt, black, fractured, med
757	770	Basalt, gray, fractured, hard
770	785	Basalt, black, vesicular, some frac, hard
785	805	Basalt, gray-green, vesicular, med-soft
805	834	Basalt, black, med
834	840	Basalt, blackish gray, hard
840	861	Basalt, gray, hard
861	865	Baslat, gray, vesicular, med-hard
865	880	Basalt, gray, hard
880	891	Basalt, black, ves, fractured, med-hard
891	898	Basalt, blackish gray, fractured
898	914	Basalt, red-grn w/quartz, soft, some caving
914	920	Basalt, blackish gray, fractured, med
920	935	Basalt, gray, very hard
935	939	Basalt, red-green, vesicular
939	948	Basalt, reddish gray, fractured, med-hard
948	979	Basalt, gray, hard
979	1030	Basalt, multi-clrd, ves, red-brn, med-soft, frac
1030	1039	Basalt, crumbly, multi-clrd, mostly red-brn & gray fractures
1039	1045	Basalt, gray, hard

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CITY OF ECHO

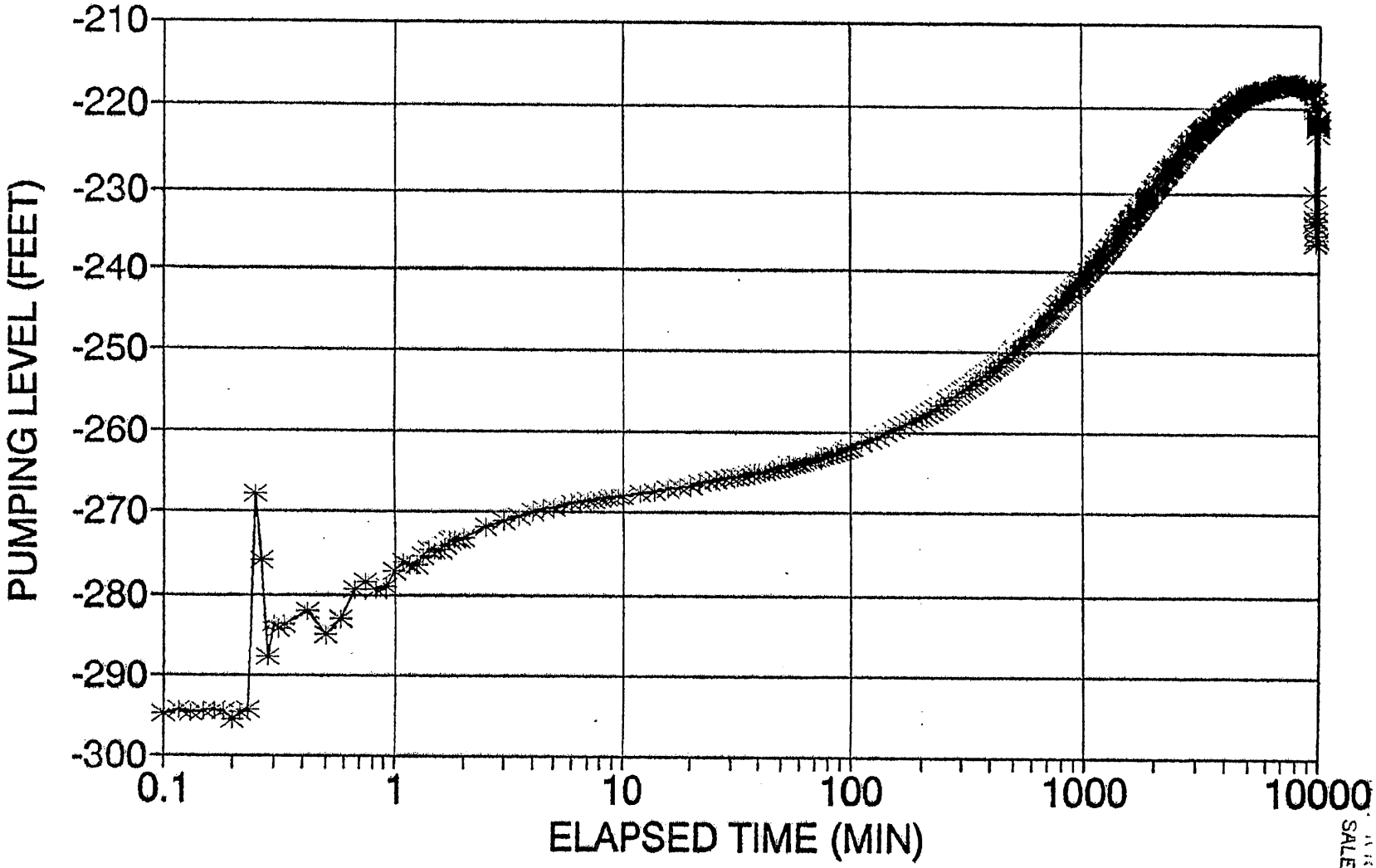
5\18-19\93 AVG. FLOW 392 GPM-REF 197.5



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CITY OF ECHO

RECOVERY 5-19-93 TO 6-9-93 REF. 197.5



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Well No. 5
Constructed 1993

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

FEB - 9 1994

WATER RESOURCES DEPT.
SALEM, OREGON

UMAT 5970

3N/29E/16aa

(START CARD) # 46232

(1) OWNER: Well Number 5

Name City of Echo

Address P.O. Box 9

City Echo State OR Zip 97826

(2) TYPE OF WORK:

[XX] New Well [ ] Deepen [ ] Recondition [ ] Abandon

(3) DRILL METHOD:

[ ] Rotary Air [ ] Rotary Mud [X] Cable

[XX] Other Reverse Circulation Rotary

(4) PROPOSED USE:

[ ] Domestic [XX] Community [ ] Industrial [ ] Irrigation

[ ] Thermal [ ] Injection [ ] Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval [X] Yes [ ] No Depth of Completed Well 1282 ft.

Explosives used [ ] Yes [X] No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
20	0	206	Bentonite	0	6	20 sks
15	206	955	Cement Grout	6	955	560 sks
10	955	1282				+60 sks sand

How was seal placed: Method [XX] A [ ] B [X] C [ ] D [ ] E

[XX] Other Bentonite was manually placed dry

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Pitless adapter:	Unit	+1	5	std	[X]	[ ]	[XX]	[ ]
Casing:	12	5	955	.375	[XX]	[ ]	[XX]	[ ]
	20	6	107	.375	[X]	[ ]	[XX]	[ ]
					[ ]	[ ]	[ ]	[ ]
Liner:	10x8	945	950	std	[X]	[ ]	[XX]	[ ]
	8	950	1282	.250	[X]	[ ]	[XX]	[ ]

Final location of shoe(s) except at screens 955

(7) PERFORATIONS/SCREENS:

[XX] Perforations Method Factory mill cut

[XX] Screens Type V shape wire wrap Material 304ss

Screens: From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
1070	1075	.150		8	PS	[ ]	[ ]
1080	1085	.150		8	PS	[ ]	[ ]
1250	1255	.150		8	PS	[ ]	[ ]
1265	1270	.150		8	PS	[ ]	[ ]
						[ ]	[ ]

(8) WELL TESTS: Minimum testing time is 1 hour

[XX] Pump [ ] Bailer [ ] Air [ ] Flowing Artesian

also see attached graphs of 24 hour test/recovery

Yield gal/min	Drawdown	Drill stem at	Time
522	26		2 hr.
1034	61		2nd - 2 hr.
1450	101		3rd - 2 hr.
1760	136		4th - 2 hr.

Temperature of Water 84°F Depth Artesian Flow Found

Is 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:

SE1 9405

(9) LOCATION OF WELL by legal description:

County Umatilla Latitude Longitude

Township 3N N or S. Range 29E E or W. WM.

Section 16 NE ¼ NE ¼

Tax Lot 100 Lot Block Subdivision

Street Address of Well (or nearest address) Golf Course Road Echo, OR

(10) STATIC WATER LEVEL:

153 ft. below land surface. Date 10/26/93

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 1st significant @ 662

From	To	Estimated Flow Rate	SWL
662	674	?	456
screened/perforated interval		see (8)	see (10)
see (7)			

(12) WELL LOG:

Ground elevation approx. 800

Material	From	To	SWL
see attached log			
'J' receptor & bell reducer			
Perforations in 8" liner are all 3/16x3 slots 32 slots per foot. Perforated interals are:			
	From	To	
160 slots	1065	1070	
160 slots	1075	1080	
160 slots	1085	1090	
640 slots	1175	1195	
160 slots	1245	1250	
320 slots	1255	1265	
320 slots	1270	1280	

Date started 5/12/93 Completed 1/7/94

(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 well construction standards. Materials used and information reported above are true to my best knowledge and belief.

Signed WWC Number 1578

Date 1/28/94

(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 well construction standards. This report is true to the best of my knowledge and belief.

Signed WWC Number 649

Date 1/28/94

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City of Echo Well No. 5
Start Card No. 46232
by Schneider Drilling Co.

Depth From	Depth To	Description
0	6	Sand & gravel, brown
6	11	Gravel, 5"-, & sand, w/some clay, brown
11	21	Clay & gravel, 3"-, brown
21	32	Clay, brown, w/coarse sand & small gravel
32	38	Gravel & sand, cemented
38	52	Clay, brown, soft, sandy, w/some cs & small gravel
52	55	Gravel, 3"- & sand, cemented, brown
55	57	Gravel, 3"- & sand, med, cemented, brown
57	67	Gravel, 1/2"-, cem, w/some clay, brown
67	70	Gravel, 1-1/2"-, cem, w/some clay, brown
70	76	Clay, brown, w/claystone & some gravel, small
76	84	Clay, brown, sandy, & claystone
84	90	Gravel, 3/4"-, & sand, cem, w/some clay, brn
90	93	Clay, brown, sandy, & claystone
93	105	Gravel, 3"-, & clay, tan-brown
105	115	Basalt, gray, hard
115	118	Basalt, blk & red, fractured, med
118	124	Basalt, red & blk, fractured, med
124	125	Basalt, drk red & blk, frac, w/some cs
125	130	Basalt, drk red & blk, frac, med
130	131	Basalt, drk gray & red, frac, med
131	132	Basalt, drk gray & red, frac, med-hard
132	140	Basalt, drk red, frac, med
140	180	Basalt, gray, w/some frac, hard
180	191	Basalt, gray, fractured, hard
191	192	Basalt, blk & red, ves, medium, w/cs, blue-grn
192	193	Basalt, blk & red, brkn, ves, med, w/some cs, blue-grn
193	200	Basalt, brown, med, some frac, some cs, blue-grn
200	203	Basalt, gray, w/some brown
203	206	Basalt, brn & gry, med-hd, frac, w/some cs, blue-grn
206	207	Basalt, lt gray, frac, med-hard
207	215	Basalt, gray, frac, hard
215	216	Basalt, gray, med, broken, w/some cs, blue-grn
216	220	Basalt, gray & brown, med, brkn, ves, w/cs, blue-grn
220	225	Basalt, gray & red, med, brkn, w/some cs, blue-grn
225	230	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
230	235	Basalt, gray, med-hard, brkn
235	237	Basalt, gray, hard, frac

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237	241	Basalt, gray & brown, hard, frac
241	243	Basalt, gry & brn, med-hd, frac, w/some cs, blue-grn
243	244	Basalt, gray, med-hard, frac, w/some cs, blue-grn
244	250	Basalt, gray, hard, frac
250	252	Basalt, gray & brown, med-hard, frac
252	258	Bslt, gry & brn, med, brkn, ves, w/some cs, blue-grn
258	268	Basalt, gray, med-hard, frac
268	275	Basalt, gray & brn, med, brkn, w/some cs, blue-grn
275	285	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
285	295	Basalt, gray, med-hard, frac
295	300	Basalt, gray, med, brkn, w/some claystone, blue-grn
300	313	Basalt, gray, med-hard, frac
313	315	Basalt, gray & brn, med, brkn, w/some cs, blue-grn, & sandstone, lt brown
315	326	Basalt, gray & brown, med, brkn, ves, w/cs, blue-grn
326	328	Basalt, gray, med, brkn
328	338	Basalt, gray, hard, brkn
338	341	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
341	343	Bslt, gry, frac, hard, some ves, w/some cs, blue-grn
343	349	Basalt, gray, ves, hard, w/some cs, blue-grn
349	353	Basalt, gray w/green, ves, hard
353	358	Basalt, gray, w/some frac, hard
358	365	Basalt, gray w/blue, ves, hard
365	367	Basalt, gray w/some frac, hard
367	379	Basalt, gray, frac, some ves, hard, w/some cs, blue
379	393	Basalt, gray, w/some blue, frac, hard
393	398	Basalt, gray, hard
398	412	Basalt, gray, w/some frac, hard
412	419	Basalt, gray, ves, med, w/cs, blue-grn
419	433	Basalt, gray, ves, frac, med, w/some cs, blue-grn
433	478	Basalt, gray, frac, some ves, hard
478	499	Basalt, gray, frac, some ves, hard, w/cs, blue-grn
499	569	Basalt, gray, some frac, hard
569	572	Basalt, black & gray, frac, hard
572	576	Basalt, gray, frac, hard
576	578	Basalt, gray, frac, hard, w/some cs, blue
578	581	Basalt, grn-gray, med, frac, w/clay & cs, gray
581	583	Bslt, gry-brn, frac, ves, med, clay & cs, brn-blue-grn
583	586	Basalt, gry & brown w/grn, frac, ves, med
586	597	Basalt, gray, frac, ves, med, w/cs, blue-grn
597	602	Basalt, gray w/blue, frac, ves
602	622	Basalt, gray, frac, hard
622	627	Basalt, gray, frac, w/some ves, hard
627	659	Basalt, gray, frac, hard
659	662	Basalt, gray & red-brn, med-hard, frac
662	666	Basalt, rusty-red, med-soft, ves, w/cs, blue-grn
666	672	Basalt, red-brn, med-soft, w/cs, light grn

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672	674	Basalt, gray-brn, med-hard, frac, ves
674	704	Basalt, gray, hard, frac
704	714	Basalt, gray & brn, med-soft, ves, brkn
714	717	Basalt, black, med-soft, ves, brkn
717	719	Basalt, black, med-soft, brkn, ves, w/cs, light grn
719	724	Basalt, drk gray & brn, w/some cs, blue-grn
724	726	Basalt, gray, med-hard, frac, w/some cs, blue-grn
726	728	Basalt, gray, hard, broken, ves
728	739	Basalt, gray, hard, fractured
739	740	Basalt, drk gray, hard, fractured
740	743	Basalt, drk gray, hard, frac, some quartz
743	754	Basalt, black, soft, some quartz, cs layers, grn
754	759	Basalt, gray & brown, med-soft, ves, cs, grn
759	787	Basalt, dk gray, med-soft, ves, some cs, grn
787	790	Basalt, dk gray, hard, fractured
790	793	Bslt, dk gry, med-hard, frac, ves, some quartz & cs, grn
793	796	Basalt, gray, hard, frac
796	805	Basalt, dk gray, med-hard, frac, ves
805	808	Basalt, gray, med-hard, broken
808	812	Basalt, gray, med-hard, frac
812	816	Basalt, gray, hard, frac
816	826	Basalt, med, dk gray, med-hard, frac
826	834	Basalt, dk gray, med-hard, frac, ves
834	838	Basalt, gray, med-hard, frac
838	851	Basalt, gray, hard, frac
851	854	Bslt, gry & grn, md-sft, well frac, some cs, blk-grn
854	861	Basalt, brown, med, well frac, w/cs, yellow
861	868	Basalt, gray, hard, frac
868	869	Basalt, brown & gray, med, well frac, w/cs, yellow
869	874	Basalt, gray, hard, frac
874	884	Basalt, blk, med-soft, ves, w/cs, blue-grn
884	887	Basalt, dk gray, med-hard, frac, some ves
887	890	Basalt, dk gray, med-hard, frac
890	898	Basalt, dk gray, med, brkn, ves, w/cs, blue-grn
898	903	Basalt, brn-red, med, brkn, ves, w/cs, blue-grn
903	905	Basalt, gray & brn, med, brkn, ves, w/cs, blue-grn
905	909	Basalt, gray, med-hard, frac, some ves, w/some cs, blue-grn
909	916	Basalt, gray, med-hard, frac
916	931	Basalt, gray, hard, frac
931	940	Basalt, dk gray, med-hd, brkn, ves, w/cs, blue-grn
940	942	Basalt, dk gray, med-hard, brkn
942	961	Basalt, dk gray, hard, frac, w/some quartz
961	969	Basalt, gray, m-h, frac, some cs, gray
969	977	Basalt, gray, soft, brkn, ves, w/cs, blue-grn
977	983	Basalt, brn, broken, soft, w/cs, blue-grn
983	985	Basalt, red-brn, brkn, soft, w/clay & cs, brn-grn

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985	987	Basalt, soft, brkn, ves; claystone, blue-grn & brn
987	989	Basalt, dk gry, brkn, soft, w/cs, blue-grn, some quartz
989	991	Basalt, gray-brn, med, brkn, w/cs, blue-grn
991	993	Basalt, gray & brown, med, frac
993	995	Basalt, dk gray, med, frac, w/cs, blue-grn
995	999	Basalt, brn, med, frac, w/some cs, blue-grn
999	1002	Basalt, gray, med, frac, w/some cs, blue-grn
1002	1017	Basalt, gray, hard, frac
1017	1018	Basalt, gray & red, brkn, med-soft, w/cs, blue-grn
1018	1019	Basalt, red, brkn, ves, med, w/cs, blue-grn
1019	1020	Basalt, gray w/red, brkn, med, ves, w/cs, blue-grn
1020	1029	Basalt, gray, med, brkn, ves, w/cs, blue-grn
1029	1036	Basalt, brown, med, frac
1036	1062	Basalt, gray, hard, frac
1062	1064	Basalt, gray, frac, med-hard
1064	1067	Basalt, brn-gray, frac, med
1067	1069	Basalt, yellow & red, frac, med-soft, w/some clay
1069	1074	Basalt, yellow & red, some ves, brkn, soft
1074	1077	Basalt, yellow-brn, brkn, some ves, med-soft
1077	1080	Basalt, red-brn, brkn, some ves, soft
1080	1091	Basalt, red, brkn, some ves, soft
1091	1092	Basalt, dk red w/some yellow-brn, brkn, ves, soft
1092	1094	Basalt, gray, frac, med
1094	1095	Basalt, brn w/orange, ves, frac, med, w/cs, blue
1095	1100	Basalt, brn-gray, ves, frac, med, w/some cs, blue
1100	1103	Basalt, gray w/red, frac, med, some quartz
1103	1108	Basalt, gray w/blue, frac, some ves, med-hard
1108	1112	Basalt, gray, some ves, frac, med-hard, w/cs, blue-grn
1112	1174	Basalt, gray, frac, hard
1174	1176	Basalt, gray, some red, med-hard, frac, w/some cs, blue-grn
1176	1178	Basalt, gray & red, med, frac, w/cs, blue-grn
1178	1179	Basalt, red, med-soft, frac, w/some sandstone, coarse, blue-grn
1179	1180	Basalt, red, med, frac, w/some ves
1180	1185	Basalt, red-brn, med-hard, frac
1185	1189	Basalt, red w/some drk gray, med-soft, ves
1189	1192	Basalt, brown w/some red & gray, med, brkn, some ves
1192	1193	Basalt, brn, med-hard, frac, some ves
1193	1194	Basalt, gray-brn, med-hard, frac
1194	1245	Basalt, gray, med-hard, frac
1245	1267	Basalt, gray w/some brn, med-soft, brkn, ves, w/cs, blue-grn, & some ss, blue-grn
1267	1268	Bslt, gry w/some brn, md-sft, brkn, ves, w/cs, blue-grn, w/some ss, crse, blue-grn
1268	1275	Basalt, gray & brownish red, med-soft, brkn, ves
1275	1282	Basalt, gray w/some brn, med-hard, frac

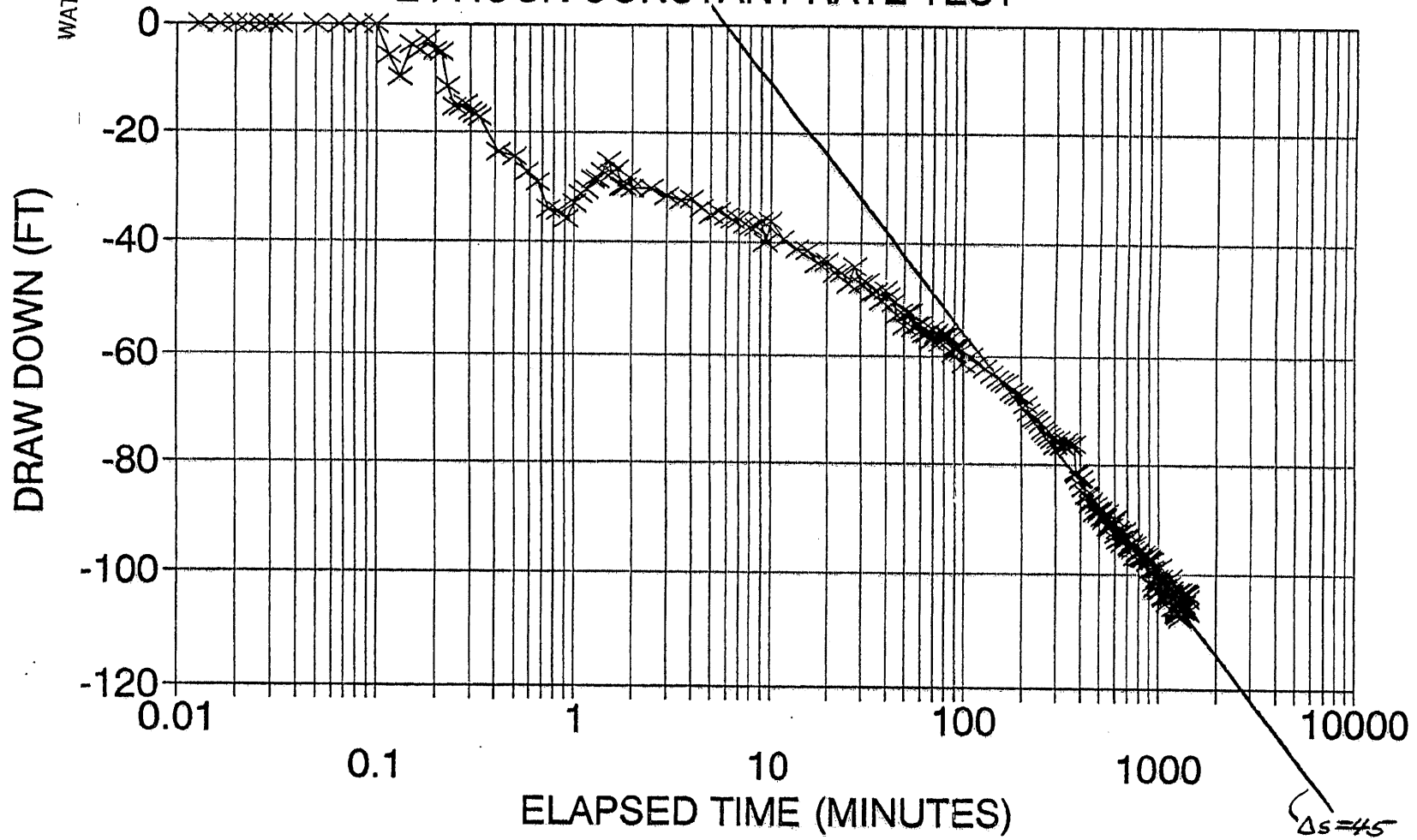
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ECHO WELL #5

10/28/93-AVG. FLOW 1137 GPM-SWL 157.5

24 HOUR CONSTANT RATE TEST

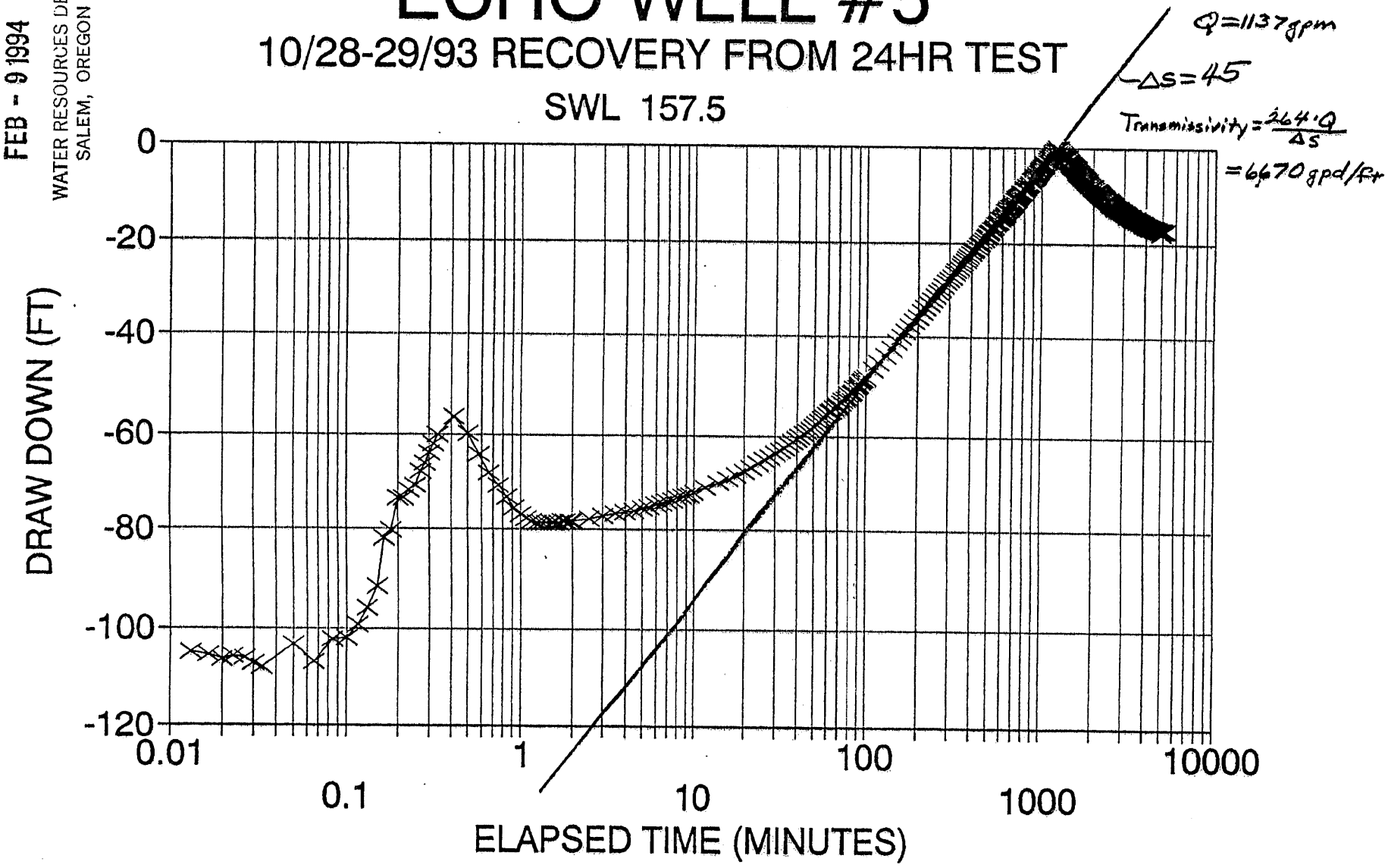


RECEIVED
FEB - 9 1994
WATER RESOURCES DEPT.
SALEM, OREGON

ECHO WELL #5

10/28-29/93 RECOVERY FROM 24HR TEST

SWL 157.5



APPENDIX E
Water Rights and Well Permit Information

Well No. 2

CERTIFICATE NO. 19613

PERMIT NO. U-168

APPLICATION FOR A PERMIT

To Appropriate the Underground Waters of the State of Oregon

I, City of Echo (Name of applicant)

of Echo (Postoffice), county of Umatilla,

state of Oregon, do hereby make application for a permit to appropriate the following described underground waters of the state of Oregon, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation Municipal corporation, incorporated March 21, 1904, Echo, Oregon

1. Give name of nearest stream to which the well, tunnel or other source of water development is situated Umatilla River (Name of stream) tributary of Columbia River

2. The amount of water which the applicant intends to apply to beneficial use is 2.25 cubic feet per second.

3. The use to which the water is to be applied is drinking water, fire protection and general municipal purposes

4. The place where the water is to be pumped or developed is located South 26° 18' West 1582 feet from the N.E. corner of Section 16, Tp. 3, No. Range 29, E.W.M. in (Give distance and bearing from section corner) Umatilla County, Oregon

being within the SE¼ NE¼ of Sec. 16, Twp. 3N, R. 29 E., W. M., in the county of Umatilla.

5. The pipe line (Canal or pipe line) to be 300 feet miles in length, terminating in the SE¼ of NW¼ (Smallest legal subdivision) of Sec. 16, Twp. 3, North R. 29, W. M., the proposed location being shown throughout on the accompanying map.

6. The name of the well or other works is

DESCRIPTION OF WORKS

7. If the flow to be utilized is artesian, the works to be used for the control and conservation of the supply when not in use must be described.

8. The development will consist of a drilled well (Give number of wells, tunnels, etc.) having a diameter of 10 inches and an estimated depth of 300 feet.

CANAL SYSTEM OR PIPE LINE—

9. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) ..... *feet; width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

(b) At ..... *miles from headgate: width on top (at water line)* ..... *feet; width on bottom* ..... *feet; depth of water* ..... *feet; grade* ..... *feet fall per one thousand feet.*

(c) Length of pipe, ... *ft.; size at intake,* ..... *in.; size at* ..... *ft. from intake* ..... *in.; size at place of use* ..... *in.; difference in elevation between intake and place of use,* ..... *ft. Is grade uniform?* ..... *Estimated capacity,* ..... *sec. ft.*

10. If pumps are to be used, give size and type a turbine type of pump, size cannot be determined until well is completed and amount of lift known

Give capacity and type of motor or engine to be used electric power to be used, capacity not known until size of pump determined

11. If the location of the well, tunnel, or other development work is less than one-fourth mile from a natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development .....

12. Location of area to be irrigated, or place of use City of Echo

Township	Range	Section	Forty-acre Tract	Number Acres to Be Irrigated
3 N	29 E	16	NE¼	
			E½ NW¼	
			NE¼ SW¼	
			N½ SE¼	

(If more space required, attach separate sheet)

(a) Character of soil .....

(b) Kind of crops raised .....

MUNICIPAL SUPPLY—

13. (a) To supply the city of Echo

Umatilla (Name of) *County, having a present population of* about 500

and an estimated population of 1500 *in 1950.*

14. *Estimated cost of proposed works, $* 7,000

15. *Construction work will begin on or before* October 15, 1945

16. *Construction work will be completed on or before* January 1, 1947

17. *The water will be completely applied to the proposed use on or before* January 1, 1947.

The City of Echo
(Signature of applicant)

By (Sgd) C. L. Gray
Mayor.

Signed in the presence of us as witnesses:

(1) W. H. Crary (Name), Echo, Oregon (Address of witness)

(2) Myrtle E. Smith (Name), Echo, Oregon (Address of witness)

Remarks:

STATE OF OREGON,
County of Marion, } *ss.*

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for completion

In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before September 29, *1945.*

WITNESS my hand this 29th *day of* August, *1945.*

CHAS. E. STRICKLIN
STATE ENGINEER

By
Ed K. Humphrey, Assistant
md

STATE OF OREGON, }
County of Marion, } *ss.*

PERMIT

This is to certify that I have examined the foregoing application and do hereby grant the same, SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 2.25 *cubic feet per second measured at the point of diversion from the well or source of appropriation, or its equivalent in case of rotation with other water users, from* A Well

The use to which this water is to be applied is Municipal

If for irrigation, this appropriation shall be limited to - - - *of one cubic foot per second*

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The priority date of this permit is August 24, 1945

Actual construction work shall begin on or before December 20, 1946 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before* October 1, 1947

Complete application of the water to the proposed use shall be made on or before October 1, 1948

WITNESS my hand this 20th *day of* December, *19*45.

CHAS. E. STRICKLIN
STATE ENGINEER

Application No. U-175

Permit No. U-168

PERMIT
TO APPROPRIATE THE UNDERGROUND WATERS OF THE STATE OF OREGON

Division No. ..... *District No.* .....

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 24th *day of* August, *19*45, *at* 8:30 *o'clock A.M.*

Returned to applicant for correction:

Corrected application received:

Approved:
December 20, 1945

Recorded in Book No. 1 *of Permit, on page* U-168

CHAS. E. STRICKLIN
STATE ENGINEER

Fees paid $12.00

7 - 16

STATE OF OREGON

COUNTY OF UMATILLA

ORDER APPROVING AN ADDITIONAL POINT OF APPROPRIATION AND CHANGE IN PLACE OF USE

Pursuant to ORS 537.705, after notice was given and no objections were filed, and finding that no injury to existing water rights would result, this order approves, as conditioned or limited herein, TRANSFER 7045 submitted by

CITY OF ECHO
P.O. BOX 9
ECHO, OREGON 97826.

The right to be modified, as evidenced by Certificate 19613, was perfected under Permit U-168 with a date of priority of AUGUST 24, 1945. The right allows the use of WELL NO. 2, in the UMATILLA RIVER BASIN, for MUNICIPAL USE. The amount of water to which this right is entitled is limited to an amount actually beneficially used and shall not exceed 1.10 cubic feet per second, if available at the original well; NE¼ NE¼, SECTION 16, T 3 N, R 29 E, WM; SOUTH 26 DEGREES 18 MINUTES WEST 1582 FEET FROM THE NORTHEAST CORNER, SECTION 16, or its equivalent in case of rotation, measured at the well.

The use shall conform to any reasonable rotation system ordered by the proper state officer.

The authorized place of use is as follows:

NE¼
E½ NW¼
NE¼ SW¼
N½ SE¼
SECTION 16
TOWNSHIP 3 NORTH, RANGE 29 EAST, W.M.

The applicant proposes to add an additional point of appropriation to:

NE¼ NE¼, SECTION 16, T 3 N, R 29 E, WM; WELL NO. 5 - 850 FEET SOUTH AND 70 FEET WEST FROM THE NORTHEAST CORNER, SECTION 16.

The applicant also proposes to change the place of use to:

S½ NE¼
SECTION 7

E½
SECTION 8

NW¼ NE¼
SW¼ NE¼
SE¼ NE¼
NW¼
S½
SECTION 9

NW¼ SW¼
S½ SW¼
SECTION 10

NW¼
NW¼ SW¼
NE¼ SW¼
SECTION 15

N½
E½ NW¼
NE¼ SW¼
E½ SE¼
N½ SE¼
SECTION 16
TOWNSHIP 3 NORTH, RANGE 29 EAST, W.M.

THIS CHANGE TO AN EXISTING WATER RIGHT MAY BE MADE PROVIDED THE FOLLOWING CONDITIONS ARE MET BY THE WATER USER:

1. The proposed change shall be completed on or before October 1, 1998.

2. The quantity of water diverted at the new point of appropriation (well), together with the quantity diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available from the original point of appropriation.

3. The water user shall install an in-line flow meter or other suitable device for measuring and recording the quantity of water used. The type and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department.

4. Water shall be acquired from the same aquifer as the original point of appropriation.

Certificate 19613 is canceled. When satisfactory proof of the completed change is received, a new certificate confirming this water right will be issued.

WITNESS the signature of the Water Resources Director, affixed AUG 08 1997.

Martha O. Pagel, Director

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

UMATILLA COUNTY

EXTENSION OF TIME

The changes approved under Transfers 7044 and 7045, in the name of the City of Echo, were to have been completed by October 1, 1998. The City has requested additional time to complete the changes.

The City provided evidence of reasonable diligence in completing the project. The request for extension of time should be approved.

The time for completion of the changes approved by Transfers 7044 and 7045, in the name of the City of Echo, shall be extended to October 1, 2003.

Witness the signature of the Water Resource Director, affixed NOV 04 1998.

For Martha O. Pagel, Director

CERTIFICATE NO. 19613

PERMIT NO. U-168

APPLICATION FOR A PERMIT

To Appropriate the Underground Waters of the State of Oregon

I, City of Echo (Name of applicant)

of Echo (Postoffice), county of Umatilla,

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10. If pumps are to be used, give size and type a turbine type of pump, size cannot be determined until well is completed and amount of lift known

Give capacity and type of motor or engine to be used electric power to be used, capacity not known until size of pump determined

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12. Location of area to be irrigated, or place of use City of Echo

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			E½ NW¼	
			NE¼ SW¼	
			N½ SE¼	

(If more space required, attach separate sheet)

(a) *Character of soil* .....

(b) *Kind of crops raised* .....

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13. (a) To supply the city of Echo

Umatilla (Name of) *County, having a present population of* about 500

and an estimated population of 1500 *in 19*50.

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15. *Construction work will begin on or before* October 15, 1945

16. *Construction work will be completed on or before* January 1, 1947

17. *The water will be completely applied to the proposed use on or before* January 1, 1947.

The City of Echo
(Signature of applicant)

By (Sgd) C. L. Gray
Mayor.

Signed in the presence of us as witnesses:

(1) W. H. Crary (Name), Echo, Oregon (Address of witness)

(2) Myrtle E. Smith (Name), Echo, Oregon (Address of witness)

Remarks:

STATE OF OREGON,
County of Marion, } *ss.*

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In order to retain its priority, this application must be returned to the State Engineer, with corrections on or before September 29, 1945.

WITNESS my hand this 29th *day of* August, 1945.

CHAS. E. STRICKLIN
STATE ENGINEER

By
Ed K. Humphrey, Assistant
md

STATE OF OREGON, }
County of Marion, } *ss.*

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CHAS. E. STRICKLIN
STATE ENGINEER

Application No. U-175
Permit No. U-168

PERMIT
TO APPROPRIATE THE UNDERGROUND WATERS OF THE STATE OF OREGON

Division No. ..... *District No.* .....

This instrument was first received in the office of the State Engineer at Salem, Oregon, on the 24th *day of* August, *19*45, *at* 8:30 *o'clock A. M.*

Returned to applicant for correction:

Corrected application received:

Approved:
December 20, 1945

Recorded in Book No. 1 *of Permit, on page* U-168

CHAS. E. STRICKLIN
STATE ENGINEER

Fees paid $12.00

Oregon Water Resources Department
Water Rights Information Query Results

Main Help
Return Contact Us

Records/Page: 10

Download

	Contacts	Application	Permit	Certificate	Claim	Decree	Transfers	
Select	APPLICANT: CITY OF ECHO PO BOX 9 ECHO, OR 97826	G21	G64				T7044 (Confirming)	NC
Select	OWNER: CITY OF ECHO PO BOX 669 ECHO, OR 97826	G8865	G8546				T13270 (Changes this right)	NC
Select	OWNER: CITY OF ECHO PO BOX 9 ECHO, OR 97826	U175	U168	92295			T7045	NC

EXTENDED to 2028

Water Right Information Query Results

Contact Information

Current contact information

APPLICANT:
CITY OF ECHO
PO BOX 9
ECHO, OR 97826

Documents

View all scanned documents

- **Application: U 175**
- **Permit: U 168** document
- **Order(s)**
- **Transfer(s)**
- View right with Web Mapping
- View Places of Use from Water Rights in the Same Area

Water Right Information

Status: Non-Cancelled
County: Umatilla
File Folder Location: Salem
Watermaster District: 5

Point(s) of Diversion

POD 1 - WELL 2 > ALKALI CANYON

Description

- T-R-S-QQ: 3.00N-29.00E-16-NE NE
- Location Description: SOUTH 26 DEG 18 MIN WEST, 1582 FEET FROM NE CORNER, SECTION 16

POD Rate

Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)
1.1	1.1		

MUNICIPAL USES (Primary)

Priority Date	Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)	Rate/Acre	Duty	Start Date	End Date	Remarks
8/24/1945	1.1	1.1					1/1	12/31	DIVERSION LIMITED TO QUANTITY AVAILABLE AT ORIGINAL POD

POD 2 - WELL 5 > ALKALI CANYON

Description

- T-R-S-QQ: 3.00N-29.00E-16-NE NE
- Location Description: 850 FEET SOUTH & 70 FEET WEST FROM NE CORNER, SECTION 16

POD Rate

Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)
1.1			

MUNICIPAL USES (Primary)

Priority Date	Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)	Rate/Acre	Duty	Start Date	End Date	Remarks
8/24/1945	1.1	0.0 (est)					1/1	12/31	DIVERSION LIMITED TO QUANTITY AVAILABLE AT ORIGINAL POD

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 8/24/1945

T-R-S	QQ	DLC	Gov't Lot	Taxlot	Acres	Status	Linked PODs	Inchoate Info	Remarks
3.00N-29.00E-7	SW NE					NC			
3.00N-29.00E-7	SE NE					NC			
3.00N-29.00E-8	NE NE					NC			
3.00N-29.00E-8	NW NE					NC			
3.00N-29.00E-8	SW NE					NC			
3.00N-29.00E-8	SE NE					NC			
3.00N-29.00E-8	NE SE					NC			
3.00N-29.00E-8	NW SE					NC			
3.00N-29.00E-8	SW SE					NC			
3.00N-29.00E-8	SE SE					NC			
3.00N-29.00E-9	NW NE					NC			
3.00N-29.00E-9	SW NE					NC			
3.00N-29.00E-9	SE NE					NC			
3.00N-29.00E-9	NE NW					NC			

3.00N-29.00E-9	NW NW					NC				
3.00N-29.00E-9	SW NW					NC				
3.00N-29.00E-9	SE NW					NC				
3.00N-29.00E-9	NE SW					NC				
3.00N-29.00E-9	NW SW					NC				
3.00N-29.00E-9	SW SW					NC				
3.00N-29.00E-9	SE SW					NC				
3.00N-29.00E-9	NE SE					NC				
3.00N-29.00E-9	NW SE					NC				
3.00N-29.00E-9	SW SE					NC				
3.00N-29.00E-9	SE SE					NC				
3.00N-29.00E-10	NW SW					NC				
3.00N-29.00E-10	SW SW					NC				
3.00N-29.00E-10	SE SW					NC				
3.00N-29.00E-15	NE NW					NC				
3.00N-29.00E-15	NW NW					NC				
3.00N-29.00E-15	SW NW					NC				
3.00N-29.00E-15	SE NW					NC				
3.00N-29.00E-15	NE SW					NC				
3.00N-29.00E-15	NW SW					NC				
3.00N-29.00E-16	NE NE					NC				
3.00N-29.00E-16	NW NE					NC				
3.00N-29.00E-16	SW NE					NC				
3.00N-29.00E-16	SE NE					NC				
3.00N-29.00E-16	NE NW					NC				
3.00N-29.00E-16	NW NW					NC				
3.00N-29.00E-16	SW NW					NC				
3.00N-29.00E-16	SE NW					NC				
3.00N-29.00E-16	NE SW					NC				
3.00N-29.00E-16	NE SE					NC				
3.00N-29.00E-16	NW SE					NC				
3.00N-29.00E-16	SE SE					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

Well No. 3

Water Right Information Query Results

Contact Information

Current contact information

APPLICANT:
CITY OF ECHO
PO BOX 9
ECHO, OR 97826

Water Right Information

Status: Non-Cancelled
County: Umatilla
File Folder Location: Salem
Watermaster District: 5

Documents

View all scanned documents

Application: G 21

- Received: 9/24/1953

Permit: G 64 document

- Signature: 10/24/1967

Order(s)

Order Origin	Volume-Page	Signature	Description
Special	10-53	5/7/1959	EXTENDS TIME LIMITS UNDER MULTIPLE PERMITS--SEE ORDER FOR LIST
Special	11-68	3/28/1961	EXTENSION OF TIME FOR CERTAIN PERMITS
Special	51-918	8/8/1997	APPROVES T-7044
Special	52-941	11/4/1998	EXTENDS TIME T-7044& T-7045
Special	69-1079	8/28/2006	STAGE GULCH ALLOCATING WATER, CITY OF ECHO

Transfer(s)

Transfer	Transfer type	Status
T7044 (Confirming)	Regular	Approved

- View right with Web Mapping
- View Places of Use from Water Rights in the Same Area

Point(s) of Diversion

POD 1 - WELL 3 > ALKALI CANYON

Description

- T-R-S-QQ: 3.00N-29.00E-16-SW NE
- Location Description: 2000 FEET SOUTH & 1700 FEET WEST FROM NE CORNER, SECTION 16

POD Rate

Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)
0.89	0.89		

MUNICIPAL USES (Primary)

Priority Date	Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)	Rate/Acre	Duty	Start Date	End Date	Remarks
9/24/1953	0.89	0.89					1/1	12/31	DIVERSION LIMITED TO QUANTITY AVAILABLE AT ORIGINAL POD

POD 2 - WELL 5 > ALKALI CANYON

Description

- T-R-S-QQ: 3.00N-29.00E-16-NE NE
- Location Description: 850 FEET SOUTH & 70 FEET WEST FROM NE CORNER, SECTION 16

POD Rate

Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)
0.89			

MUNICIPAL USES (Primary)

Priority Date	Max Rate (cfs)	Rate (cfs)	Max Volume (af)	Volume (af)	Rate/Acre	Duty	Start Date	End Date	Remarks
9/24/1953	0.89	0.0 (est)					1/1	12/31	DIVERSION LIMITED TO QUANTITY AVAILABLE AT ORIGINAL POD

Place(s) of Use

Add TRS grouping

Use - MUNICIPAL USES (Primary); Priority Date: 9/24/1953

T-R-S	QQ	DLC	Gov't Lot	Taxlot	Acres	Status	Linked PODs	Inchoate Info	Remarks
3.00N-29.00E-7	SW NE					NC			
3.00N-29.00E-7	SE NE					NC			
3.00N-29.00E-8	NE NE					NC			
3.00N-29.00E-8	NW NE					NC			
3.00N-29.00E-8	SW NE					NC			
3.00N-29.00E-8	SE NE					NC			

3.00N-29.00E-8	NE SE					NC				
3.00N-29.00E-8	NW SE					NC				
3.00N-29.00E-8	SW SE					NC				
3.00N-29.00E-8	SE SE					NC				
3.00N-29.00E-9	NW NE					NC				
3.00N-29.00E-9	SW NE					NC				
3.00N-29.00E-9	SE NE					NC				
3.00N-29.00E-9	NE NW					NC				
3.00N-29.00E-9	NW NW					NC				
3.00N-29.00E-9	SW NW					NC				
3.00N-29.00E-9	SE NW					NC				
3.00N-29.00E-9	NE SW					NC				
3.00N-29.00E-9	NW SW					NC				
3.00N-29.00E-9	SW SW					NC				
3.00N-29.00E-9	SE SW					NC				
3.00N-29.00E-9	NE SE					NC				
3.00N-29.00E-9	NW SE					NC				
3.00N-29.00E-9	SW SE					NC				
3.00N-29.00E-9	SE SE					NC				
3.00N-29.00E-10	NW SW					NC				
3.00N-29.00E-10	SW SW					NC				
3.00N-29.00E-10	SE SW					NC				
3.00N-29.00E-15	NE NW					NC				
3.00N-29.00E-15	NW NW					NC				
3.00N-29.00E-15	SW NW					NC				
3.00N-29.00E-15	SE NW					NC				
3.00N-29.00E-15	NE SW					NC				
3.00N-29.00E-15	NW SW					NC				
3.00N-29.00E-16	NE NE					NC				
3.00N-29.00E-16	NW NE					NC				
3.00N-29.00E-16	SW NE					NC				
3.00N-29.00E-16	SE NE					NC				
3.00N-29.00E-16	NE NW					NC				
3.00N-29.00E-16	NW NW					NC				
3.00N-29.00E-16	SW NW					NC				
3.00N-29.00E-16	SE NW					NC				
3.00N-29.00E-16	NE SW					NC				
3.00N-29.00E-16	NE SE					NC				
3.00N-29.00E-16	NW SE					NC				
3.00N-29.00E-16	SE SE					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

STATE OF OREGON

COUNTY OF UMATILLA

ORDER APPROVING AN ADDITIONAL POINT OF APPROPRIATION AND CHANGE IN PLACE OF USE

Pursuant to ORS 537.705, after notice was given and no objections were filed, and finding that no injury to existing water rights would result, this order approves, as conditioned or limited herein, TRANSFER 7044 submitted by

CITY OF ECHO
P.O. BOX 9
ECHO, OREGON 97826.

The right to be modified, as evidenced by Certificate 34386, was perfected under Permit G-64 with a date of priority of SEPTEMBER 24, 1953. The right allows the use of WELL NO. 3, in the UMATILLA RIVER BASIN, for MUNICIPAL USE. The amount of water to which this right is entitled is limited to an amount actually beneficially used and shall not exceed 0.89 cubic foot per second, if available at the original well; SW¼ NE¼, SECTION 16, T 3 N, R 29 E, WM; 2000 FEET SOUTH AND 1700 FEET WEST FROM THE NORTHEAST CORNER, SECTION 16, or its equivalent in case of rotation, measured at the well.

The use shall conform to any reasonable rotation system ordered by the proper state officer.

The authorized place of use is as follows:

NE¼
E½ NW¼
NE¼ SW¼
N½ SE¼
SECTION 16
TOWNSHIP 3 NORTH, RANGE 29 EAST, W.M.

The applicant proposes to add an additional point of appropriation to:

NE¼ NE¼, SECTION 16, T 3 N, R 29 E, WM; WELL NO. 5 - 850 FEET SOUTH AND 70 FEET WEST FROM THE NORTHEAST CORNER, SECTION 16.

The applicant also proposes to change the place of use to:

S½ NE¼
SECTION 7

E½
SECTION 8

NW¼ NE¼
SW¼ NE¼
SE¼ NE¼
NW¼
S½
SECTION 9

NW¼ SW¼
S½ SW¼
SECTION 10

NW¼
NW¼ SW¼
NE¼ SW¼
SECTION 15

N½
E½ NW¼
NE¼ SW¼
E½ SE¼
N½ SE¼
SECTION 16
TOWNSHIP 3 NORTH, RANGE 29 EAST, W.M.

THIS CHANGE TO AN EXISTING WATER RIGHT MAY BE MADE PROVIDED THE FOLLOWING CONDITIONS ARE MET BY THE WATER USER:

1. The proposed change shall be completed on or before October 1, 1998.

2. The quantity of water diverted at the new point of appropriation (well), together with the quantity diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available from the original point of appropriation.

3. The water user shall install an in-line flow meter or other suitable device for measuring and recording the quantity of water used. The type and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department.

4. Water shall be acquired from the same aquifer as the original point of appropriation.

Certificate 34386 is canceled. When satisfactory proof of the completed change is received, a new certificate confirming this water right will be issued.

WITNESS the signature of the Water Resources Director, affixed AUG 08 1997.

Martha O. Pagel, Director

BEFORE THE WATER RESOURCES DIRECTOR OF OREGON

UMATILLA COUNTY

EXTENSION OF TIME

The changes approved under Transfers 7044 and 7045, in the name of the City of Echo, were to have been completed by October 1, 1998. The City has requested additional time to complete the changes.

The City provided evidence of reasonable diligence in completing the project. The request for extension of time should be approved.

The time for completion of the changes approved by Transfers 7044 and 7045, in the name of the City of Echo, shall be extended to October 1, 2003.

Witness the signature of the Water Resource Director, affixed NOV 04 1998.

For Martha O. Pagel, Director

Form U-1—(12-6-48)

Permit No. G-64

APPLICATION FOR A PERMIT

To Appropriate the Underground Waters of the State of Oregon

I, City of Echo
(Name of applicant)

of Echo (Mailing address), county of Umatilla

state of Oregon, do hereby make application for a permit to appropriate the following described underground waters of the state of Oregon, SUBJECT TO EXISTING RIGHTS:

If the applicant is a corporation, give date and place of incorporation

Municipal Corporation, Incorporated March 21st 1904 -- Echo, Oregon

1. Give name of nearest stream to which the well, tunnel or other source of water development is situated Umatilla River
(Name of stream)

tributary of Columbia River

2. The amount of water which the applicant intends to apply to beneficial use is [illegible] cubic feet per second.

3. The use to which the water is to be applied is drinking water, fire protection, General Municipal purposes

4. The well or other source is located [illegible] and [illegible] in the [illegible] of Section 4 in Block 6 Echo Orchard Tracts, being located in the Southeast quarter of the Northeast quarter of Section 32 T. 5 N. R. 29 E. W. M., in the County of Umatilla

[illegible] side line

[illegible]

DESCRIPTION OF WELL

CANAL SYSTEM OR PIPE LINE—

9. (a) Give dimensions at each point of canal where materially changed in size, stating miles from headgate. At headgate: width on top (at water line) ..... feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(b) At ..... miles from headgate: width on top (at water line) ..... feet; width on bottom ..... feet; depth of water ..... feet; grade ..... feet fall per one thousand feet.

(c) Length of pipe, ... ft.; size at intake, ... in.; size at ..... from intake ..... in.; size at place of use ..... in.; difference in elevation between intake and place of use, ... ft. Is grade uniform? ..... Estimated capacity ..... sec. ft.

10. If pumps are to be used, give size and type 12 Stage 10" Model EH Bowler Water Lub. Deep Well Turbine Pump 50 HP 3 phase 1800 RPM Vertical Hollow Shaft

Give horsepower and type of motor or engine to be used

11. If the location of the well, tunnel, or other development work is less than one-fourth mile from natural stream or stream channel, give the distance to the nearest point on each of such channels and the difference in elevation between the stream bed and the ground surface at the source of development

Over 1/4 mile = 9 Blocks from Sa about 2000 ft.

12. Location of area to be irrigated, or place of use ..... Only inside City Limits

Township North	Range E or W of Willamette Meridian	Section	Forty-acre Tract	Number of Acres
	12E	16	NW¼	
			NE¼	
			SW¼	
			SE¼	

MUNICIPAL SUPPLY—

13. (c) To supply the city of Echo

[redacted] county, having a present population of about 500

and an estimated population of ..... in 19.....

14. Estimated cost of proposed works, $ 15,000

15. Construction work will begin on or before .....

16. Construction work will be completed on or before November 1951

17. The water will be completely applied to the proposed use on or before .....

City of Echo

H. L. McFaul
(Signature of applicant)

City Recorder

Remarks: .....

STATE OF OREGON)
County of Marion,) ss.

This is to certify that I have examined the foregoing application, together with the accompanying plans and data, and return the same for completion, fees

STATE OF OREGON,)
) ss.
County of Marion,)

PERMIT

This is to certify that I have examined the foregoing application and do hereby grant the same SUBJECT TO EXISTING RIGHTS and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 1.11 cubic feet per second measured at the point of diversion from the well or source of appropriation, or its equivalent in case of rotation with other water users, from Well No. 3.

The use to which this water is to be applied is municipal.

If for irrigation, this appropriation shall be limited to -- of one cubic foot per second or its equivalent for each acre irrigated and shall be further limited to a diversion of not to exceed acre feet per acre for each acre irrigated during the irrigation season of each year;

The well shall be cased as necessary in accordance with good practice and if flow is artesian the works shall include proper capping and control valve to prevent the waste of ground water.

The works constructed shall include an air line and pressure gauge or an access port for measuring line, adequate to determine water level elevation in the well at all times.

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The permittee shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The well shall be so cased as to prevent the loss of underground water.

The priority date of this permit is September 24, 1953

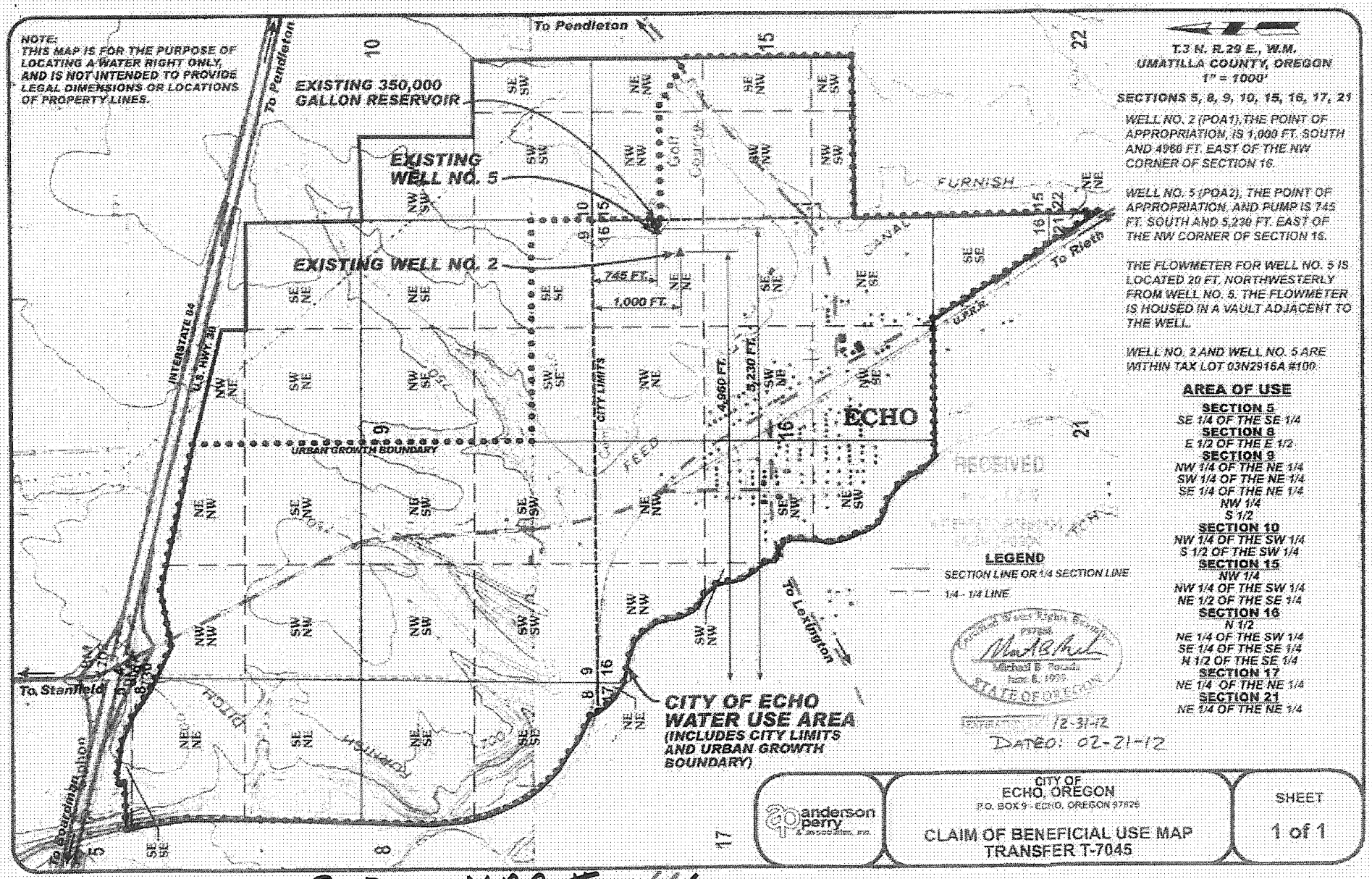
Actual construction work shall begin on or before December 20, 19[illegible] and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19[illegible]

Complete application of the water to the proposed use shall be made on or before Oct[illegible]

WITNESS my hand this 20th day of December, 19[illegible]

[illegible]

0666



COBU MAP # 0666

J# 1391-17-217 Feb. 21, 2012 lbauer

Well No. 4

WCLC# 2 & 4

Application No. G-8865 Permit No. G 8546

RECEIVED
JUN 21 1978
WATER RESOURCES DEPT.
SALEM, OREGON

STATE OF OREGON WATER RESOURCES DEPARTMENT

Application for a Permit to Appropriate Ground Water

I, City of Echo, Oregon
(Name of Applicant)

of P.O. Box 669, Echo (ZIP 97826)
(Mailing Address) (City)

State of Oregon, (Zip Code) Phone No. 376-8341 do hereby

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

1. The development will consist of ~~a single deep~~ 2 wells (City Wells No. 4 & No. 2)
(Give number of wells, tile lines, infiltration galleries, etc.)

having a diameter of #2 8, 10, & 12" #4 10 inches and an estimated depth of #2 & #4 600 feet.

2. The well or other source is to be located ..... ft. (N. or S.) and ..... ft. (E. or W.)

from the NE corner of SECTION 16
(Public Land Survey Corner)

#2 - S 17° 41' 08" W 1146.1 feet within NE¼ NE¼

(If there is more than one well, each must be described)

#4 - S 22° 02' 29" W 1959.6' being within the S.E. ¼ of the N.E. ¼ of

Sec. 16 Tp. 3 North R. 29 East, W. M., in the county of Umatilla

3. Location of area to be irrigated, or place of use if use other than irrigation.

Township	Range	Section	List ¼ ¼ of Section	List use and/or number of acres to be irrigated
3 N	29E	5	S½ SE¼	MUNICIPAL
		8	E ½	"
		9	NW¼ NE¼	"
			S ½ NE ¼ NW ¼	"
		10	S ½ W ½ SW ¼	"
			SE¼ SW¼	"
		15	NW¼	"
		16	N ½ SW ¼ N ½	"
			NE¼ SW¼ N½ SE¼	"
		17	SE¼ SE¼ NE¼ NE¼	"

4. It is estimated that #4 45 feet of the well will require ¼" thick 10" dia. casing.
both #2 Ben Dreyer (Kind) (6-20-74)

5. Depth to water table is estimated 315 (Feet) Well drilled by #4 Troy Griffin (Completed 8-2-74)

6. The amount of water which the applicant intends to apply to beneficial use is ~~2.0~~ 4.9 cubic feet per second or ~~900~~ 2205 gallons per minute. being 2.9 cfs from well #2 and 2.0 cfs from well #4.

7. The use to which the water is to be applied is Municipal; ie: Domestic, industrial, recreational irrigation, fire protection, etc.

8. If the flow to be utilized is artesian, the works to be used for the control and conservation of the supply when not in use must be described.

N.A.

9. If the location of the well, or other development work is less than one-fourth mile from a natural stream channel, give the distance to the channel and the difference in elevation between the stream bed and the ground surface at the source of development.

N.A.

10. DESCRIPTION OF WORKS

Include length and dimensions of supply ditch or pipeline, size and type of pump and motor, type of irrigation system to adequately describe the proposed distribution system.

To be submitted prior to new construction and reconstruction of the present water system.

11. Construction work will begin on or before June 20, 1978

12. Construction work will be completed on or before June 20, 1981

13. The water will be completely applied to the proposed use on or before June 20, 1984

14. If the ground water supply is supplemental to an existing supply, identify the supply and existing water right. Certificate 19613 and 34386

Application No. G-8865 Permit No. G 8546

Remarks:.....

.....

.....

.....

.....

.....

.....

.....

.....

Stanley G. Wallulis
Signature of Applicant

Stanley G. Wallulis, Echo City Engineer

This is to certify that I have examined the foregoing application, together with the accompanying maps and data, and return the same for.....

.....

In order to retain its priority, this application must be returned to the Water Resources Director with corrections 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 21st *day of* June, *19* 78, *at* 4:20 *o'clock* P. *M.*

Application No. G-8865 *Permit No.* G-8546

Application No. G-8886 Permit No. G 8340

Permit to Appropriate the Public Waters of the State of Oregon

G-8886

This is to certify that I have examined the foregoing application and do hereby grant the same, SUBJECT TO EXISTING RIGHTS INCLUDING THE EXISTING MINIMUM FLOW POLICIES ESTABLISHED BY THE WATER POLICY REVIEW BOARD and the following limitations and conditions:

The right herein granted is limited to the amount of water which can be applied to beneficial use and shall not exceed 4.9 *cubic feet per second measured at the point of diversion from the well or source of appropriation, or its equivalent in case of rotation with other water users, from* Wells #2 and #4; being 2.9 c.f.s. from Well #2 and 2.0 c.f.s. from Well #4.

The use to which this water is to be applied is municipal.

If for irrigation, this appropriation shall be limited to ..... *of one cubic foot per second or its equivalent for each acre irrigated and shall be further limited to a diversion of not to exceed* ..... *acre feet per acre for each acre irrigated during the irrigation season of each year;*

and shall be subject to such reasonable rotation system as may be ordered by the proper state officer.

The well shall be constructed in accordance with the General Standards for the Construction and Maintenance of Water Wells in Oregon.

The works constructed shall include an air line and pressure gauge or an access port for measuring line, adequate to determine water level elevation in the well at all times.

The permittee shall install and maintain a weir, meter, or other suitable measuring device, and shall keep a complete record of the amount of ground water withdrawn.

The priority date of this permit is June 21, 1978

Actual construction work shall begin on or before May 30, 1980 *and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19* 80

Extended to Oct. 1985 Extended to October 1, 1990, 10-1-95, 10-1-2000

Complete application of the water to the proposed use shall be made on or before October 1, 19 81

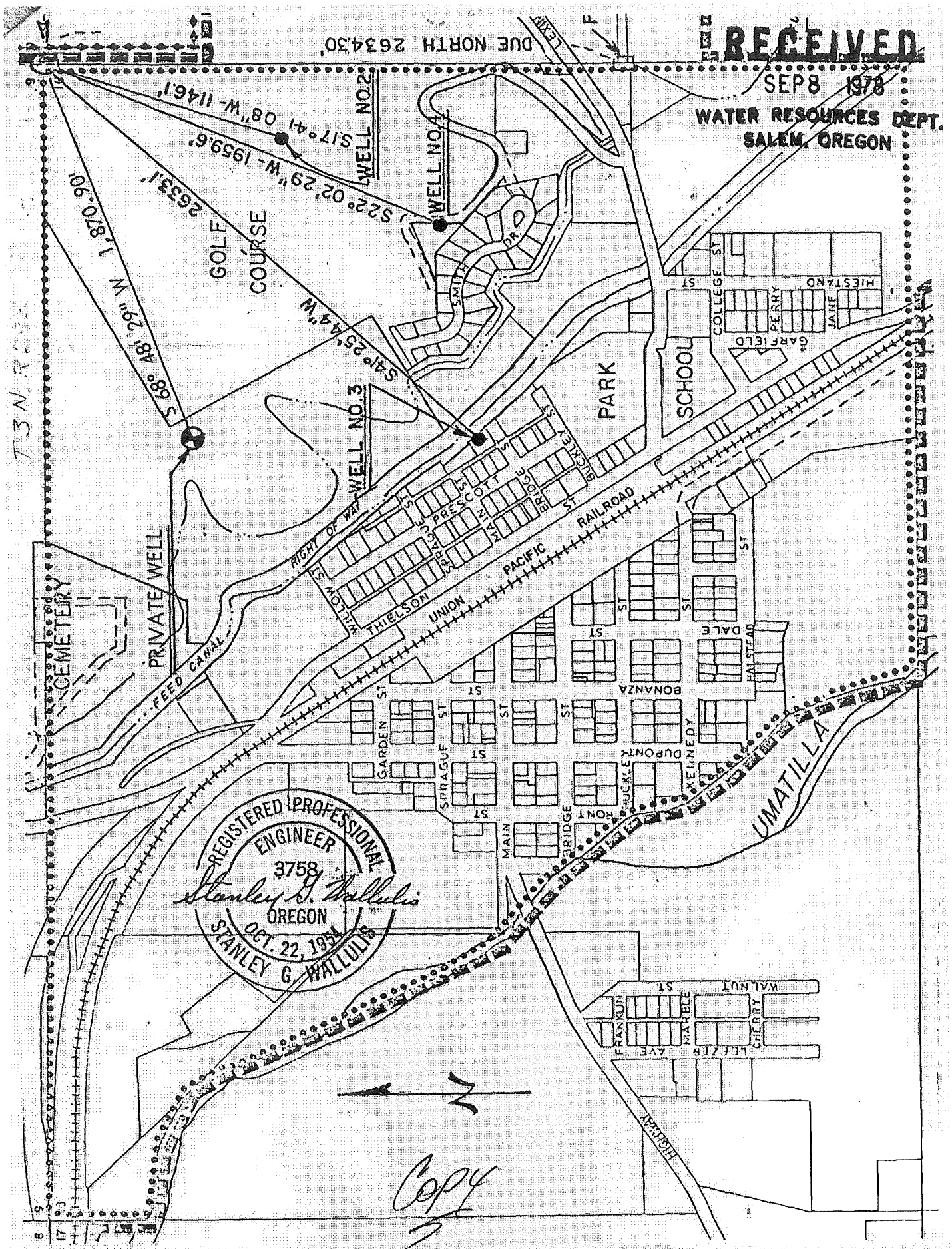
Extended to Oct. 1985 Extended to October 1, 1990, 10-1-95, 10-1-2000

WITNESS my hand this 30th *day of* May, *19* 79

James E. Sexton

Water Resources Director

PUT A



PROJ. LOCATION SURVEY OF PRIVATE WELL	WALLULIS & ASSOCIATES, INC. ENGINEERING & PLANNING 5 SE NYE 108 E. MAIN PENDLETON HERMISTON	SCALE 1" = 600'	NO. 76-113
TITLE City of Echo, Oregon Deep Well Protest		DATE Sept. 7 1978	

Oregon Water Resources Department
Water Rights Division

Water Rights Application
Number G-8865

Final Order
Extension of Time for Permit Number G-8546

Appeal Rights
This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition 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 petition 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
On February 27, 2003, The City of Echo submitted an application to the Department for an extension of time for permit number G-8546. The Department issued permit number G-8546 on May 30, 1979. The permit called for completion of construction work by October 1, 1980, and complete application of water to beneficial use by October 1, 1981. In accordance with OAR 690-315-0050(2), on May 23, 2006, the Department issued a Proposed Final Order proposing to extend the time for complete construction of the water system to October 1, 2028, and the time for complete application of water to October 1, 2028. The protest period closed July 7, 2006, in accordance with OAR 690-315-0060(1). No protest was filed.

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:

CONDITION

1. **Municipal Use Extension Condition**
   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 wells. The plan shall be submitted to the Department within one year of the date the Extension Order 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 wells or and adequate substitute such as water levels in nearby wells.

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 Number G-8865, Permit Number G-8546, therefore, is approved subject to conditions contained herein. The deadline to complete construction is extended to October 1, 2028. The deadline to apply water to the full beneficial use is extended to October 1, 2028.

DATED: August 3, 2006

Dwight French, Administrator of
Water Rights and Adjudications
for
Phillip C. Ward, Director

If you have any questions about statements contained in this document, please contact Ann L. Reece at (503) 986-0808.

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

BEFORE THE WATER RESOURCES DEPARTMENT
OF THE
STATE OF OREGON

In the Matter of Stage Gulch 2007 Annual Allocation of Ground Water, Umatilla County, Oregon	))))	FINAL ORDER APPROVING ALLOCATION OF GROUND WATER

CITY ADMINISTRATOR
CITY OF ECHO
P. O. BOX 9
ECHO, OR 97826

ORS 537.730 and 537.735 establish the process by which the Water Resources Commission may designate an area of the state as a critical ground water area. OAR Chapter 690, Division 507 implements the statutes and provides the Department procedures and criteria for the purpose of managing the ground water resource and evaluating requests for allocation of ground water.

AUTHORITY

1) Oregon Administrative Rules (OAR) 690-507-0750 states in pertinent part that the Director issued an order on May 15, 1991 declaring the Stage Gulch Critical Groundwater Area. The order described the exterior boundaries and divided the area with eight subareas for the purposes of managing the groundwater resource. The response of ground-water levels to pumpage in each subarea is largely independent of pumpage within other subareas.

2) OAR 690-507-0770 states in pertinent part that the use of water from the basalt groundwater reservoir within the Stage Gulch Critical Groundwater Area shall be limited to the sustainable annual yield. Water from the basalt groundwater reservoir in the Stage Gulch Critical Groundwater Area shall be used for irrigation only during the irrigation season. The irrigation season shall begin on the 1st of March and end on the 30th of November. The Department shall not accept any new applications for appropriation of water from the basalt groundwater reservoir within the Stage Gulch Critical Groundwater Area.

This is a final order in other than contested case. This order is subject to judicial review under ORS 183.484. Any petition 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 petition 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.

3) OAR 690-507-0780 states in pertinent part that appropriation of groundwater from the Stage Gulch Critical Groundwater Area is prohibited unless the water user meets certain requirements. A water user authorized by OAR 690-507-0810 to pump water from the basalt groundwater reservoir shall satisfy the following conditions:

- Wells shall have an access port with a minimum diameter of 3/4 inch. The access shall be adequate to determine the water level at any time;
- A water user may install a functioning airline with a pressure gage in addition to the access port.
- A water user shall install and maintain a totalizing flow meter on each well authorized by OAR 690-507-0810 except wells authorized for irrigation of ten acres or less. The meter shall meet the requirements of OAR 690-507-0785.

4) OAR 690-507-0810 states in pertinent part that the method for distributing the sustainable annual yield from the basalt groundwater reservoir within each managed subarea in the Stage Gulch Critical Groundwater Area is as follows:

- A water user who intends to pump water for any authorized use except municipal use during any year shall make a request to the Department in Salem by July 1st of the preceding year on forms provided by the Department;
- The Department shall assume that municipal water users intend to pump a quantity of water equivalent to the average pumped for the previous three (3) years, unless the municipal water user informs the Department otherwise by July 1st;
- The distribution of groundwater for any authorized use except municipal use shall be based on the priority dates of the water rights within the individual subarea;
- In determining the amount of groundwater each water user is allocated to pump during the next calendar year or irrigation season, the Department may consider:
  - Requests for allocations received;
  - The sustainable annual yield;
  - The limits of the groundwater rights;
  - The relative dates of priority, with preference given without regard to priority date for municipal use;
  - Historical usage;
  - Whether or not a water user is physically capable of pumping and putting to a beneficial use the quantity requested; and
  - Any other factors deemed appropriate by the Department.

- If pumpage for a particular year exceeds the sustainable annual yield for a subarea, the total subarea allocation for the second year after that occurrence shall be reduced by that volume.

- If any water user requests more water than has been historically used, the Department may allocate less water than requested if, upon investigation, it appears unlikely the user will pump the volume requested.

- If any water user requests less water than has been historically used, the Department may allocate more water than requested if, upon investigation, it appears likely that the user will pump more than the volume requested.

FINDINGS OF FACT

1) Allocations are made to the municipal water users in Subarea A first. Then allocations are made to the senior water rights. The City of Echo is a municipal water user in Subarea A.

2) The quantity allocated to municipal users is based on the average pumped from the basalt ground-water reservoir for the three (3) previous years, unless the municipal water user informs the Department otherwise by July 1st. Allocations shall not exceed the limits of the water rights. Once the sustainable annual yield or reduced volume is allocated for a subarea, no more water shall be allocated.

3) The sustainable annual yield for Subarea A is 11,450 acre-feet. For the year 2005, 11,450 acre-feet of water was allocated to municipal and senior water right holders in Subarea A.

4) Flow meter and power meter data collected by Department staff indicate that 12,093 acre-feet of water was pumped from permitted wells in Subarea A in 2005. Pumpage for 2005 exceeded the sustainable annual yield by 643 acre-feet. The Subarea A allocation for 2007 is reduced by 643 acre-feet to a total of 10,807 acre-feet.

5) Municipal water users are not required to file a request for water use in 2007, Stage Gulch Critical Ground Water Area, Subarea A.

6) Flow meter and power meter data and water-use reporting records indicate that the City of Echo pumped an average of 256 acre-feet for the three previous years from the basalt ground-water reservoir. This shall be the quantity allocated for 2007.

DISCUSSION

The sustainable annual yield for Subarea A is 11,450 acre-feet. The quantity of water allocated for 2007 for Subarea A is reduced to 10,807 acre-feet because more water was pumped in 2005 than was allocated. The City of Echo is a municipal water user in Subarea A. The quantity allocated to municipal users is based on the average pumped from the basalt ground-water reservoir for the three previous years. The City of Echo pumped an average of 256 acre-feet for the three previous years. The allocation for the City of Echo does not exceed the limits of the

water rights or the quantity allocated for Subarea A. Therefore, the 2007 allocation is for 256 acre-feet.

CONCLUSIONS OF LAW

The allocation of ground water for the State Gulch Critical Ground Water Area for the year 2007 is consistent with the requirements of ORS 537.705 and 540.505 to 540.580, and Oregon Administrative Rules Chapter 690, Division 507.

ORDER

Now, THEREFORE, it is ORDERED that 256 acre-feet of water is allocated for the year 2007 to the City of Echo for Subarea A of the Stage Gulch Critical Ground Water Area.

Dated at Salem, Oregon this 28 day of August, 2006.

Barry F. Norris, Administrator
Technical Services Division

CERTIFICATE OF SERVICE

I certify that on August 30, 2006, I mailed the attached FINAL ORDER APPROVING ALLOCATION OF GROUND WATER by certified mail to:

CITY ADMINISTRATOR
CITY OF ECHO
P. O. BOX 9
ECHO, OR 97826

Zachary L. Stark-MacMillan
Oregon Water Resources Department

Well No. 5

STATE OF OREGON

COUNTY OF UMATILLA

CERTIFICATE OF WATER RIGHT

THIS CERTIFICATE ISSUED TO

CITY OF ECHO
PO BOX 9
ECHO OR 97826

confirms the right to the use of water perfected under the terms of Permit U-168. The amount of water used to which this right is entitled is limited to the amount used beneficially, and shall not exceed the amount specified, or its equivalent in the case of rotation, measured at the well. The specific limits and conditions of the use are listed below.

SOURCE OF WATER: WELL NO. 5

PURPOSE OR USE: MUNICIPAL USE

MAXIMUM RATE: 1.10 CUBIC FEET PER SECOND

DATE OF PRIORITY: AUGUST 24, 1945

The well is located as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
3 N	29 E	WM	16	NE NE	WELL NO. 5 (POA2) – 745 FEET SOUTH AND 5230 FEET EAST FROM NW CORNER, SECTION 16

The use shall conform to any reasonable rotation system ordered by the proper state officer.

A description of the place of use is as follows:

Twp	Rng	Mer	Sec	Q-Q
3 N	29 E	WM	8	E1/2
3 N	29 E	WM	9	NW NE
3 N	29 E	WM	9	SW NE
3 N	29 E	WM	9	SE NE
3 N	29 E	WM	9	NW1/4
3 N	29 E	WM	9	S1/2
3 N	29 E	WM	10	NW SW
3 N	29 E	WM	10	S1/2 SW1/4
3 N	29 E	WM	15	NW1/4
3 N	29 E	WM	15	NW SW
3 N	29 E	WM	15	NE SW
3 N	29 E	WM	16	N1/2
3 N	29 E	WM	16	NE SW
3 N	29 E	WM	16	SE SE
3 N	29 E	WM	16	N1/2 SE1/4

NOTICE OF RIGHT TO PETITION FOR RECONSIDERATION OR JUDICIAL REVIEW

This is an order in other than a contested case. This order is subject to judicial review under ORS 183.482. Any petition for judicial review must be filed within the 60-day time period specified by ORS 183.482. Pursuant to ORS 183.482, ORS 536.075 and OAR 137-003-0675, you may petition for judicial review and 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.

The quantity of water diverted at the new point of appropriation (well), together with the quantity diverted at the old point of appropriation, shall not exceed the quantity of water lawfully available from the original point of appropriation described as follows:

Twp	Rng	Mer	Sec	Q-Q	Measured Distances
3 N	29 E	WM	16	NE NE	WELL NO. 2 (POA1) – 1000 FEET SOUTH AND 4960 FEET EAST FROM NW CORNER, SECTION 16

The water user shall install and in-line flow meter or other suitable device for measuring and recording the quantity of water used. The type and plans of the measuring device must be approved by the Department prior to beginning construction and shall be installed under the general supervision of the Department.

Water shall be acquired from the same aquifer as the original point of appropriation.

The right to the use of the water for the above purpose is restricted to beneficial use on the place of use described.

This certificate is issued to confirm a change in PLACE OF USE AND AN ADDITIONAL POINT OF DIVERSION approved by an order of the Water Resources Director entered August 8, 1997, at Special Order Volume 51, Page 921, approving Transfer Application 7045, supercedes Certificate 19613, State record of Water Right Certificates.

Issued FEB 10 2017.

Dwight French
Water Right Services Division Administrator, for
Thomas M. Byler, Director
Oregon Water Resources Department

APPENDIX F
Oregon Health Authority - Drinking Water Services Water Quality Testing Summaries

OHA Drinking Water Services

PWS ID: 00270 ---- ECHO, CITY OF

Alerts indicate water quality tests with analytical results greater than the detection limit or one-half of the maximum allowable contaminant level which may require some follow-up actions by Drinking Water Services. See the Contacts link for reports on follow-up actions. Alerts are not water quality violations. Violations for this water system can be found here.

Alert Type Abbreviations: COLI = Coliform, SODIUM = Sodium*

**Non-alert (water quality notice)*

Results: 15 alerts found for this water system. Show response time

Water Quality Alerts

Alert ID	Sample Date	Alert Date	Source ID	Source Name	Alert Type	Contaminant	Result	Alert Level	MCL	Contact Report
CHEM6338	06/02/2014	06/26/2014	EP-A	EP FOR WELLS	SODIUM*	SODIUM	47.2	20		
CHEM4955	06/06/2011	07/19/2011	EP-A	EP FOR WELLS	SODIUM*	SODIUM	52.4	20		
COLI5418	07/26/2008	07/28/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI5418	07/26/2008	07/28/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI5244	06/06/2008	06/09/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI5244	06/06/2008	06/09/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI5244	06/06/2008	06/09/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI5239	06/04/2008	06/06/2008	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI4484	09/05/2007	09/06/2007	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI2310	08/08/2005	08/15/2005	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI2310	08/08/2005	08/15/2005	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI2310	08/08/2005	08/15/2005	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI2310	08/08/2005	08/15/2005	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
COLI2189	07/06/2005	07/15/2005	DIST-A	Distribution System	COLI	COLIFORM, TOTAL (TCR)	Present	Present	Present	
CHEM156	02/27/2002	10/10/2002	EP-A	EP FOR WELLS	SODIUM*	SODIUM	49	20		

**Non-alert (water quality notice)*

Archived Alerts (SWS database)

Date	Source	Chemical	Results mg/l	MCL mg/l
01/06/1999		Coliform		
10/29/1996	A--EP FOR WELLS	Sodium	51	
10/27/1993	AA--WELL #5 (RESERVOIR)	Sodium	51	
05/26/1993	AB--WELL #4 (GOLF COURSE ROAD)	Sodium	52	

OHA Drinking Water Services

PWS ID: 00270 ---- ECHO, CITY OF

Excel Spreadsheet

MCL = 0.010 mg/L; MCL exceedances are indicated with **red text**.
ND = Not detected at the minimum reporting level.

Arsenic Samples

Sample ID	Sample Date	Date Received	Source Name	Source ID	Result (mg/L)	Comments
X027776-I	06/26/2017	08/14/2017	EP FOR WELLS	EP-A	0.00195	
X015286-I	06/02/2014	06/19/2014	EP FOR WELLS	EP-A	0.00106	
X07086-I	06/06/2011	07/07/2011	EP FOR WELLS	EP-A	0.00152	
A80306V1-I	03/06/2008	06/09/2008	EP FOR WELLS	EP-A	0.0011	
A50124J-1	01/24/2005	03/28/2005	EP FOR WELLS	EP-A	0.0012	
A20227AN-1I	02/27/2002	06/17/2002	EP FOR WELLS	EP-A	0.0015	

Archived Arsenic Samples

Sample ID	Sample Date	Date Received	Source Name	Source ID	Result
990825B*A	08/25/1999	10/25/1999	EP FOR WELLS	A	0.001
990512I*A	05/12/1999	10/05/1999	EP FOR WELLS	A	0.0013
961029G*A	10/29/1996	01/14/1997	EP FOR WELLS	A	0.0014
931028AVAA	10/27/1993	06/13/1995	WELL #5 (RESERVOIR)	AA	ND
930527ADAA	05/26/1993	10/18/1993	WELL #4 (GOLF COURSE ROAD)	AB	ND
-1981627	05/10/1989	10/02/1989	WELL #4 (GOLF COURSE ROAD)	AB	ND
-1981582	05/10/1989	10/02/1989	WELL #3 (BRIDGE STREET)	AC	ND
-1981628	08/07/1986	08/07/1986	WELL #4 (GOLF COURSE ROAD)	AB	ND

Oregon Public Health
Drinking Water Data Online

Introduction :: Data Search Options :: Water System Search :: DWS Home :: DWS Rules :: Quick Data Links

Coliform fact sheet

PWS ID: 00270 ---- ECHO, CITY OF

Current Coliform Summary History

Samples Required	Sample Type	Sampling Period Type
1	RT	MONTH

Spreadsheet

Number of Samples Reported

Period End Date	Routines Reported	Routine TC+	Routine FC+	Repeats Reported	Repeat TC+	Repeat FC+	Period Type
Jun 30, 2021	1	0	0	0	0	0	MN
May 31, 2021	1	0	0	0	0	0	MN
Apr 30, 2021	1	0	0	0	0	0	MN
Mar 31, 2021	1	0	0	0	0	0	MN
Feb 28, 2021	1	0	0	0	0	0	MN
Jan 31, 2021	1	0	0	0	0	0	MN
Dec 31, 2020	1	0	0	0	0	0	MN
Nov 30, 2020	1	0	0	0	0	0	MN
Oct 31, 2020	1	0	0	0	0	0	MN
Sep 30, 2020	1	0	0	0	0	0	MN
Aug 31, 2020	1	0	0	0	0	0	MN
Jun 30, 2020	1	0	0	0	0	0	MN
May 31, 2020	1	0	0	0	0	0	MN
Apr 30, 2020	1	0	0	0	0	0	MN
Mar 31, 2020	1	0	0	0	0	0	MN
Feb 29, 2020	1	0	0	0	0	0	MN
Jan 31, 2020	1	0	0	0	0	0	MN
Dec 31, 2019	1	0	0	0	0	0	MN
Dec 31, 2019	0	0	0	0	0	0	YR
Nov 30, 2019	1	0	0	0	0	0	MN
Oct 31, 2019	1	0	0	0	0	0	MN
Sep 30, 2019	1	0	0	0	0	0	MN
Aug 31, 2019	1	0	0	0	0	0	MN
Jul 31, 2019	1	0	0	0	0	0	MN
Jun 30, 2019	1	0	0	0	0	0	MN
May 31, 2019	1	0	0	0	0	0	MN
Apr 30, 2019	1	0	0	0	0	0	MN
Mar 31, 2019	1	0	0	0	0	0	MN
Feb 28, 2019	1	0	0	0	0	0	MN
Jan 31, 2019	1	0	0	0	0	0	MN
Dec 31, 2018	0	0	0	0	0	0	3Y
Dec 31, 2018	1	0	0	0	0	0	MN
Dec 31, 2018	0	0	0	0	0	0	YR
Nov 30, 2018	1	0	0	0	0	0	MN
Oct 31, 2018	1	0	0	0	0	0	MN
Sep 30, 2018	1	0	0	0	0	0	MN
Aug 31, 2018	1	0	0	0	0	0	MN
Jul 31, 2018	1	0	0	0	0	0	MN
Jun 30, 2018	1	0	0	0	0	0	MN
May 31, 2018	1	0	0	0	0	0	MN
Apr 30, 2018	1	0	0	0	0	0	MN
Mar 31, 2018	1	0	0	0	0	0	MN
Feb 28, 2018	1	0	0	0	0	0	MN
Jan 31, 2018	1	0	0	0	0	0	MN
Dec 31, 2017	1	0	0	0	0	0	MN
Dec 31, 2017	0	0	0	0	0	0	YR
Nov 30, 2017	1	0	0	0	0	0	MN
Oct 31, 2017	1	0	0	0	0	0	MN
Sep 30, 2017	1	0	0	0	0	0	MN
Aug 31, 2017	1	0	0	0	0	0	MN
Jul 31, 2017	1	0	0	0	0	0	MN
Jun 30, 2017	2	0	0	0	0	0	MN

May 31, 2017	1	0	0	0	0	MN
Apr 30, 2017	1	0	0	0	0	MN
Mar 31, 2017	1	0	0	0	0	MN
Feb 28, 2017	1	0	0	0	0	MN
Jan 31, 2017	1	0	0	0	0	MN
Dec 31, 2016	1	0	0	0	0	MN
Dec 31, 2016	0	0	0	0	0	YR
Nov 30, 2016	1	0	0	0	0	MN
Oct 31, 2016	1	0	0	0	0	MN
Sep 30, 2016	1	0	0	0	0	MN
Aug 31, 2016	1	0	0	0	0	MN
Jul 31, 2016	1	0	0	0	0	MN
Jun 30, 2016	1	0	0	0	0	MN
May 31, 2016	1	0	0	0	0	MN
Apr 30, 2016	1	0	0	0	0	MN
Mar 31, 2016	1	0	0	0	0	MN
Feb 29, 2016	1	0	0	0	0	MN
Jan 31, 2016	1	0	0	0	0	MN
Dec 31, 2015	0	0	0	0	0	3Y
Dec 31, 2015	1	0	0	0	0	MN
Dec 31, 2015	0	0	0	0	0	YR
Nov 30, 2015	1	0	0	0	0	MN
Oct 31, 2015	1	0	0	0	0	MN
Sep 30, 2015	1	0	0	0	0	MN
Aug 31, 2015	1	0	0	0	0	MN
Jul 31, 2015	1	0	0	0	0	MN
Jun 30, 2015	1	0	0	0	0	MN
May 31, 2015	1	0	0	0	0	MN
Apr 30, 2015	1	0	0	0	0	MN
Mar 31, 2015	1	0	0	0	0	MN
Feb 28, 2015	1	0	0	0	0	MN
Jan 31, 2015	1	0	0	0	0	MN
Dec 31, 2014	1	0	0	0	0	MN
Dec 31, 2014	0	0	0	0	0	YR
Nov 30, 2014	1	0	0	0	0	MN
Oct 31, 2014	1	0	0	0	0	MN
Sep 30, 2014	1	0	0	0	0	MN
Aug 31, 2014	1	0	0	0	0	MN
Jul 31, 2014	1	0	0	0	0	MN
Jun 30, 2014	1	0	0	0	0	MN
May 31, 2014	1	0	0	0	0	MN
Apr 30, 2014	1	0	0	0	0	MN
Mar 31, 2014	1	0	0	0	0	MN
Feb 28, 2014	1	0	0	0	0	MN
Jan 31, 2014	1	0	0	0	0	MN
Dec 31, 2013	1	0	0	0	0	MN
Nov 30, 2013	1	0	0	0	0	MN
Oct 31, 2013	1	0	0	0	0	MN
Sep 30, 2013	1	0	0	0	0	MN
Aug 31, 2013	1	0	0	0	0	MN
Jul 31, 2013	1	0	0	0	0	MN
Jun 30, 2013	1	0	0	0	0	MN
May 31, 2013	1	0	0	0	0	MN
Apr 30, 2013	2	0	0	0	0	MN
Mar 31, 2013	1	0	0	0	0	MN
Feb 28, 2013	1	0	0	0	0	MN
Jan 31, 2013	1	0	0	0	0	MN
Dec 31, 2012	0	0	0	0	0	3Y
Dec 31, 2012	1	0	0	0	0	MN
Dec 31, 2012	0	0	0	0	0	YR
Nov 30, 2012	1	0	0	0	0	MN
Oct 31, 2012	1	0	0	0	0	MN
Sep 30, 2012	1	0	0	0	0	MN
Aug 31, 2012	2	0	0	0	0	MN
Jul 31, 2012	1	0	0	0	0	MN
Jun 30, 2012	1	0	0	0	0	MN
May 31, 2012	1	0	0	0	0	MN
Apr 30, 2012	1	0	0	0	0	MN

Mar 31, 2012	1	0	0	0	0	0	MN
Feb 29, 2012	2	0	0	0	0	0	MN
Jan 31, 2012	1	0	0	0	0	0	MN
Dec 31, 2011	1	0	0	0	0	0	MN
Dec 31, 2011	0	0	0	0	0	0	YR
Nov 30, 2011	1	0	0	0	0	0	MN
Oct 31, 2011	1	0	0	0	0	0	MN
Sep 30, 2011	1	0	0	0	0	0	MN
Aug 31, 2011	1	0	0	0	0	0	MN
Jul 31, 2011	1	0	0	0	0	0	MN
Jun 30, 2011	1	0	0	0	0	0	MN
May 31, 2011	1	0	0	0	0	0	MN
Apr 30, 2011	1	0	0	0	0	0	MN
Mar 31, 2011	1	0	0	0	0	0	MN
Feb 28, 2011	1	0	0	0	0	0	MN
Jan 31, 2011	1	0	0	0	0	0	MN
Dec 31, 2010	1	0	0	0	0	0	MN
Dec 31, 2010	0	0	0	0	0	0	YR
Nov 30, 2010	1	0	0	0	0	0	MN
Oct 31, 2010	1	0	0	0	0	0	MN
Sep 30, 2010	1	0	0	0	0	0	MN
Aug 31, 2010	1	0	0	0	0	0	MN
Jul 31, 2010	1	0	0	0	0	0	MN
Jun 30, 2010	1	0	0	0	0	0	MN
May 31, 2010	1	0	0	0	0	0	MN
Apr 30, 2010	1	0	0	0	0	0	MN
Mar 31, 2010	1	0	0	0	0	0	MN
Feb 28, 2010	1	0	0	0	0	0	MN
Jan 31, 2010	1	0	0	0	0	0	MN
Dec 31, 2009	1	0	0	0	0	0	MN
Nov 30, 2009	1	0	0	0	0	0	MN
Oct 31, 2009	1	0	0	0	0	0	MN
Sep 30, 2009	1	0	0	0	0	0	MN
Aug 31, 2009	1	0	0	0	0	0	MN
Jul 31, 2009	1	0	0	0	0	0	MN
Jun 30, 2009	1	0	0	0	0	0	MN
May 31, 2009	1	0	0	0	0	0	MN
Apr 30, 2009	1	0	0	0	0	0	MN
Mar 31, 2009	1	0	0	0	0	0	MN
Feb 28, 2009	1	0	0	0	0	0	MN
Jan 31, 2009	1	0	0	0	0	0	MN
Dec 31, 2008	1	0	0	0	0	0	MN
Nov 30, 2008	1	0	0	0	0	0	MN
Oct 31, 2008	1	0	0	0	0	0	MN
Sep 30, 2008	1	0	0	0	0	0	MN
Aug 31, 2008	5	0	0	0	0	0	MN
Jul 31, 2008	5	**2**	0	0	0	0	MN
Jun 30, 2008	3	**1**	0	**4**	**3**	0	MN
May 31, 2008	1	0	0	0	0	0	MN
Apr 30, 2008	1	0	0	0	0	0	MN
Mar 31, 2008	1	0	0	0	0	0	MN
Feb 29, 2008	1	0	0	0	0	0	MN
Jan 31, 2008	1	0	0	0	0	0	MN
Dec 31, 2007	1	0	0	0	0	0	MN
Nov 30, 2007	1	0	0	0	0	0	MN
Oct 31, 2007	5	0	0	0	0	0	MN
Sep 30, 2007	1	**1**	0	**4**	0	0	MN
Aug 31, 2007	1	0	0	0	0	0	MN
Jul 31, 2007	1	0	0	0	0	0	MN
Jun 30, 2007	1	0	0	0	0	0	MN
May 31, 2007	1	0	0	0	0	0	MN
Apr 30, 2007	1	0	0	0	0	0	MN
Mar 31, 2007	1	0	0	0	0	0	MN
Feb 28, 2007	1	0	0	0	0	0	MN
Jan 31, 2007	1	0	0	0	0	0	MN
Dec 31, 2006	1	0	0	0	0	0	MN
Nov 30, 2006	1	0	0	0	0	0	MN
Oct 31, 2006	1	0	0	0	0	0	MN

Sep 30, 2006	1	0	0	0	0	0	MN
Aug 31, 2006	1	0	0	0	0	0	MN
Jul 31, 2006	1	0	0	0	0	0	MN
Jun 30, 2006	1	0	0	0	0	0	MN
May 31, 2006	1	0	0	0	0	0	MN
Apr 30, 2006	1	0	0	0	0	0	MN
Mar 31, 2006	1	0	0	0	0	0	MN
Feb 28, 2006	1	0	0	0	0	0	MN
Jan 31, 2006	1	0	0	0	0	0	MN
Dec 31, 2005	1	0	0	0	0	0	MN
Nov 30, 2005	1	0	0	0	0	0	MN
Oct 31, 2005	1	0	0	0	0	0	MN
Sep 30, 2005	5	0	0	0	0	0	MN
Aug 31, 2005	5	**4**	0	**4**	0	0	MN
Jul 31, 2005	1	**1**	0	**4**	0	0	MN
Jun 30, 2005	1	0	0	0	0	0	MN
May 31, 2005	1	0	0	0	0	0	MN
Apr 30, 2005	1	0	0	0	0	0	MN
Mar 31, 2005	1	0	0	0	0	0	MN
Feb 28, 2005	1	0	0	0	0	0	MN
Jan 31, 2005	1	0	0	0	0	0	MN
Dec 31, 2004	1	0	0	0	0	0	MN
Nov 30, 2004	1	0	0	0	0	0	MN
Sep 30, 2004	1	0	0	0	0	0	MN
Aug 31, 2004	2	0	0	0	0	0	MN
Jul 31, 2004	1	0	0	0	0	0	MN
Jun 30, 2004	1	0	0	0	0	0	MN
May 31, 2004	1	0	0	0	0	0	MN
Apr 30, 2004	1	0	0	0	0	0	MN
Mar 31, 2004	1	0	0	0	0	0	MN
Feb 29, 2004	1	0	0	0	0	0	MN
Jan 31, 2004	1	0	0	0	0	0	MN
Dec 31, 2003	1	0	0	0	0	0	MN
Nov 30, 2003	1	0	0	0	0	0	MN
Oct 31, 2003	1	0	0	0	0	0	MN
Sep 30, 2003	1	0	0	0	0	0	MN
Aug 31, 2003	1	0	0	0	0	0	MN
Jul 31, 2003	1	0	0	0	0	0	MN
Jun 30, 2003	1	0	0	0	0	0	MN
May 31, 2003	1	0	0	0	0	0	MN
Apr 30, 2003	1	0	0	0	0	0	MN
Mar 31, 2003	1	0	0	0	0	0	MN
Feb 28, 2003	1	0	0	0	0	0	MN
Jan 31, 2003	1	0	0	0	0	0	MN
Dec 31, 2002	1	0	0	0	0	0	MN
Nov 30, 2002	1	0	0	0	0	0	MN
Oct 31, 2002	1	0	0	0	0	0	MN
Sep 30, 2002	1	0	0	0	0	0	MN
Aug 31, 2002	1	0	0	0	0	0	MN
Jul 31, 2002	1	0	0	0	0	0	MN
Jun 30, 2002	1	0	0	0	0	0	MN
May 31, 2002	1	0	0	0	0	0	MN
Apr 30, 2002	1	0	0	0	0	0	MN
Mar 31, 2002	1	0	0	0	0	0	MN
Feb 28, 2002	1	0	0	0	0	0	MN
Jan 31, 2002	1	0	0	0	0	0	MN

Show results prior to 01/01/2002

OHA Drinking Water Services

Bromate Monitoring Requirements :: DBP Monitoring Schedules :: Excel Spreadsheet

PWS ID: 00270 ---- ECHO, CITY OF

Disinfection By-Product (DBP) Monitoring Samples

ND = Not Detected at the Minimum Reporting Level; -- = Not Sampled

Sample ID	Sample Date	Receive Date	Sample Point	Location	TTHM (mg/L) MCL = 0.080	HAA5 (mg/L) MCL = 0.060	Bromate (mg/L)	Notes
X04647901A-D	06/29/21	07/09/21	2DBP-01	10 W MAIN	--	ND	--	
X04647901B-D	06/29/21	07/09/21	2DBP-01	10 W MAIN	ND	--	--	
X04394601A-D	11/19/20	12/09/20	2DBP-01	10 W MAIN	0.0021500	--	--	
X04394601B-D	11/19/20	12/09/20	2DBP-01	10 W MAIN	--	ND	--	
X037538-D	06/19/19	07/08/19	2DBP-01	10 W MAIN	0.0007800	ND	--	
180684301A-D	06/18/18	07/06/18	2DBP-01	10 W MAIN	0.0005600	--	--	
180684301B-D	06/18/18	07/06/18	2DBP-01	10 W MAIN	--	ND	--	
180684302A-D	06/18/18	07/06/18	2DBP-02	325 W BUCKLEY	ND	--	--	
180684302B-D	06/18/18	07/06/18	2DBP-02	325 W BUCKLEY	--	ND	--	
1706A4401B-D	06/27/17	07/03/17	2DBP-01	10 W MAIN	--	ND	--	
1706A4402B-D	06/27/17	07/03/17	2DBP-02	325 W BUCKLEY	--	ND	--	
1706A4401A-D	06/26/17	07/03/17	2DBP-01	10 W MAIN	ND	--	--	
1706A4402A-D	06/26/17	07/03/17	2DBP-02	325 W BUCKLEY	ND	--	--	
X022704-D	06/14/16	06/27/16	2DBP-01	10 W MAIN	0.0011700	ND	--	
X022705-D	06/14/16	06/27/16	2DBP-02	325 W BUCKLEY	0.0007000	ND	--	
X018835-D	06/16/15	06/30/15	2DBP-01	10 W MAIN	0.0007400	ND	--	
X018836-D	06/16/15	06/30/15	2DBP-02	325 W BUCKLEY	0.0006800	ND	--	
X015287-D	06/02/14	06/13/14	2DBP-01	10 W MAIN	0.0012700	ND	--	
X015288-D	06/02/14	06/13/14	2DBP-02	325 W BUCKLEY	0.0008200	0.0483000	--	
X014698-D	03/27/14	04/14/14	IDSE-01	20 S BONANZA	0.0008000	ND	--	
X014697-D	03/27/14	04/14/14	IDSE-02	325 BUCKLEY	0.0007800	ND	--	
X014082-D	12/16/13	01/03/14	IDSE-01	20 S BONANZA	0.0008600	ND	--	
X014081-D	12/16/13	01/03/14	IDSE-02	325 BUCKLEY	0.0007500	ND	--	
X0134423B-D	09/23/13	10/28/13	IDSE-01	20 S BONANZA	ND	ND	--	
X0134423A-D	09/23/13	10/09/13	IDSE-02	325 BUCKLEY	ND	ND	--	
X012741-D	06/25/13	07/08/13	DBPMAX02	10 W MAIN ST	0.0012800	ND	--	
X012739-D	06/25/13	07/08/13	IDSE-01	20 S BONANZA	ND	ND	--	
X0127391-D	06/25/13	07/11/13	IDSE-02	325 BUCKLEY	ND	ND	--	
X010005-D	06/26/12	07/09/12	DBPMAX02	10 W MAIN ST	0.0013600	0.0059100	--	
X07087-D	06/06/11	07/07/11	DBPMAX01	325 W BUCKLEY ST	0.0018200	ND	--	
X04125-D	06/16/10	07/08/10	DBPMAX01	325 W BUCKLEY ST	ND	ND	--	

Oregon Public Health
Drinking Water Data Online

Oregon Health Authority

Introduction :: Data Search Options :: Water System Search :: DWS Home :: DWS Rules :: Quick Data Links

PWS ID: 00270 ---- ECHO, CITY OF

Lead and Copper Compliance Actions

- No lead and copper schedules found.

Action Levels: Lead = 0.015 mg/L; Copper = 1.3 mg/L

All detailed results

Lead and Copper 90th Percentile Summary Results and Consumer Notices*

Sample Dates	Date Received	Sample Count	Duration	Lead (mg/L)	Copper (mg/L)	Consumer Notice Date*
Jul 16, 2018 - Jul 17, 2018	Jul 30, 2018	10	3Y	0.0002	0.0110	
Jun 15, 2015 - Jun 16, 2015	Jun 30, 2015	10	3Y	0.0004	0.0246	
Jun 27, 2012 - Jun 27, 2012	Jul 09, 2012	10	3Y	0.0006	0.0149	
Aug 21, 2009 - Aug 21, 2009	Sep 08, 2009	10	3Y	0.0006	0.0144	
Sep 13, 2006 - Sep 13, 2006	Jan 09, 2007	5	3Y	0.0000	0.0000	
Aug 26, 2003 - Aug 26, 2003	Oct 20, 2003	5	3Y	0.0020	0.0110	
Jan 01, 1999 - Sep 13, 2000	Oct 30, 2000	10	3Y	0.0010	0.0200	
Jan 01, 1997 - Nov 13, 1997	Oct 12, 1998	10	YR	0.0016	0.0090	
Jan 01, 1996 - Oct 29, 1996	Oct 12, 1998	10	YR	0.0013	0.0130	
Jan 01, 1995 - Jun 15, 1995	Jul 19, 1995	10	YR	0.0000	0.0000	
Jan 01, 1994 - Feb 24, 1994	Mar 31, 1994	20	6M	0.0050	0.0000	
Jul 01, 1993 - Aug 03, 1993	Aug 20, 1993	20	6M	0.0000	0.0500	

*Consumer notice date is the date water customers were notified of their tap results. Consumer notice records are not available prior to 2016.

OHA Drinking Water Services

PWS ID: 00270 ---- ECHO, CITY OF

Excel Spreadsheet

MCL = 10 mg/L; MCL exceedances are indicated with **red text**.
ND = Not detected at the minimum reporting level.

Nitrate Samples

Sample ID	Sample Date	Date Received	Analyte Name	Source Name	Source ID	Result (mg/L)	Comments
X041154A-I	04/22/2020	05/01/2020	NITRATE	EP FOR WELLS	EP-A	ND	
X035665A-I	01/08/2019	02/03/2019	NITRATE	EP FOR WELLS	EP-A	ND	
X031047A-I	01/16/2018	01/25/2018	NITRATE	EP FOR WELLS	EP-A	1.97	
X025763-I	02/14/2017	02/20/2017	NITRATE	EP FOR WELLS	EP-A	1.1	
X023336A-I	08/09/2016	10/17/2016	NITRATE	EP FOR WELLS	EP-A	ND	
X017544A-I	02/03/2015	02/09/2015	NITRATE	EP FOR WELLS	EP-A	ND	
X015286-I	06/02/2014	06/19/2014	NITRATE	EP FOR WELLS	EP-A	0.206	
X014365A-I	02/03/2014	02/10/2014	NITRATE	EP FOR WELLS	EP-A	ND	
X011445A-I	01/15/2013	01/22/2013	NITRATE	EP FOR WELLS	EP-A	ND	
X08985A-I	02/08/2012	02/16/2012	NITRATE	EP FOR WELLS	EP-A	ND	
X07086-I	06/06/2011	07/07/2011	NITRATE	EP FOR WELLS	EP-A	0.29	
X04128A-I	06/16/2010	06/21/2010	NITRATE	EP FOR WELLS	EP-A	ND	
090423D1Q-I	04/23/2009	05/04/2009	NITRATE	EP FOR WELLS	EP-A	ND	
A80306V1-I	03/06/2008	06/09/2008	NITRATE	EP FOR WELLS	EP-A	0.26	
A70306O1	03/06/2007	03/19/2007	NITRATE	EP FOR WELLS	EP-A	ND	
A6090701	09/07/2006	09/20/2006	NITRATE	EP FOR WELLS	EP-A	ND	
A50124J-1	01/24/2005	03/28/2005	NITRATE	EP FOR WELLS	EP-A	0.3	
A40304X-1	03/03/2004	04/26/2004	NITRATE	EP FOR WELLS	EP-A	1	
A30108B-1	01/08/2003	04/18/2003	NITRATE	EP FOR WELLS	EP-A	0.2	
A20227AN-1I	02/27/2002	06/17/2002	NITRATE	EP FOR WELLS	EP-A	0.3	

Archived Nitrate Samples

Sample ID	Sample Date	Date Received	Analyte Name	Source Name	Source ID	Result
A10328A*A	03/28/2001	04/12/2001	Nitrate	EP FOR WELLS	A	0.4
990825B*A	08/25/1999	10/25/1999	Nitrate	EP FOR WELLS	A	0.12
981007AB*A	10/07/1998	11/16/1998	Nitrate	EP FOR WELLS	A	0.02
971113UAA	11/13/1997	01/22/1998	Nitrate	WELL #5 (RESERVOIR)	AA	0.26
971113U1AA	11/13/1997	01/22/1998	Nitrate	WELL #4 (GOLF COURSE ROAD)	AB	0.25
961029G*A	10/29/1996	01/14/1997	Nitrate	EP FOR WELLS	A	0.28
950615I*A	06/15/1995	08/03/1995	Nitrate	EP FOR WELLS	A	0.8
931028AVAA	10/27/1993	06/13/1995	Nitrate	WELL #5 (RESERVOIR)	AA	0.1
930527ADAA	05/26/1993	10/18/1993	Nitrate	WELL #4 (GOLF COURSE ROAD)	AB	0.8
-1981613	05/10/1989	10/02/1989	Nitrate	WELL #4 (GOLF COURSE ROAD)	AB	ND
-1981575	05/10/1989	10/02/1989	Nitrate	WELL #3 (BRIDGE STREET)	AC	ND
-1981614	08/07/1986	08/07/1986	Nitrate	WELL #4 (GOLF COURSE ROAD)	AB	ND

Oregon Public Health
Drinking Water Data Online

PWS ID: 00270 ---- ECHO, CITY OF

For questions regarding these violations contact: REGION 1 ---- Bill Goss/Amy Word ---- (541) 276-8006

Violations are displayed for the last 5 years only.
Group Abbreviations: DBP = Disinfection Byproducts, TCR = Total Coliform Rule
Gray shading indicates return to compliance.

Hide Auto-RTC | *Show Determination Dates*

Click here to see public notices.

Violation History

Violation Number	Auto-RTC?	Monitoring Period Begin	End	Facility ID	Analyte Group	Violation Type - Analyte Count *Show analytes for all violations*	Enforcement Action - Date *Show history*	Points
900631112	Y	Jan 01, 2020	Dec 31, 2020	DIST-A	DBP	DBP Late/Nonreporting - 2 *Show analytes*		1
900631110	*Y*	*Jul 01, 2020*	*Jul 31, 2020*		*TCR*	*Routine Coliform - Did Not Report ANY - 1*	*Returned To Compliance - Sep 09, 2020*	*1*

SYSTEM SCORE SUMMARY

Unaddressed Points:	1
Number of years the oldest violation has been unaddressed (*n*):	0
System Score:	**1**
Points under formal enforcement:	0
Points RTC'd:	1

For all compliance errors, please contact Chuck Michael, DWS Compliance Specialist, at 971-673-0420.

Click here for more information on system scores and how they are calculated, including the point values of specific violations.

Violation history last updated 07/27/2021, 4 hours ago.

For further information on this public water system, click on the area of interest below:
System Info :: Report for Lenders :: Alerts :: Violations :: Compliance & Enforcement :: Contacts & Advisories :: Site Visits :: Public Notice
Coliform Summary :: Coliform Results :: Sampling Schedule for Coliform :: Groundwater/GWUDI Source Details :: Plan Review :: Annual Fee
Chemical Group Summary :: Latest Chemical Results :: Entry Point Detects :: Single Analyte Results
Chemical Schedule Summary :: Chemical Schedule Details
Lead & Copper :: Corrosion Control (LCR) :: Nitrate :: Arsenic :: Radionuclides :: GWR 4-Log :: LT2 :: Cyanotoxins
DBPs :: TOC & Alkalinity :: DBP Sample Sites :: FANLs :: MRDL :: Turbidity :: SWTR :: RAA :: LRAA

APPENDIX G
Source Water Assessment Report 2002

SOURCE WATER ASSESSMENT REPORT

City of Echo
Echo, Oregon
PWS #4100270

July, 2002

Prepared

by

Oregon Department of Human Services
Health Services
Drinking Water Program

and

Oregon Department of Environmental Quality
Water Quality Division
Drinking Water Protection Program

Available in Alternate Formats by contacting the DHS DWP at (541) 726-2587

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Website: www.ohd.hr.state.or.us/dwp.welcome.htm

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Drinking Water Program
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Oregon Association of Water Utilities

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Mike Hayes **(for assistance in developing a drinking water protection plan)**
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Oregon Home*A*Syst Education Program

OSU Extension/Bioresource Engineering
Oregon State University
Corvallis, Oregon 97331-3906
Gail Glick Andrews **(for outreach information concerning private wells/septic systems)**
(541) 737-6294 Website: http://wellwater.orst.edu

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City of Echo: Source Water Assessment Report

Summary

The Source Water Assessment Program, mandated by the 1996 Amendments to the Safe Drinking Water Act, requires that states provide the information needed by public water systems to develop drinking water protection plans if they choose. The information that is provided includes the identification of the area most critical to maintaining safe drinking water, i.e., the Drinking Water Protection Area, an inventory of potential sources of contaminants within the Drinking Water Protection Area, and an assessment of the relative threat that these potential sources pose to the water system.

This report identifies the Drinking Water Protection Area for the City of Echo as the area at the surface that overlies that part of the aquifer that supplies groundwater to the wells. ***The Columbia River Basalt aquifer supplies the drinking water to the system. It is a confined layered basalt aquifer with several hydraulically connected water-bearing zones between 275 and 674 feet below the surface with additional water bearing zones between 979 and 1039 feet (Well # 4) and 1070 to 1270 feet (Well #5). The main wells (#4 and #5) produce from the lower zones (979 to 1039 feet and 1070 to 1270 feet).***

The aquifer is considered highly sensitive based on a lead detection (0.034 mg/L in 5/89) and the absence of a well construction log for well #3. Approximately 4 wells occur in the section containing the system's wells and at this time do not pose a risk to the system.

The primary intent of this inventory is to identify and locate significant potential sources of contaminants of concern within the City of Echo's drinking water protection area. The inventory was conducted by reviewing applicable state and federal regulatory databases and land use maps, interviewing persons knowledgeable of the area, and conducting a windshield survey by driving through the drinking water protection area to field locate and verify as many of the potential contaminant source activities as possible. It is important to remember the sites and areas identified are only <u>potential</u> sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

The delineated drinking water protection area is primarily occupied by irrigated farmland and non-irrigated fields with approximately ten percent of the area occupied by residential and commercial land uses within the City of Echo. Four potential contaminant sources (the golf course, a confirmed leaking underground storage tank at the Echo School, an irrigation canal and the railroad corridor) were identified within the two-year TOT zone. Several of the potential contaminant sources identified within the two-year TOT (the irrigation canal and railroad corridor) extend through the rest of the drinking water protection area. Two underground storage tanks and the irrigated crops were also identified in the area between the

two-year and ten-year TOT zones. The potential contaminant sources within the drinking water protection area all pose a relatively higher to moderate risk to the drinking water supply.

The size of the Drinking Water Protection Area is designed to approximate the next 10 years of groundwater supply for the City of Echo. The two year time-of-travel zone shown on the map is used as a conservative estimate of the survival time of some viruses in groundwater. Although the source is considered highly sensitive, there are no sources of virus present within the two year time-of-travel. Therefore, the drinking water source is not susceptible to viral contamination.

The costs associated with contaminated drinking water are high. Developing an approach to protecting that resource will reduce the risks of a contamination event occurring. In this report, we have summarized the local geology and well construction issues as they pertain to the quality of your drinking water source. We have identified the area we believe to be most critical to preserving your water quality (the Drinking Water Protection Area) and have identified potential sources of contamination within that area. In addition, we provide you with recommendations, i.e., BMPS, regarding the proper use and practices associated with those potential contamination sources. We believe public awareness is a powerful tool for protecting drinking water. The information in this report will help you increase public awareness about the relationship between land use activities and drinking water quality.

1. City of Echo: Source Water Assessment Report

1.1 Introduction and Overview

Traditionally, water systems have relied on proper water system management, water quality monitoring and, if necessary, water treatment to ensure that the water they serve meets drinking water standards. In spite of the best of these efforts, contamination of drinking water still occurs. The costs, both tangible and intangible, to a water system contending with a contaminated water supply are significant. At minimum, there is the cost of increased monitoring that will be required to make certain that the water does not pose a significant health risk. At contaminant concentrations exceeding a drinking water standard, the system may be dealing with the cost of installing and maintaining treatment, the loss of the drinking water source, i.e., a well, and most assuredly, a concerned and often frightened public.

Beginning with the 1986 Amendments to the Safe Drinking Water Act, an additional "barrier to contamination" was recognized at the federal level. A shift from the "reactive" approach of water treatment to a "proactive" approach of prevention began to take place. Although water treatment may be necessary in some cases, it is much more cost effective to prevent the contamination from happening in the first place. The Oregon Department of Environmental Quality (DEQ) and the Department of Human Services Drinking Water Program (DHS) recently compared the estimated cost of prevention (less than $15 per resident) to the actual cost of investigation and treatment (more than $1500 per resident) in a small Oregon community impacted by a volatile organic contaminant that exceeded the drinking water standard.

Oregon has a Drinking Water Protection Program in place for groundwater systems, i.e., wells and springs. In order to protect a drinking water resource, a water system must know where the drinking water comes from, what potential sources of pollution exist and what level of threat each presents to the system's drinking water. Up until recently, the costs associated with acquiring this information were the responsibility of the water system, a financial burden that even the most proactive water systems found hard to meet. The 1996 Amendments to the Safe Drinking Water Act lifted that burden from water systems by requiring that the states conduct Source Water Assessments for the water systems within their respective boundaries. The purpose of the Assessment is to provide the water systems with the information that they need to develop a strategy to protect their source of drinking water if they choose.

As mandated by the 1996 Amendments, a Source Water Assessment consists of the following: (1) the identification of the area that directly overlies that part of the aquifer supplying drinking water to the well or spring, (2) an inventory of potential sources of contamination within that area, and (3) the evaluation of the susceptibility of the water system to contamination from those sources. Funding for assessments was provided to the states through the Act as part of the state's Drinking Water Revolving Loan Fund.

The DEQ and DHS worked with a citizen's advisory committee and with DHS' Drinking Water

Advisory Committee to design a program that would meet the needs of Oregon's public water systems. The Environmental Protection Agency (EPA) has certified that Oregon's plan meets the requirements of the Safe Drinking Water Act. Within the program, DHS has the responsibility of working with groundwater systems and the DEQ works with surface water systems and conducts potential contaminant inventories.

Within this report, you will find general descriptions of the various elements of the Source Water Assessment Program, as well as specific information identifying the source of your water system and an inventory of the potential threats to your drinking water quality. Although developing a Drinking Water Protection Plan is voluntary in Oregon, it is hoped that the information provided in the Source Water Assessment Report will be used as a basis for reducing the risk of contamination to your source. Later in this report, you will be given some specific recommendations on how to accomplish this risk reduction for your system. The bulk of these recommendations center on an Drinking Water Protection Plan, providing information to those residences, agricultural operations and businesses, etc., that live or operate within the identified area.

Additional assessment analysis will be made available to you should you decided to proceed with the development of a drinking water protection plan. This analysis will include a more in-depth description of the local hydrogeology as well as the susceptibility of the drinking water source to the potential contaminant sources identified through the inventory process.

1.2 Groundwater Basics

In order to protect a groundwater source of drinking water, it is important to understand how the groundwater system works, e.g., where groundwater comes from, how it occurs in the subsurface, how it moves and how it can become contaminated. Included in this report is as Fact Sheet about groundwater that you can use to help increase the awareness of others regarding groundwater (see Appendix G) and its susceptibility to contamination.

When a well is drilled, the driller passes through a distance of soil, sediments and/or bedrock in which all the open spaces between the soil and sediment particles and in the fractures of the bedrock are filled with air. No water can be derived from this zone, referred to as the vadose zone. If the driller continues, he or she will eventually encounter a depth in which all the open spaces are filled with water. This is groundwater and we have just crossed the water table to reach it. Groundwater, therefore, does not occur as underground rivers, pools or veins, rather it simply occurs within the open spaces within the geologic material. We refer to any geologic material that contains water and that can yield the water to a well as an aquifer. Aquifers can be any geologic material, e.g., sand and gravel, porous lava flows, fractured bedrock, etc., that can hold water and when drilled into will supply that water to the well.

So where does the groundwater in the aquifer come from? Groundwater is part of the hydrologic

cycle that controls the distribution of water on the surface of this planet. It is therefore linked to other sources of water, notably surface water as streams, rivers and lakes. Virtually without exception, the groundwater originates as precipitation at the surface that sinks through the soil and percolates down to the water table. This is what makes groundwater vulnerable to contamination. The water recharging the aquifer originates at the surface. The downward percolating water has to pass through whatever is at the surface or just below it. As it does so, the water can dissolved contaminants and carry them downward to the aquifer.

The direction and speed in which groundwater moves is controlled by the slope of the water table, which has high areas and low areas just like the ground surface, and the permeability of the aquifer. In general, groundwater moves at a velocity of inches to a few feet per day. The pumping of a well can significantly influence the movement of groundwater by drawing down the water table in its vicinity. This produces a "capture zone" that can draw groundwater in from some distance away. We identify this distance during the delineation phase of the assessment.

2. Delineation of the Drinking Water Protection Area

The delineation of the Drinking Water Protection Area identifies the area on the surface that directly overlies that part of the aquifer that supplies groundwater to the well, well field or spring. The delineation exercise requires the use of site-specific information so that the area identified reflects the hydraulic characteristics of the aquifer and the operation of the water system.

The level of hydrogeologic assessment performed during the delineation depends on the population served, the presence of potentially interfering wells and the complexity of the local hydrogeology. The delineation methods are described in the table and text below. The method used for your delineation is indicated in Appendix E (Parameters Used in the Delineation Model).

Population	Interfering Wells?	Complex Hydrogeology?	Delineation Method	Parameters Needed[1]
25-500	N	N	CFR	Q,n,b
25-500	Y	Y/N	Enhanced CFR	Q,b,n,K
501-3300	Y/N	N	Analytical	Q,b,n,K,i
501-3300	Y/N	Y	Analytic or Numerical	Q,b,n.K,i,h
3301-50,000	Y/N	N	Analytical	Q,b,n,K,i,h
3301-50,000	Y/N	Y	Analytic or Numerical	Q,b,n,K,i,h
50,000+	Y/N	Y/N	Numerical	Q,b,K,i,h
Spring	NA	Y/N	Hydrogeologic Mapping	Local Geology

1. Q = pump rate; n = aquifer porosity; b = aquifer thickness; K = hydraulic conductivity (permeability); i = gradient (slope of the water table); h = hydraulic head (elevation of the water table).

CFR: The calculated fixed radius method determines the volume of the aquifer that would be needed to supply the system for next 15 years. The delineation is circular in shape, centered on the well.

Enhanced CFR: If the water system has more than one well and there is a potential for interference between the wells, a more sophisticated analytical method is used. Specifically, an

analytical model that allows well interference to be accommodated. As with the CFR, the next 15 years of groundwater are identified.

Analytical: Neither the CFR or Enhanced CFR methods take into account the direction and rate of groundwater flow. Analytical models incorporate the groundwater gradient into the calculations. Because of the more site-specific nature of this model, only the next 10 years of groundwater is identified. For systems serving 501 to 3300 and not having complex boundaries, the groundwater gradient is either taken from published reports or is estimated. For water systems serving more than 3300, the gradient may be determined directly by field measurement.

Analytic or Numerical: These more sophisticated models allow for the incorporation of complex boundaries such as streams and formation contacts, can be checked with local water levels, and in the case of the numerical model, can incorporate variations in aquifer properties.

Specific information regarding the delineation of your system's Drinking Water Protection Area can be found in Appendix E.

2.1 Location of the Drinking Water Source

We have located your source(s) using a Trimble GeoExplorer II Global Positioning System (GPS) unit. The data have been differentially corrected to remove some of the common positioning errors. The location of the source(s), with the corresponding Drinking Water Protection Area, has been placed in a Geographic Information System (GIS) layer and overlain onto a U.S.G.S. 7.5 minute topographic map that is included within this report.

The well was located using Trimble GeoExplorer II GPS unit. Data collection specifics include:

- 150 individual measurements,
- linked to a minimum of four satellites,
- a PDOP of less than 6 (pertains to precision of measurement),
- a signal to noise ratio of greater than 5

The raw data were subjected to differential correction using the PATHFINDER software. The location data for your wells are as follows:

Well 3
45° 44' 33.621" North Latitude
119° 11' 22.243" West Longitude

Well 4
45° 44' 35.349" North Latitude
119° 11' 07.947" West Longitude

Well 5
45° 44' 44.999" North Latitude
119° 10' 59.005" West Longitude

2.2 Nature and Characteristics of the Aquifer

The aquifer supplying the drinking water for the City of Echo consists of layered Columbia River Basalt with water bearing zones occurring between 275 and 674 feet below the surface with additional water bearing zones between 979 and 1039 feet (Well # 4) and 1070 to 1270 feet (Well #5) below ground surface.

The aquifer supplying the wells is identified as the Columbia River Basalt aquifer. It is overlain by approximately 5 feet of silty soil, 15 feet of claystone, and 255 feet of basalt. The layered volcanic Columbia River Basalt aquifer produces water from fractured inter-flow zones. Well 3 produces from several shallow zones between 275 feet and 674 feet. Wells #4 and #5 produce water from deeper interflow zones. The static water levels (water level in the well when it is at rest, i.e. not being pumped) were reported by the driller as 95 feet below the surface for well #3, and between 153 feet and 195 feet for wells #4 and #5. The massive basalt flow interiors immediately above the aquifer are likely to be of low permeability and probably serves as a confining layers. **The aquifer is considered to be a confined volcanic basalt flow aquifer with a confining layer thickness of at least 255 feet.**

2.3 Well Construction

Well 3 was originally drilled in 1951. There is no official well report, but a detailed schematic diagram is available. A 16-inch hole was initially drilled to depth of 158 feet. A 12-inch hole was drilled to 380 feet, and a 10-inch diameter hole continued to a final depth of 490 feet. Sixteen-inch steel casing extends from the surface to 32 feet, and 12-inch casing extends to 158 feet. The rest of the well is an open hole. It is in this open interval that the water enters the well. The 16-inch casing in the upper 32 feet of the well does not appear to be adequately sealed. The annular space between the 12-inch casing and the 16-inch hole in the upper 158 feet was sealed, but the seal material is unknown. The casing seal is there to provide protection from surface and near surface water from gaining access to the well bore. The casing seal does not appear to have been constructed properly. The schematic well diagram for this well is in Appendix D.

Well 4 was originally drilled in August, 1974, and was deepened and reconstructed in May, 1993. A 14-inch hole was initially drilled to depth of 45 feet, and a 10-inch hole extends to 1045 feet. Eight-inch steel casing extends from the surface to 951 feet, with an 6-inch perforated liner extending to the bottom of the well. It is in this perforated interval that the water enters the well. The annular space between the 10-inch casing and the 14-inch hole in the upper 45 feet was filled with cement, with additional seal extending to ~220 feet, and a split seal between ~600 feet and

951 feet. The casing seal is there to provide protection from surface and near surface water from gaining access to the well bore. The casing seal appears to have been constructed properly. The well report for this well is in Appendix D.

Well 5 was originally drilled in January, 1994. A 20-inch hole was initially drilled to depth of 206 feet. A 15-inch hole extends to 955 feet, and a 10-inch diameter hole continued to a final depth of 1282 feet. Twenty-inch steel casing extends from the surface to 107 feet, and 12-inch casing extends to 955 feet, with an 8-inch screened/ perforated liner extending to the bottom of the well. It is in this perforated interval that the water enters the well. The annular space between the 20-inch casing and the 20-inch hole in the upper 107 feet was filled with bentonite/cement, and the 12-inch casing was sealed to 955 feet with cement grout. The well log indicates that special construction approval was obtained for this well. The casing seal is there to provide protection from surface and near surface water from gaining access to the well bore. The casing seal appears to have been constructed properly. The well report for this well is in Appendix D.

2.4 Other Wells

Other wells proximity to the production well may pose a risk if their construction is inadequate or has been compromised. Such wells may act as a conduit, providing access of shallow potentially contaminated water to the well. The risk of this is assessed by evaluating the number and age of wells within the section containing the public water supply well. Well report records indicate that there are 4 wells within the section containing the system's wells. Two of these wells are pre-1979. This leads to an Other Well score of 10, below the score of 400, which is regarded as significant risk to the water system. The Other Well score indicates that there is a no risk to the system at this time.

It is possible that other wells exist within the section that were either drilled prior to when it became a requirement to submit well reports (around 1960) or were illegally installed.

2.5 Monitoring History

Monitoring records at the Oregon Health Division indicate that there has been a total coliform detections (1/1/99) within the system. It appears that the detection occurred within the distribution system, and may not indicate that there is a problem at the source. Repeat sampling should be conducted at the wellhead to rule out problems associated with the source.

Nitrate has been detected at 0.4 mg/L in March, 2001. Nitrate levels should be watched closely. Nitrate concentrations are known to vary seasonally, with the lower concentrations occurring in the rainy season as a result of dilution by recharging rainfall.

The inorganic chemicals arsenic (0.001 mg/L), barium (0.017 mg/L), fluoride (1.2 mg/L), **lead (0.034 mg/L)**, and chromium (0.002 mg/L) have been detected as well.

Sodium occurs at 51 mg/L (12/18/97), and is well above the 20 mg/L level where it is recommended that area doctors be notified so that they can take this into account for their patients on a reduced sodium diet.

2.6 Sensitivity Summary

The aquifer sensitivity for the system is summarized on the sensitivity summary sheet in the appendix. If a criterion on the form is checked "No", it implies that, based on our evaluation, that criterion does not contribute significantly to the aquifer's sensitivity. We have identified the following criteria which we believe increase the aquifer's sensitivity to contamination from the surface.

2.6.1 Highly Sensitive Criteria

Contributing to the sensitivity of the system is the fact that lead was detected in the aquifer at a concentration which exceeds the MCL (0.034 mg/L in 1989). This implies that there may be a pathway for near surface contaminants to reach the aquifer used by this system. Continued sampling must be accomplished and monitored carefully to ensure that the nitrate levels are not increasing with time. **The elevated inorganic concentration in the well indicate that the aquifer is highly sensitive to potential contaminant sources at the surface or shallow subsurface.**

Since there is no well drillers report available for Well #3, the exact underground construction is unknown. It is not known if the casing seal is composed of an appropriate material or if the seal extends to a depth that limits the potential for contamination from the surface or shallow subsurface area from entering the well. **The fact that there is no well report or casing seal construction detail makes the aquifer highly sensitive.**

2.6.2 Moderately Sensitive Criteria

Arsenic (0.001 mg/L), barium (0.017 mg/L), fluoride (1.2 mg/L), and chromium (0.002 mg/L) have been detected at the source. Inorganic detections at the source indicates that the source is moderately sensitive.

The age of well #3, originally constructed in 1951, also contributes to the sensitivity of the system. Casing seals do deteriorate with time. The system is therefore considered to be moderately sensitive to contamination from surface activities.

The estimated travel time for water crossing soils in the area from the surface under saturated conditions is approximately 50 hours. For soils with travel times of less than 65 hours, little opportunity for degradation of a contaminant within the soil zone would occur for contaminants such as nitrate. All of the soils fall into this category. On the sensitivity map in Appendix B, patterns for soil sensitivity are shown. The entire DWPA is covered with high sensitivity soils.

3. Inventory of Potential Contaminant Sources

3.1 Methodology

The primary intent of an inventory is to identify and locate significant potential sources of any of the contaminants of concern within the drinking water protection area. Significant sources of contamination can be defined as any facility or activity that stores, uses, or produces, the contaminants of concern and has a sufficient likelihood of releasing such contaminants to the environment at levels that could contribute significantly to the concentration of these contaminants in the source waters of the public water supply. The inventory is a very valuable tool for the local community in that it:

- Provides information on the locations of potential contaminant sources, especially those that present the greatest risks to the water supply,
- Provides an effective means of educating the local public about potential problems, and
- Provides a reliable basis for developing a local management plan to reduce the risks to the water supply.

The primary intent of an inventory is to identify and locate significant potential sources of any of the contaminants of concern within the drinking water protection area. Significant sources of contamination can be defined as any facility or activity that stores, uses, or produces, the contaminants of concern and has a sufficient likelihood of releasing such contaminants to the environment at levels that could contribute significantly to the concentration of these contaminants in the source waters of the public water supply.

Inventories were focused primarily on the potential sources of contaminants regulated under the federal Safe Drinking Water Act (SDWA). This includes contaminants with a maximum contaminant level (MCL), contaminants regulated under the Surface Water Treatment Rule, and the microorganism Cryptosporidium. The inventory was designed to identify several categories of potential sources of contaminants including micro-organisms (i.e., viruses, Giardia lamblia, Cryptosporidium, and bacteria); inorganic compounds (i.e., nitrates and metals); and organic compounds (i.e., solvents, petroleum compounds and pesticides). Contaminants can reach a water body (groundwater, rivers, lakes, etc.) from activities occurring on the land surface or below it. Contaminant releases to water bodies can also occur on an area-wide basis or from a single point source.

It is advantageous to identify as many potential risks as possible within the drinking water protection area during the inventory. It is important to remember the sites and areas identified in this section are only **potential** sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly. Not all of these inventoried activities pose actual high risks to your public water supply. The day-to-day operating practices and environmental (contamination) awareness varies considerably from one facility or land use activity to another. When one considers potential risks, we make "worst-case" assumptions. One assumption that has to be made when considering potential risks to

water bodies is that the facility or activity is not employing good management practices or pollution prevention. This is important because it is the potential risk that we are attempting to determine. Also, assumptions were made about particular types of land use. For example, it is assumed that rural residences associated with farming operations have specific potential contamination sources such as fuel storage, chemical storage and mixing areas, and machinery repair shops.

In-depth analysis or research was not completed to assess each specific facility's compliance status with local, state and/or federal programs or laws. Further, the inventory process did not include an attempt to identify unique contamination risks at individual sites such as facilities (permitted or not) that do not safely store potentially hazardous materials.

Not all of the inventoried activities will need to be addressed if you choose to develop a Drinking Water Protection Plan. After the delineation, inventory, and susceptibility analysis are complete, a "management" plan can be developed to protect your public water supply. When developing a protection plan, sources which pose little to no threat to your public water supply can be screened out. For example, if any of these land use activities are conducted in a manner that already significantly reduces the risk of a contamination release, the facility would not need to re-evaluate their practices based on any drinking water protection "management". One of the goals of developing a Drinking Water Protection Plan based on the inventory results is to address those land use activities that do pose high or moderate risks to your public water supply.

Past, current, and possible future potential sources of contaminants were identified through a variety of methods and resources. In completing this inventory, DEQ used readily available information including review of DEQ and other agencies' databases of currently listed sites, interviews with the public water system operator, and field observation as discussed below.

The process for completing the inventory included several steps, which are summarized as follows:

1. Collected relevant information as of August 1, 1999 from applicable state and federal regulatory databases including the following lists:
    - DEQ Environmental Cleanup Site Information System (ECSI) which includes the U.S. EPA National Priorities List (NPL) and the U.S. EPA Comprehensive Environmental Response, Compensation and Liability Information System (CERCLA) list;
    - DEQ leaking underground storage tank (LUST) list;
    - DEQ registered underground storage tank (UST) list;
    - DEQ Source Information System (for water discharge permit sites including National Pollutant Discharge Elimination System (NPDES) permits, Water Pollution Control Facility (WPCF) permits, storm water discharge permits, and on-site sewage (septic) system permits);
- DEQ Active Solid Waste Disposal Permits list;

- DEQ Dry Cleaners list;

- State Fire Marshall Hazardous Material Handlers (HAZMAT) site list (information on materials in a gas-form was not used since gaseous compounds rarely pose a threat to surface water or groundwater); and

- DEQ Hazardous Waste Management Information System (HWIMSY) list which includes U.S. EPA Resource Conservation Recovery Act (RCRA) generators or notifiers and U.S. EPA RCRA Treatment, Storage, and Disposal Facility (TSDF) Permits.

Because of the way various state and federal databases are set up, the specific location of listed sites is not always given or accurate within the database. DEQ verified the presence and approximate location of potential contaminant sources within the drinking water protection area by consulting with local community members and/or by driving through the area (windshield survey) as discussed below in subsequent inventory steps.

- Interviewed public water system officials, or someone they designated as knowledgeable of the area to identify potential sources that are not listed elsewhere in databases or on maps and to assist in locating potential sources listed in the state and federal databases.

- Conducted a windshield survey by driving through the drinking water protection area to field locate and verify as many as possible of the potential contaminant source activities. We looked for potential contaminant sources within four general categories of land use: residential/municipal, commercial/industrial, agricultural/forest, and other land uses (see Appendix C, Table 1).

- Assigned high-, medium-, or low-risk ratings to each potential contaminant source based on the Oregon Source Water Assessment Plan (1999). A summary of the types of potential contaminant sources and level of assigned risk is presented in Appendix C, Table 1 (Summary of Potential Contaminant Sources by Land Use). The comments section of Appendix C, Table 2 (Inventory Results- List of Potential Contaminant Sources) provides justification for any modifications to the risk rating that may have resulted from field observations that were different from what is typically expected for the specific facility. For example, a "random dumpsite" is typically considered a moderate risk to groundwater. However, if disposal of hazardous or toxic substances was observed during the field visit, the risk rating may be modified to "high". Relative risk ratings are considered an effective way for the PWS and community to prioritize management efforts for the drinking water protection area. When the PWS and community enhance the inventory for use in developing management options, the community may need to conduct further analysis to more closely evaluate the actual level of risk.

- Produced final summary of the inventoried sources and the GIS base map, which are presented in this report.

Not all of the activities that are potential contaminant sources were inventoried in the entire drinking water protection area. The inventory of sources of microorganisms such as bacteria, viruses and cryptosporidium focused primarily on areas within the 2-year time-of-travel because of limitations on survivability of the organism. Potential sources of microbes are highlighted on Appendix C, Table 1.

3.2 Results

The results of the inventory were analyzed in terms of current, past, and future land uses; their time of travel (TOT) relationship to the well site; and their associated risk rating. In general, land uses that are closest to the well and those with the highest risk rating pose the greatest threat to your drinking water supply. Inventory results are summarized in Appendix C, Tables 1 and 2 and are shown on Figure 2.

3.2.1 Within Two-Year Time of Travel

Approximately one-third of the area within the two-year TOT zone is occupied by residential and commercial land uses within the City of Echo. Irrigated crops and the golf course occupy the other two-thirds of the area. Four potential contaminant sources (Reference Numbers 2, 5, 6, and 7on Figure 2 and Appendix C, Table 2) were identified in the two-year TOT zone and include the golf course, a confirmed leaking underground storage tank at the Echo School, an irrigation canal and the railroad corridor. The potential contaminant sources within the two-year TOT all pose a relatively higher to moderate risk to the drinking water supply. Only one of the potential contaminant sources (the irrigation canal) has a high risk of transmitting micro-organisms to the groundwater.

3.2.2 Overview of Inventory Results within Five-Year and Ten-Year Time of Travel

Irrigated farmland and non-irrigated fields primarily occupy the delineated drinking water protection area between the two-year TOT and the ten-year TOT. Several of the potential contaminant sources identified within the two-year TOT (the irrigation canal and railroad corridor) extend through the five and ten-year TOT zones and are shown on Figure 2 in the location nearest to the well (which is in the two-year TOT zone). Two underground storage tanks and the irrigated crops (Reference numbers 3 and 4 on Figure 2 and Table 2 in Appendix C) were also identified in the area between the two-year and ten-year TOT zones. The potential contaminant sources identified between the two-year TOT and the ten-year TOT all have relatively higher to moderate risk rankings.

4. Susceptibility of the Drinking Water Source

The final step in the Source Water Assessment is the susceptibility analysis, i.e., how vulnerable is the drinking water source to potential contaminants at or near the surface. Whether or not a given drinking water source is susceptible depends primarily on two issues: are there potential sources of contamination within the Drinking Water Protection Area, and is the aquifer sensitive to contamination, i.e., is it likely that a contaminant at the surface would migrate to the water table and into the well. The identification of potential contaminant sources within the Drinking Water Protection Area was accomplished during the inventory phase of the assessment. Aquifer sensitivity depends on a number of factors that can collectively or individually allow the aquifer to become contaminated. These are described below and are summarized in the Appendix F, Aquifer Sensitivity Summary.

4.1 Aquifer Sensitivity

Aquifer sensitivity refers to those factors, those characteristic of the aquifer and overlying materials, as well as those that are imposed upon the aquifer, e.g., well construction, that increase the potential of contaminants from the surface gaining access to the aquifer.

4.1.1 Depth to the water-bearing zone

The shorter the distance downward to the water table, the greater the potential of a contaminant, if released, to migrate to the aquifer. **The depth to the aquifer supplying the City of Echo is approximately 275 and 674 feet below the surface with additional water bearing zones between 979 and 1039 feet (Well # 4) and 1070 to 1270 feet (Well #5) below ground surface.** The shallow water bearing zones could be connected hydraulicly to the deeper water-bearing zones if the wells are not adequately constructed.

4.1.2 Nature of the Aquifer

Aquifers are often classified as unconfined or confined. Unconfined aquifers are often shallow and are not separated from the surface by a protective low-permeability layer. Confined aquifers are often deeper and are overlain by a protective low-permeability layer. Unconfined aquifers are more sensitive than confined aquifers. **The aquifer here is considered confined and is separated from the surface by a thick succession of massive basalt flow interiors.**

4.1.3 Characteristics of the Aquifer

Aquifers that are highly permeable, i.e., gravels and boulders, sand and gravel without significant clay layers, etc., or do not provide for natural filtration as water moves through them, i.e., are fractured, are considerably more sensitive than other types of aquifers. **The Columbia River Basalt aquifer supplying the City of Echo consist of volcanic interflow zones which are**

considered highly permeable.

4.1.4 Characteristics of the Confining Layer

The thicker the confining unit the more likely it is to be persistent laterally and the more it retards the movement of contaminants downward. Confining units consisting of plastic clay and unfractured rock are much more protective than those consisting of silt. **The confining layer for the shallowest water-bearing zone within the aquifer is described in the well reports as having a thickness of 131 feet and consisting of unfractured basalt. The confining layer which overlies the first water bearing zone which contributes to the well consists of 162 feet of unfractured basalt.**

4.1.5 Soil Types

Some types of soils are thinner and/or have higher permeability than others. We consider those soils in which water could move through under saturated conditions in less than 65 hours as being highly sensitive. Recognition of these soil types and their occurrence within the Drinking Water Protection Area can indicate those parts of the Drinking Water Protection Area where contamination is most likely to cross the soil zone. **The bulk of the soils in the Drinking Water Protection Area for the City of Echo are of high permeability (Burke silt loam, Esquatzel silt loam, Powder silt loam, Shano silt loam, and the Stanfield silt loam) (see Figure 2, Appendix B).**

4.1.6 Well Construction

When a well is drilled in soft or loose materials, a casing (steel or plastic pipe) is inserted to hold the hole open during and after drilling. The casing does not in itself provide adequate protection from contaminated shallow water gaining access to the well. Contaminated shallow water can migrate to the casing and follow the casing directly down to the well. The real protection from potentially contaminated shallow water is the casing seal. This seal is put in place by drilling a hole that is at least four inches greater in diameter than the final casing. After the larger hole is drilled, casing is put in and the annular space between the casing and seal is filled with a sealant, either bentonite (an expanding clay), cement, or a combination of the two. The casing seal must by law be placed a minimum of 18 feet below the surface, however, it should be placed to a depth that is controlled by the local geology, e.g., for a confined aquifer, the casing seal should extend down to the confining layer. Having a well drilled by a licensed well constructor greatly reduces the risk that the well will be improperly constructed. **Well #3 does not have a well construction log. There is no information about the nature and construction of the casing seal. Well #4 and #5 appear to have been properly constructed.**

4.1.7 Other Wells

An additional threat to drinking water quality within the Drinking Water Protection Area are old

wells or production wells that have been improperly constructed. Wells are used to extract groundwater form the aquifer, however if they have lost their integrity or were improperly constructed, they may provide a conduit for contaminants to move directly to the aquifer. We assume that the greater the number of wells in the vicinity of the public water supply well, the greater the risk of encountering a well has been improperly constructed. Even a properly constructed well has a given life-time. The seal may begin to deteriorate with time and eventually may fail, allowing shallow waters to gain access to the aquifer. As an estimate of the potential risk posed by other wells in the area, we total the number of well reports that are on file at the Water Resources Department in the section containing the system's production well and develop a score based on number and age as follows:

Other Well Score = (No. of wells 1979 or younger) + 4 x (No. of wells older than 1979)

An Other Well score greater than 400 is considered to cause the aquifer to be moderately sensitive to contamination from the surface. **Records indicate that 4 wells occur within the section containing the City of Echo wells. Of these, two are pre-1979. This leads to an Other Well Score of 10, well below the score of 400 at which other wells pose a significant risk to the system.**

It should be noted that the numbers above only represent wells on record at the Water Resources Department. Prior to 1960, well reports were not required to be filed. In addition, unauthorized wells are not uncommon in many areas. The Other Well Score should therefore be considered as a minimum assessment of risk.

4.1.8 Monitoring History

The record of water quality as indicated by the routine monitoring history of the water system provides an indicator of relative risk to the system. Clearly, if a contaminant is detected at the source, there is a pathway from the surface to the aquifer that allowed that contaminant to reach the water table. Coliform and nitrate detections are particularly useful as indicators of the existence of contaminant pathways. Coliform bacteria are ubiquitous in the environment and their presence in the source water may indicate a microbial source nearby, or that a pathway exists, either naturally as a result of soil and aquifer characteristics, or artificially, through a failed or inadequate casing seal. Nitrate provides similar information, and given its mobility in the subsurface, will arrive at the well sooner than other contaminants that may also be moving toward the aquifer. **Total coliform (1/1/99) has been detected within the system.** If future coliform detections during routine monitoring occur, it is important for the system to continue to include a sample at the well as part of the repeat and follow-up monitoring.

Nitrate has been detected at 0.4 mg/L in March, 2001.

The inorganic chemicals arsenic (0.001 mg/L), barium (0.017 mg/L), fluoride (1.2 mg/L), **lead (0.034 mg/L)**, and chromium (0.002 mg/L) have been detected at the source. The lead detection

exceeded the MCL for lead. The source of the inorganic constituent is not known at this time.

Sodium concentrations are above the 20 mg/L level at which area doctors should be notified so that they can account for the consumption of sodium through drinking water for their patients on prescribed low-sodium diets.

4.2 The Presence and Distribution of Potential Contaminant Sources of Moderate- and High-Risk

The presence of Potential Contaminant Sources (PCSs) within the DWPA provides the potential sources of chemicals that could, if improperly managed or released, impact the water quality of the aquifer. Small quantities of these chemicals, in some cases a gallon or less, can significantly impact aquifers. The DEQ and DHS strongly recommend that the community address all high- and moderate-risk PCSs that occur within their DWPA in order to reduce the risk of their drinking water supply becoming polluted. How the PCSs are prioritized and the level of management strategies that are appropriate depend on the proximity of the PCS to the well or well and whether the sensitivity of the aquifer at the PCS site is high, medium or low.
The results of the PCS inventory performed for the the City of Echo by the Department of Environmental Quality is shown on the accompanying map (Appendix B, Figure 2) and are summarized as a function of time-or-travel zones in the table below.

4.2.1 Potential Contaminant Sources and Time-of-Travel Zones

In general, PCSs within the shorter time-of-travel zones pose greater risk than those in the longer time-of-travel zones. Also of concern is the location and distribution of these sources with respect to high and moderately sensitive areas. Overlaying the PCS location map and the sensitivity map for the Water System provides a tool to determine the susceptibility of the community's drinking water supply to contamination from each PCS (see Appendices). The table below indicates the relationship between susceptibility of the drinking water from a specific PCS and the identified PCS risk and aquifer sensitivity at the site.. The community can use the PCS location numbers on the inventory map in conjunction with the displayed aquifer sensitivity and relative risk rankings for each PCS from Table 2 (Appendix C) to identify the susceptibility of the drinking water source to contamination from each PCSs and take steps to reduce the risk accordingly.

Potential Risks as a Function of Time-of-Travel Zone

PWS No. 4100270

	Within 2-yr TOT	Between 2-yr and 5-yr TOT	Between 5-yr and 10-yr TOT	Just Outside DWPA	Total
Total Number of High and Moderate Risk PCSs	4	2	1	0	7
Total High Risk PCSs	2	1	1	0	4
Total Moderate Risk PCSs	2	1	0	0	3
Total Low Risk PCSs	0	0	0	0	0
TOTAL PCSs	4	2	1	0	7

4.2.2 Relative Susceptibility Matrix

In figure 4, Appendix B, we have combined the location and relative risk rankings of the PCSs with aquifer sensitivity. For any given PCS, the water system can determine the susceptibility of the drinking water source to contamination by comparing PCS field risk and aquifer sensitivity at the site using the matrix below.

		Aquifer Sensitivity[1]		
		Low	**Moderate**	**High**
Field Risk[2]:	Moderate	*Low*	*Moderate*	*High*
	High	*Moderate*	*High*	*High*

1. As indicated on Figure 3, Appendix B
2. As indicated for the facility in question in Table 1, Appendix C

When a public water system is determined to have a high or moderate susceptibility from a specific site, i.e., a given PCS, as a result of a particular conditions or set of conditions, it means that a significant risk of contamination of the drinking water system exists. The susceptibility analysis cannot predict when, or if, contamination will occur, but it does recognize conditions that are highly favorable for contamination to occur. If a contaminant release to soils or groundwater should occur in the area of high susceptibility, it is very likely that contamination of the aquifer would occur if remedial actions are not completed as soon as possible.

If a public water system's drinking water source is determined to be of high or moderate

susceptibility relative to a given PCS, it is recommended that the system identify the condition(s) that led to that susceptibility rating and take immediate steps to protect the resource through remedying the condition, e.g., repairing or replacing faulty well construction, working directly with the facility operator(s) to implement sound management practices, etc.

Water systems with a low susceptibility relative to a given PCS should consider all identified factors that could lead to a high susceptibility rating in the future and take action to prepare a strategy to mitigate those factors. Raising public awareness through signs and other education programs, encouraging proper well construction, encouraging the use of best management practices in existing facilities, use zoning to maintain low density, etc. are good ways of ensuring that the water source retains its low susceptibility.

5. Recommended Use of the Source Water Assessment Report

The process for developing a Drinking Water Protection Plan can be summarized as follows:

5.1.1 Assessment Phase (Source Water Assessment provided by DHS and DEQ)

- Delineate the area that serves as the source of the public water supply (Drinking Water Protection Area (DWPA))
- Inventory the potential risks or sources of contamination within the DWPA
- Determine the areas most susceptible to contamination

5.1.2 Protection Phase (performed by the water system or community)

- Assemble a local Drinking Water Protection Team
- Enhance the Source Water Assessment if necessary
- Develop a plan to reduce the risk of contamination (protect the resource)
- Develop a contingency plan to address the potential loss of the drinking water supply
- Certify (optional) and implement the Drinking Water Protection Plan

The assessment phase was funded by the federal Safe Drinking Water Act. Its purpose is to supply the water system within the information necessary to develop the protection plan. Developing the plan is voluntary.

Prior to moving into the protection phase, DEQ recommends the inventory presented in this document be reviewed in detail to clarify the presence, location, operational practices, actual risks, etc. of the identified facilities and land use activities. The SWA inventory should be regarded as a preliminary review of potential sources of contamination within the drinking water protection area. Resources within the community should be used to do an "enhanced inventory" to refine this preliminary list of potential sources of contamination.

It is also important to remember that not all of the inventoried activities will need to be addressed if you choose to develop a Drinking Water Protection Plan. When developing a protection plan, sources which pose little or no threat to your drinking water source can be screened out. For example, if any of the land use activities are conducted in a manner that already significantly reduces the risk of a contamination release, the facility would not need to re-evaluate their practices based on drinking water protection "management". One of the goals of developing a plan based on the inventory results is to address those land use activities that do pose high or moderate risks to your public water supply. The system should target these facilities with greater levels of education and technical assistance to minimize the risk of contamination.

Limited technical assistance is available through the DEQ and Drinking Water Program at DHS for water systems that choose to move beyond the assessments and voluntarily develop a Drinking Water Protection Plan. Using the results of the assessment, the water system/community can form a Drinking Water Protection Team of individuals that have a stake in the plans implementation.

Forming a local team to help with the development of a protection plan is very important. Oregon's drinking water protection approach relies upon the concept of "community based protection", as are many other water quality programs. This simply refers to the concept of allowing local control and decision-making to implement the water quality protection effort. Community-based protection is successful only with significant local citizen stakeholder involvement. Community-based protection can draw on the knowledge and successful adaptive practices within the area. Landowners generally know best how to achieve water resource restoration and protection as long as a thorough explanation of the problem is provided, the objectives to solve the problem are clearly defined and technical assistance is available.

In community-based protection, citizens have more control and are therefore more likely to participate in the program and be more willing to assist with the educational and outreach effort which will make the plan successful. *We recommend that the protection plan be developed so as to minimize any burdens on individual property owners, but maximize the equity in responsibility for reducing the risks of future contamination.*

Protecting the drinking water supply in a community can also be a very effective way to encourage all citizens to participate in an issue which directly affects everyone in that community. This often leads to more public involvement in other significant local decisions concerning future livability issues, e.g., land use planning. In communities already developing and implementing Drinking Water Protection Plans, the process has served to bring many diverse interests together on a common goal and strengthen the local rural and urban relationships through communication and increased understanding. The risks and sources of water quality problems are not only from industries, farmers and managed forests, but every individual living commuting and working in that area.

Communities/water systems interested in developing Drinking Water Protection Plans may contact the Department of Environmental Quality (503-229-5413) or the DHS Drinking Water Program (541-726-2587) for further information.

Appendices

A. References

B. Figures

C. Inventory of Potential Contaminant Sources

D. Well Report(s)

E. Parameters Used in Delineation Model

F. Sensitivity Summary

G. Groundwater Fact Sheet

Additional copies of the appendix materials are available upon written request to the following address:

Groundwater Coordinator
Drinking Water Program
Department of Human Services
442 A Street
Springfield, OR 97477

Appendix A: References

Robinson, James H., 1971. Hydrology of basalt aquifers in the Hermiston-Ordnance area Umatilla and Morrow counties, Oregon. U.S. Geological Survey Hydrological Investigation HA-387.

Morton, M.A. and Bartholomew, W.S., 1984. Update of ground water conditions and declining water levels in the Butter Creek area, Morrow and Umatilla counties, Oregon. State of Oregon Water Resources Department Groundwater Report No. 30.

Davies-Smith, A., Bolke, E.L., and Collins, C.A., 1988. Geohydrology and digital simulation of the ground-water flow system in the Umatilla plateau and Horse Heaven Hills area, Oregon and Washington. U.S. Geological Survey Water-Resources Investigations Report 87-4268.

Stewart, S. and Nelson, D., 1996. Oregon Wellhead Protection Program Guidance Manual. Oregon Department of Environmental Quality (available at www.deq.or.state.us)

Appendix B: Figures

Figure 1: Drinking Water Protection Areas

Figure 2: Potential Contaminant Survey

Figure 3: Soil Sensitivity Map

Figure 4: Susceptibility Map

City of Echo
Drinking Water Protection Area

Figure 1



2000 0 2000 4000 6000 Feet

1:24,000





Drinking Water Protection Area (DWPA)
2, 5, and 10 Year Time of Travel (TOT)
Analytical Method

Model Parameters
Delineation Area (mi*mi): 2.66
Transmissivity (ft*ft/day): 8640
Production Interval (ft): 20
Effective Porosity: 0.25
Usage (gal/day): 464,888

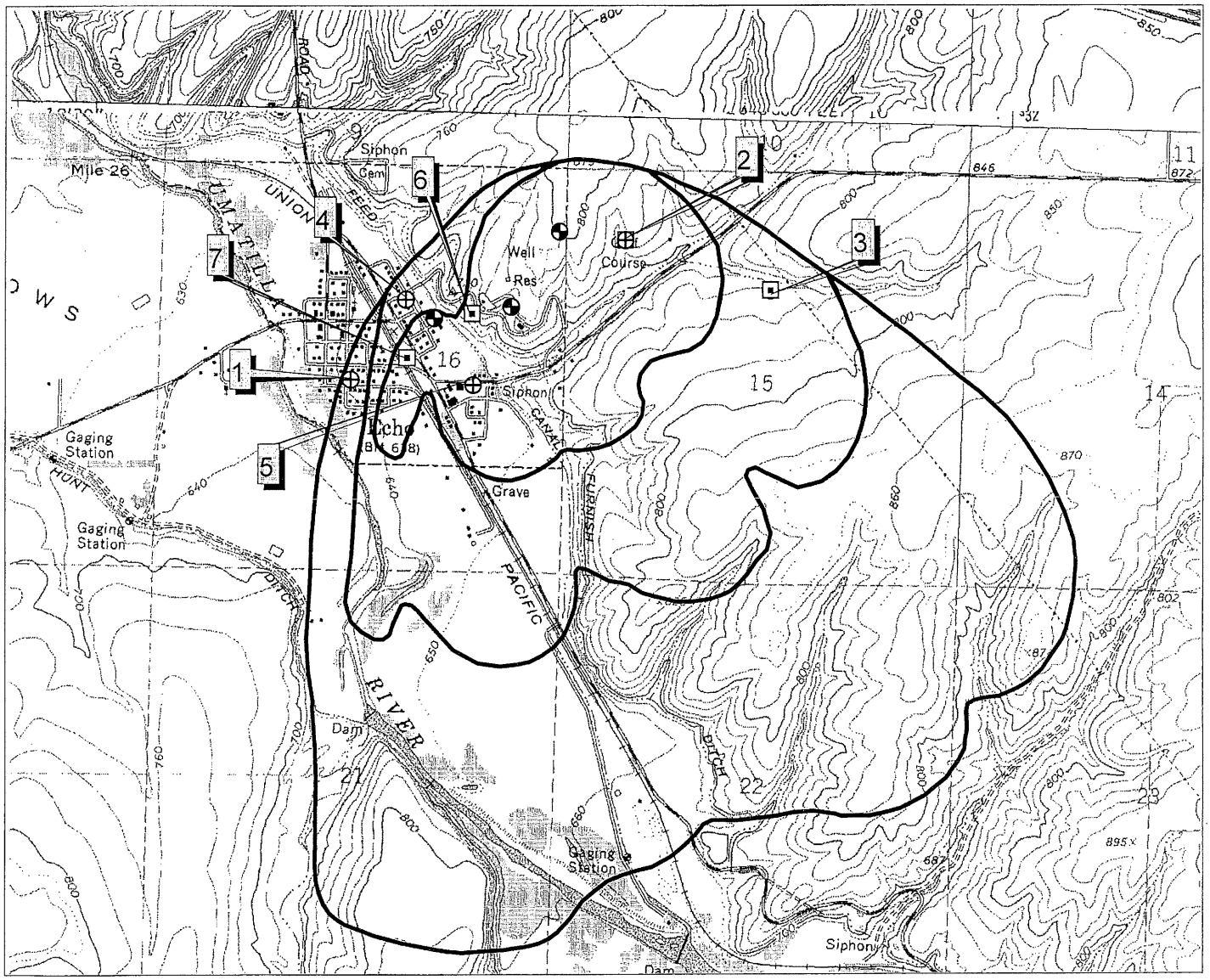
Prepared by: JF 7/19/02
Project Manager: JF RG#1867
File # 4100270

Well Location: Township 3N Range 29E Section 16
Umatilla County
Well #3 45°44'33.62156"N 119°11'22.24324"W
Well #4 45°44'35.34893"N 119°11'07.94708"W
Well #5 45°44'44.99991"N 119°10'59.00531"W

USGS Echo, Stanfield, OR Quadrangle
(part section) 7.5' Series (Topographic)

Figure 2

City of Echo Drinking Water Protection Area
Potential Contaminant Sources



2000 0 2000 4000 Feet

1:24,000

USGS Echo, Stanfield, OR Quadrangle
(part section) 7.5' Series (Topographic)

Drinking Water Protection Area (DWPA)
2, 5, and 10 Year Time of Travel (TOT)
Analytical Method

Prepared by: CW 06/25/02
Project Manager: JF RG#1867
File # 4100270

N

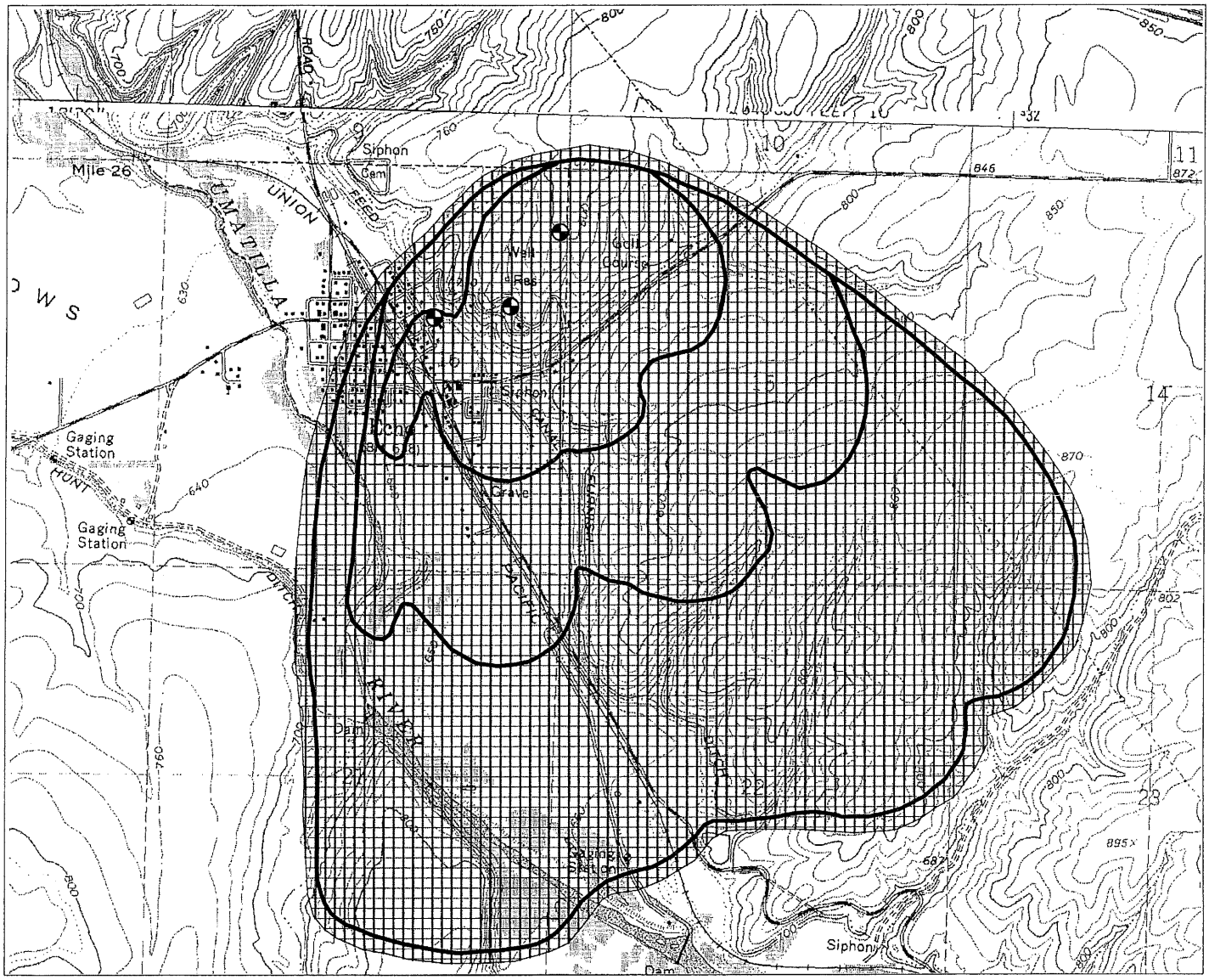
Potential Contaminant Sources
- **Higher Relative Risk**
- **Moderate Relative Risk**
- **Low Relative Risk**

Well Location: Township 3N Range 29E Section 16
Umatilla County
Well #3 45°44'33.62156"N 119°11'22.24324"W
Well #4 45°44'35.34893"N 119°11'07.94708"W
Well #5 45°44'44.99991"N 119°10'59.00531"W

Note: Sites and areas noted in this figure are potential sources of contamination to the drinking water as identified by Oregon Drinking Water Protection Staff. Environmental contamination is not likely to occur when chemicals are used and managed properly. Numbers indicate potential contaminant sources indexed to Appendic C, Table 2.

Figure 3

City of Echo Drinking Water Protection Area
Soil Sensitivity Analysis



2000 0 2000 4000 6000 Feet

1:24,000

USGS Echo, Stanfield, OR Quadrangle (part section) 7.5' Series (Topographic)

Drinking Water Protection Area (DWPA)
2, 5, and 10 Year Time of Travel (TOT)
Analytical Method

N

Prepared by: JF 08/01/02
Project Manager: JF RG#1867
File # 4100270

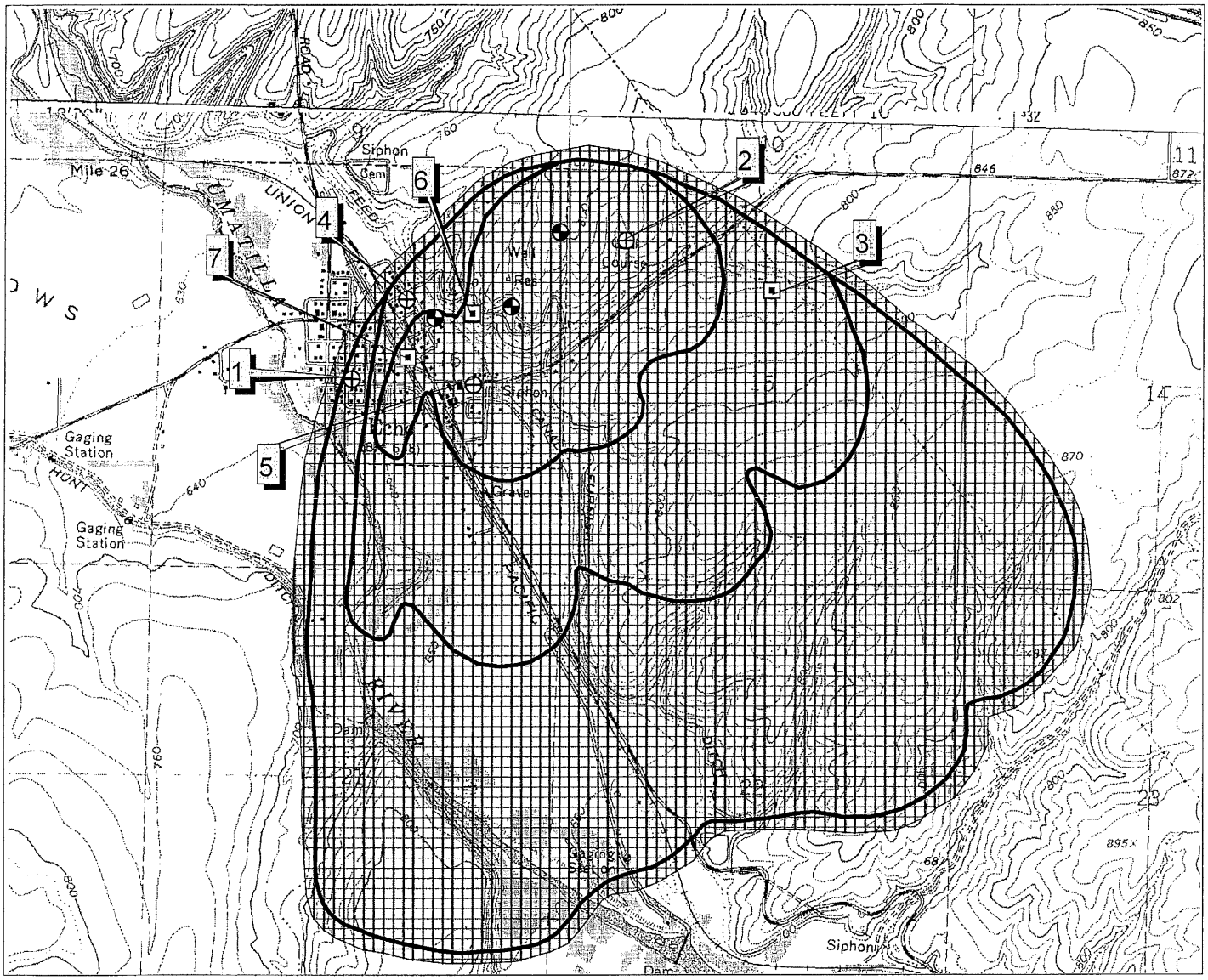
Sensitivity Analysis
- **High Soil Sensitivity**
- **Medium Soil Sensitivity**
- **Low Soil Sensitivity**

Well Location: Township 3N Range 29E Section 16
Umatilla County
Well #3 45°44'33.62156"N 119°11'22.24324"W
Well #4 45°44'35.34893"N 119°11'07.94708"W
Well #5 45°44'44.99991"N 119°10'59.00531"W

Note: Sites and areas noted in this figure are potential sources of contamination to the drinking water as identified by Oregon Drinking Water Protection Staff. Environmental contamination is not likely to occur when chemicals are used and managed properly. Numbers indicate potential contaminant sources indexed to Appendic C, Table 2.

Figure 4

City of Echo Drinking Water Protection Area
Potential Contaminant Sources and Soil Sensitivity Analysis



2000 0 2000 4000 6000 Feet

1:24,000

USGS Echo, Stanfield, OR Quadrangle (part section) 7.5' Series (Topographic)

Drinking Water Protection Area (DWPA)
2, 5, and 10 Year Time of Travel (TOT)
Analytical Method

Potential Contaminant Sources
- ⊕ **Higher Relative Risk**
- ⊡ **Moderate Relative Risk**
- △ **Low Relative Risk**

Sensitivity Analysis
- **High Soil Sensitivity**
- **Medium Soil Sensitivity**
- **Low Soil Sensitivity**

N

Prepared by: JF 08/01/02
Project Manager: JF RG#1867
File # 4100270

Well Location: Township 3N Range 29E Section 16
Umatilla County
Well #3 45°44'33.62156"N 119°11'22.24324"W
Well #4 45°44'35.34893"N 119°11'07.94708"W
Well #5 45°44'44.99991"N 119°10'59.00531"W

Note: Sites and areas noted in this figure are potential sources of contamination to the drinking water as identified by Oregon Drinking Water Protection Staff. Environmental contamination is not likely to occur when chemicals are used and managed properly. Numbers indicate potential contaminant sources indexed to Appendic C, Table 2.

Appendix C: Inventory of Potential Contaminant Sources

APPENDIX C - INVENTORY OF POTENTIAL CONTAMINANT SOURCES
CITY OF ECHO - PWS # 4100270
OREGON SOURCE WATER ASSESSMENT

Notes and Acronyms for Table 1 and Table 2

Sites and areas identified in these Tables are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

Total number of sources listed in Table 1 in the DWPA may not add up to the total number of potential contaminants sources in Table 2 because more than one type of potential contaminant source may be present at any given facility.

Data collected by DLC of Oregon Department of Environmental Quality on September 22, 1999.

Acronyms:

AST - Aboveground Storage Tank
DEQ - Oregon Department of Environmental Quality
DRYCLEANER - DEQ's Drycleaner database
DWPA - Drinking Water Protection Area
ECSI - DEQ's Environmental Cleanup Site Information database
HWIMSY - DEQ's Hazardous Waste Information Management System database
LUST - DEQ's Leaking Underground Storage Tank database
NPDES - National Pollution Discharge Elimination System
PCS - Potential Contaminant Source
PWS - Public Water System
SFM - State Fire Marshall's database of hazardous materials
SIS - DEQ's Source Information System database which includes WPCF and NPDES permits
SWMS - DEQ's Solid Waste Management System database
UST - DEQ's Underground Storage Tank database
UST - Underground Storage Tank
WPCF - Water Pollution Control Facility
WRD -Oregon Water Resources Division database for water rights information system

TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE; CITY OF ECHO; PWS# 4100270

COMMERCIAL/INDUSTRIAL SOURCES		Relative Risk Ranking	Total in DWPA
AUTOMOBILES	BODY SHOPS	HIGHER	0
	CAR WASHES	MODERATE	0
	GAS STATIONS	HIGHER	0
	REPAIR SHOPS	HIGHER	0
BOAT SERVICES/REPAIR/REFINISHING		HIGHER	0
CEMENT/CONCRETE PLANTS		MODERATE	0
CHEMICAL/PETROLEUM PROCESSING/STORAGE		HIGHER	0
DRY CLEANERS		HIGHER	0
ELECTRICAL/ELECTRONIC MANUFACTURING		HIGHER	0
FLEET/TRUCKING/BUS TERMINALS		HIGHER	0
FOOD PROCESSING		MODERATE	0
FURNITURE/LUMBER/PARTS STORES		MODERATE	0
HOME MANUFACTURING		HIGHER	0
JUNK/SCRAP/SALVAGE YARDS		HIGHER	0
MACHINE SHOPS		HIGHER	0
MEDICAL/VET OFFICES [1]		MODERATE	0
METAL PLATING/FINISHING/FABRICATION		HIGHER	0
MINES/GRAVEL PITS		HIGHER	0
OFFICE BUILDINGS/COMPLEXES		LOWER	0
PARKING LOTS/MALLS - > 50 SPACES		HIGHER	0
PHOTO PROCESSING/PRINTING		HIGHER	0
PLASTIC/SYNTHETICS PRODUCER		HIGHER	0
RESEARCH LABORATORIES		HIGHER	0
RV/MINI STORAGE		LOWER	0
WOOD PRESERVING/TREATING		HIGHER	0
WOOD/PULP/PAPER PROCESSING AND MILLS		HIGHER	0
OTHERS (LIST)			0

RESIDENTIAL/MUNICIPAL SOURCES	Relative Risk Ranking	Total in DWPA
AIRPORT - MAINTENANCE/FUELING AREA	HIGHER	0
APARTMENTS AND CONDOMINIUMS	LOWER	0
CAMPGROUNDS/RV PARKS [1]	LOWER	0
CEMETERIES - PRE-1945	MODERATE	0
DRINKING WATER TREATMENT PLANTS	MODERATE	0
FIRE STATION	LOWER	0
FIRE TRAINING FACILITIES	MODERATE	0
GOLF COURSES	MODERATE	1
HOUSING - HIGH DENSITY - > 1 HOUSE/0.5 ACRES	MODERATE	0
LANDFILL/DUMPS [1]	HIGHER	0
LAWN CARE - HIGHLY MAINTAINED AREAS	MODERATE	0
MOTOR POOLS	MODERATE	0
PARKS	MODERATE	0
RAILROAD YARDS/MAINTENANCE/FUELING AREAS	HIGHER	0
SCHOOLS	LOWER	0
SEPTIC SYSTEMS - HIGH DENSITY - > 1/ACRE [1]	HIGHER	0
SEWER LINES - CLOSE PROXIMITY TO PWS [1]	HIGHER	0
UTILITY STATIONS - MAINTENANCE TRANSFORMER STORAGE	HIGHER	0
WASTE TRANSFER/RECYCLING STATIONS [1]	MODERATE	0
WASTEWATER TREATMENT PLANTS/COLLECTION STATIONS [1]	MODERATE	0
OTHERS (LIST)		

(Continued on p.2)

NOTES/KEY:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

[1] - Potential Source of Microbial Contamination

[2] - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

[3] - Septic Systems located within the 2-year time-of-travel (TOT) for wells are considered moderate risks.

TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE; CITY OF ECHO; PWS# 4100270

AGRICULTURAL/FOREST SOURCES		Relative Risk Ranking	Total in DWPA
AUCTION LOTS [1]		HIGHER	0
BOARDING STABLES [1]		MODERATE	0
CONFINED ANIMAL FEEDING OPERATIONS (CAFOS) [1]		HIGHER	0
CROPS - IRRIGATED - BERRIES, HOPS, MINT, ORCHARDS, VINEYARDS/NURSERIES, GREEN HOUSES, VEGETABLES, ETC.		MODERATE [2]	1
CROPS - NONIRRIGATED - CHRISTMAS TREES, GRAINS, GRASS SEEDS, HAY, PASTURE		LOWER	0
FARM MACHINERY REPAIR		HIGHER	0
GRAZING ANIMALS - > 5 LARGE ANIMALS OR EQUIVALENT/ACRE [1]		MODERATE	0
LAGOONS/LIQUID WASTES [1]		HIGHER	0
LAND APPLICATION SITES [1]		MODERATE	0
MANAGED FOREST LANDS	BROADCAST FERTILIZED AREAS	LOWER	0
	CLEARCUT HARVESTED - < 35 YRS.	MODERATE	0
	PARTIAL HARVESTED - <10 YRS.	MODERATE	0
	ROAD DENSITY - > 2 MI./SQ. MI.	MODERATE	0
PESTICIDE/FERTILIZER/PETROLEUM STORAGE, HANDLING, MIXING, & CLEANING AREAS		HIGHER	0
RECENT BURN AREAS - < 10 YRS.		LOWER	0
OTHERS (LIST)			
IRRIGATION CANAL		MODERATE	1

MISCELLANEOUS SOURCES		Relative Risk Ranking	Total in DWPA
ABOVE GROUND STORAGE TANKS		MODERATE	1
CHANNEL ALTERATIONS - HEAVY		LOWER	0
COMBINED SEWER OUTFALLS [1]		LOWER	0
STORMWATER OUTFALLS [1]		LOWER	0
COMPOSTING FACILITIES [1]		MODERATE	0
HISTORIC GAS STATIONS		HIGHER	0
HISTORIC WASTE DUMPS/LANDFILLS [1]		HIGHER	0
HOMESTEADS - RURAL	MACHINE SHOPS	HIGHER	0
	SEPTIC SYSTEMS < 1/ACRE [1]	LOWER(3)	0
INJECTION WELLS/DRYWELLS/SUMPS - CLASS V UICS [1]		HIGHER	0
KENNELS - > 20 PENS [1]		LOWER	0
MILITARY INSTALLATIONS		HIGHER	0
RANDOM DUMPSITES		MODERATE	0
RIVER RECREATION - HEAVY USE [1]		LOWER	0
SLUDGE DISPOSAL AREAS [1]		MODERATE	0
STORMWATER RETENTION BASINS [1]		MODERATE	0
TRANSMISSION LINES - RIGHT-OF-WAYS		LOWER	0
TRANSPORTATION CORRIDORS	FREEWAYS/STATE HIGHWAYS	MODERATE	0
	RAILROADS	MODERATE	1
	HERBICIDE USE AREAS	MODERATE	0
	RIVER TRAFFIC - HEAVY	LOWER	0
	STREAM CROSSING - PERENNIAL	LOWER	0
UNDERGROUND STORAGE TANKS	CONFIRMED LEAKING TANKS - DEQ LIST	HIGHER	2
	DECOMMISSIONED - INACTIVE	LOWER	0
	NON-REGULATED TANKS - < 1,100 GALS	HIGHER	0
	NOT YET UPGRADED OR REGISTERED TANKS	HIGHER	0
	UPGRADED AND/OR REGISTERED - ACTIVE	LOWER	0
	STATUS UNKNOWN	HIGHER	2
UPSTREAM RESERVOIRS		LOWER	0
WELLS/ABANDONED WELLS		HIGHER	0
LARGE CAPACITY SEPTIC SYSTEMS -CLASS V UIC (SERVES >20 PEOPLE) [1]		HIGHER	0
OTHERS (LIST)			0

NOTES/KEY:

Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) - Potential Source of Microbial Contamination

(2) - Drip irrigated crops, such as vineyards and some vegetables, are considered lower risk than spray irrigation

(3) - Septic Systems located within the 2-year time-of-travel (TOT) for wells are considered moderate risks.

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES; CITY OF ECHO; PWS# 4100270						
REFERENCE NO. (SEE FIGURE 2)	PCS TYPE(S)	PCS NAME	APPROXIMATE LOCATION	CITY	RELATIVE RISK RANKING	METHOD FOR LISTING
1	UST - STATUS UNKNOWN	ECHO PLANT	WILLOW & THILSON	ECHO	HIGHER	DATABASE FIELD OBSERVATION INTERVIEW
2	GOLF COURSE / ABOVE GROUND STORAGE TANKS	GOLF COURSE	NORTHEAST SIDE OF TOWN	ECHO	HIGHER	DATABASE FIELD OBSERVATION INTERVIEW
3	CONFIRMED LEAKING TANK - DEQ LIST / IRRIGATED CROPS	CIRCLE C CUBING	EAST SIDE OF TOWN NEAR GOLF COURSE	ECHO	HIGHER	DATABASE FIELD OBSERVATION INTERVIEW
4	UST - STATUS UNKNOWN	ECHO MOBILE STATION	MAIN ST	ECHO	HIGHER	DATABASE FIELD OBSERVATION INTERVIEW
5	CONFIRMED LEAKING TANK - DEQ LIST	ECHO SCHOOL	600 GEROME ST	ECHO	HIGHER	DATABASE FIELD OBSERVATION INTERVIEW
6	IRRIGATION CANAL	FEED CANAL	RUNS THROUGH TOWN - EXTENDS THROUGH DWPA	ECHO	MODERATE	FIELD OBSERVATION INTERVIEW
7	TRANSPORTATION CORRIDOR - RAILROADS	TRANSPORTATION CORRIDOR-UNION PACIFIC RR	RUNS THROUGH TOWN - EXTENDS THROUGH DWPA	ECHO	MODERATE	FIELD OBSERVATION INTERVIEW

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES; CITY OF ECHO; PWS# 4100270			
REFERENCE NO. (SEE FIGURE 2)	POTENTIAL IMPACTS	DATABASE LISTINGS	COMMENTS
1	SPILLS, LEAKS, OR IMPROPER HANDLING OF STORED MATERIALS MAY IMPACT THE DRINKING WATER SUPPLY.	UST LIST WITH A UNKNOWN STATUS.	NONE
2	OVER-APPLICATION OR IMPROPER HANDLING OF PESTICIDES OR FERTILIZERS MAY IMPACT DRINKING WATER. EXCESSIVE IRRIGATION MAY CAUSE TRANSPORT OF CONTAMINANTS TO GROUNDWATER OR SURFACE WATER THROUGH RUNOFF. SPILLS, LEAKS, OR IMPROPER HANDLING OF STORED MATERIALS MAY IMPACT THE DRINKING WATER SUPPLY.	SFM LIST WITH THE FOLLOWING MATERIALS REPORTED ON-SITE: GASOLINE (AST); DIESEL FUEL; STOVE OIL (AST); MOTOR OIL; 2-4D; AMMONIUM NITRATE SULFATE.	NONE
3	EXISTING CONTAMINATION FROM SPILLS, LEAKS, OR IMPROPER HANDLING OF STORED MATERIALS MAY IMPACT THE DRINKING WATER SUPPLY. OVER-APPLICATION OR IMPROPER HANDLING OF PESTICIDES OR FERTILIZERS MAY IMPACT DRINKING WATER. EXCESSIVE IRRIGATION MAY CAUSE TRANSPORT OF CONTAMINANTS OR SEDIMENTS TO GROUNDWATER/SURFACE WATER THROUGH RUNOFF. NOTE: *DRIP-IRRIGATED CROPS SUCH AS VINEYARDS AND SOME VEGETABLES, ARE CONSIDERED TO BE A LOW RISK.	LUST LIST WITH A UNKNOWN STATUS.	NONE
4	SPILLS, LEAKS, OR IMPROPER HANDLING OF STORED MATERIALS MAY IMPACT THE DRINKING WATER SUPPLY.	UST LIST WITH A UNKNOWN STATUS.	NONE
5	EXISTING CONTAMINATION FROM SPILLS, LEAKS, OR IMPROPER HANDLING OF STORED MATERIALS MAY IMPACT THE DRINKING WATER SUPPLY. SPILLS, LEAKS, OR IMPROPER HANDLING OF CHEMICALS AND OTHER MATERIALS DURING TRANSPORTATION, USE, STORAGE AND DISPOSAL MAY IMPACT THE DRINKING WATER SUPPLY.	LUST LIST WITH A STATUS OF CLEANUP INITIATED 06/99. PWS SHOULD VERIFY CLEANUP PROGRESS. SFM LIST WITH THE FOLLOWING MATERIALS REPORTED ON-SITE: DIESEL (UST).	NONE
6	THE IMPACTS OF THIS POTENTIAL CONTAMINANT SOURCE SHOULD BE ADDRESSED DURING THE ENHANCED INVENTORY.	NONE	NONE
7	RAIL TRANSPORT INCREASES THE RISKS FOR LEAKS OR SPILLS OF FUELS AND OTHER HAZARDOUS MATERIALS THAT MAY IMPACT DRINKING WATER. INSTALLATION AND MAINTENANCE OF TRACKS MAY CONTRIBUTE TO INCREASED EROSION AND SLOPE FAILURE CAUSING TURBIDITY IN DRINKING WATER SOURCE. OVER-APPLICATION OR IMPROPER HANDLING OF PESTICIDES ADJACENT TO TRACKS MAY IMPACT THE DRINKING WATER SUPPLY.	NONE	NONE

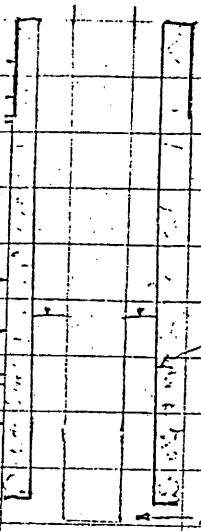
Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

Appendix D: Well Reports

#3

T3N R29E Elev ± 690'

Well #1 drilled 1951 A.A Durar



Soil	
Water-bearing	14'
Columbia Riv. Basalt	25'
Basalt hard	32
	35
Basalt, gray, hard, static W.L. 10'	
	85
Basalt, black, medium hard	
	103
" " broken	
Clay blue	116
Basalt black broken	118
	132
Basalt black medium hard broken 137-139	
" " " "	159
	164
Basalt block SWL 10'	
" " broken	179
Basalt grey hard	184
	187
Basalt gray medium hard	
Basalt black soft honeycomb SWL 107'	275
	290
Basalt black	
Basalt grey hard	360
	362
" " very hard	
	406
Basalt grey firm	
Basalt black, soft broken	430
	435
Basalt, grey, hard, SWL 100'	
	490

16" casing to 32'

SWL 95' 1951 Temp 65°F

12" casing to 158'

OD est 12' by corrosion of pump column when last pu

Column & bowls est 160'

400 gpm 50 HP

Pacific Pump Co.

12" hole to 380' est 10"

Water bearing zone

1:60

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)

37 1974 State Well No. 3N/28E-16

STATE ENGINEER SALEM, OREGON State Permit No.

(1) OWNER:

Name City of Echo

Address Echo, Oregon 97826

(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 ☐

10" Diam. from 0 ft. to 45 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 in. by in.

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) WELL TESTS:

Drawdown is amount water level is lowered below static level

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

Yield: 6.56 gal./min. with 18 ft. drawdown after 13 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 45 ft.

Diameter of well bore to bottom of seal 14 in.

Diameter of well bore below seal 10 in.

Number of sacks of cement used in well seal 20 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 Umatilla Driller's well number 47 WSB

¼ ¼ Section 16 T. 3N. R. 28E. W.M.

Bearing and distance from section or subdivision corner

Tax Lot 3200 276' ETS

(11) WATER LEVEL: Completed well.

Depth at which water was first found 353 ft.

Static level 315 ft. below land surface. Date 7-15-74

Artesian pressure lbs. per square inch. Date

(12) WELL LOG:

Diameter of well below casing 10"

Depth drilled 600 ft. Depth of completed well 600 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
Topsoil	0	5	
Claystones	5	20	
Rock, brown	20	37	
Basalt	37	146	
Rock, Med., Black	146	289	
Basalt	289	341	
Basalt, hard, gray	341	353	
Rock, porous, black	353	415	W.B.
Basalt, block	415	441	
Basalt, hard, gray	441	512	
Rock, black + blue Obsydian	512	532	
Rock, Med. gray	532	548	
Rock, brown	548	554	
Basalt	554	585	
Rock, porous	585	600	W.B.

Work started 5-20 1974 Completed 8-1 1974

Date well drilling machine moved off of well 6-4 1974

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] James F. Griffith (Drilling Machine Operator) Date 8-5, 1974

Drilling Machine Operator's License No. 665

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 TROY GRIFFIN (Person, firm or corporation) (Type or print)

Address 900 HERMISTON AVE, HERMISTON, OR

[Signed] Troy G. Griffin (Water Well Contractor)

Contractor's License No. 665 Date 8-2, 1974

(USE ADDITIONAL SHEETS IF NECESSARY)

SP*45656-119

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

Deepened

(START CARD) # 46231

(1) OWNER:

Well Number 4

Name City of Echo

Address P.O. Box 9

City Echo State OR Zip 97826

(2) TYPE OF WORK:

☐ New Well ☒ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD

☐ Rotary Air ☐ Rotary Mud ☐ Cable

☒ Other RC Dual Tube Rotary

(4) PROPOSED USE:

☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval Yes ☐ No ☒ Depth of Completed Well 1043.5 ft.

Explosives used Yes ☐ No ☒ Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
10	600	1045	cement	0	~180	75 sks
			cement	~180	>220	100 sks
			cement	<600	951	300 sks*
			had LC between 220 & 600			

How was seal placed: Method ☒ A ☐ B ☐ C ☐ D ☐ E

☒ Other poured & probed

Backfill placed from 1043.5 ft. to 1045 ft. Material slough/pea gravel

LCM Gravel placed from >220 ft. to <600 ft. Size of gravel 38 sks of 6x9 CSSI

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing:	8	+2	951	.250	☒	☐	☒	☐
	removed 2 feet of existing:				☐	☐	☐	☐
	10	+2	0	.250	☒	☐	☒	☐
	plate welded between 10 & 8				☐	☐	☐	☐
Liner:	6	937	1043.5	.280	☒	☐	☒	☐
	except at screens				☐	☐	☐	☐

Final location of shoe(s)

(7) PERFORATIONS/SCREENS:

☒ Perforations Method factory milled

☒ Screens Type V-shaped wire wrap Material 304SS

From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
						☐	☐
978.5	1022.5	150	cont.	6	PS	☐	☐
1022.5	1032.5	3/16x3	240			☐	☒
						☐	☐
						☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal/min	Drawdown	Drill stem at	Time
see attached plots			1 hr.

Temperature of water approx. 75°F Depth Artesian Flow Found

Was a water analysis done? ☒ Yes By whom Water Food & Research Lab

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 Umatilla Latitude Longitude

Township 3N N or S. Range 29E E or W. WM.

Section 16 SE ¼ NE ¼

Tax Lot 3600 Lot Block Subdivision

Street Address of Well (or nearest address) none assigned- Golf Course Road, Echo, Oregon

(10) STATIC WATER LEVEL:

195 ft. below land surface. Date 5/19/93

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 382 (SWL on 2/2/93 prior t deepening)

From	To	Estimated Flow Rate	SWL
The most obvious WB zone encountered in the deepened portion of the well was:			
979	1039	see (8)	see(10

(12) WELL LOG:

Ground elevation 735

Material	From	To	SWL
see attached			

Date started 1/25/93 Completed 5/21/93

(unbonded) Water Well Constructor Certification:

I certify that the work I performed on the construction, alteration, abandonment of this well is in compliance with Oregon well constructi standards. Materials used and information reported above are true to my be knowledge and belief.

WWC Number 806

Signed David Donald Date 6/18/93

(bonded) Water Well Constructor Certification:

I accept responsibility for the construction, alteration, or abandonme work performed on this well during the construction dates reported above. work performed during this time is in compliance with Oregon w construction standards. This report is true to the best of my knowledge a belief.

WWC Number 649

Signed Stephen Schneider Date 6/18/93

SECOND COPY - CONSTRUCTOR THIRD COPY - CUSTOMER 9809C 3

City of Echo
Start Card No. 46231
by Schneider Drilling Co.
May 18, 1993

Depth From	Depth To	Description
600	607	Basalt, multi-color, soft, vesicular
607	612	Basalt, blackish gray, med
612	643	Basalt, gray, hard, fractured
643	655	Basalt, black, med-soft, fractured
655	660	Basalt, black, med, some fractures
660	690	Basalt, gray, hard
690	712	Basalt, grayish black, med, vesicular
712	725	Basalt, black, fractured
725	757	Basalt, black, fractured, med
757	770	Basalt, gray, fractured, hard
770	785	Basalt, black, vesicular, some frac, hard
785	805	Basalt, gray-green, vesicular, med-soft
805	834	Basalt, black, med
834	840	Basalt, blackish gray, hard
840	861	Basalt, gray, hard
861	865	Baslat, gray, vesicular, med-hard
865	880	Basalt, gray, hard
880	891	Basalt, black, ves, fractured, med-hard
891	898	Basalt, blackish gray, fractured
898	914	Basalt, red-grn w/quartz, soft, some caving
914	920	Basalt, blackish gray, fractured, med
920	935	Basalt, gray, very hard
935	939	Basalt, red-green, vesicular
939	948	Basalt, reddish gray, fractured, med-hard
948	979	Basalt, gray, hard
979	1030	Basalt, multi-clrd, ves, red-brn, med-soft, frac
1030	1039	Basalt, crumbly, multi-clrd, mostly red-brn & gray fractures
1039	1045	Basalt, gray, hard

W32036.ECH

STATE OF OREGON

WATER WELL REPORT

(as required by ORS 537.765)

(START CARD) # 46232

(1) OWNER: Well Number 5

Name City of Echo

Address P.O. Box 9

City Echo State OR Zip 97826

(2) TYPE OF WORK:

☒ New Well ☐ Deepen ☐ Recondition ☐ Abandon

(3) DRILL METHOD:

☐ Rotary Air ☐ Rotary Mud ☒ Cable

☒ Other Reverse Circulation Rotary

(4) PROPOSED USE:

☐ Domestic ☒ Community ☐ Industrial ☐ Irrigation

☐ Thermal ☐ Injection ☐ Other

(5) BORE HOLE CONSTRUCTION:

Special Construction approval ☒ Yes ☐ No Depth of Completed Well 1282 ft.

Explosives used ☐ Yes ☒ No Type Amount

HOLE Diameter	From	To	SEAL Material	From	To	Amount sacks or pounds
20	0	206	Bentonite	0	6	20 sks
15	206	955	Cement Grout	6	955	560 sks
10	955	1282				+60 sks sand

How was seal placed: Method ☒ A ☐ B ☒ C ☐ D ☐ E

☒ Other Bentonite was manually placed dry

Backfill placed from ft. to ft. Material

Gravel placed from ft. to ft. Size of gravel

(6) CASING/LINER:

	Diameter	From	To	Gauge	Steel	Plastic	Welded	Threaded
Casing: Pitless Unit		+1	5	std	☒	☐	☒	☐
	12	5	955	.375	☒	☐	☒	☐
	20	6	107	.375	☒	☐	☒	☐
					☐	☐	☐	☐
Liner:	10x8	945	950	std	☒	☐	☒	☐
	8	950	1282	.250	☒	☐	☒	☐

Final location of shoe(s) except at screens 955

(7) PERFORATIONS/SCREENS:

☒ Perforations Method Factory mill cut

☒ Screens Type V shape wire wrap Material 304ss

Screens: From	To	Slot size	Number	Diameter	Tele/pipe size	Casing	Liner
1070	1075	.150		8	PS	☐	☐
1080	1085	.150		8	PS	☐	☐
1250	1255	.150		8	PS	☐	☐
1265	1270	.150		8	PS	☐	☐
						☐	☐

(8) WELL TESTS: Minimum testing time is 1 hour

☒ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

also see attached graphs of 24 hour test/recovery

Yield gal/min	Drawdown	Drill stem at	Time
522	26		2 hr.
1034	61		2nd - 2 hr.
1450	101		3rd - 2 hr.
1760	136		4th - 2 hr.

Temperature of Water 84°F 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: SE19405

(9) LOCATION OF WELL by legal description:

County Umatilla Latitude Longitude

Township 3N N or S. Range 29E E or W. WM.

Section 16 NE ¼ NE ¼

Tax Lot 100 Lot Block Subdivision

Street Address of Well (or nearest address) Golf Course Road Echo, OR

(10) STATIC WATER LEVEL:

153 ft. below land surface. Date 10/26/93

Artesian pressure lb. per square inch. Date

(11) WATER BEARING ZONES:

Depth at which water was first found 1st significant @ 662

From	To	Estimated Flow Rate	SWL
662	674	?	456
screened/perforated interval		see (8)	see
see (7)			(10)

(12) WELL LOG:

Ground elevation approx. 800

Material	From	To	SWL
see attached log			
'J' receptor & bell reducer			
Perforations in 8" liner are all 3/16x3 slots			
32 slots per foot. Perforated intervals are:			
	From	To	
160 slots	1065	1070	
160 slots	1075	1080	
160 slots	1085	1090	
640 slots	1175	1195	
160 slots	1245	1250	
320 slots	1255	1265	
320 slots	1270	1280	

Date started 5/12/93 Completed 1/7/94

(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 well construction standards. Materials used and information reported above are true to my best knowledge and belief.

WWC Number 1578

Signed Date 1/28/94

(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 performe during this time is in compliance with Oregon well construction standards. This rep is true to the best of my knowledge and belief.

WWC Number 64

Signed Date 1/28/94

City of Echo Well No. 5
Start Card No. 46232
by Schneider Drilling Co.

Depth From	Depth To	Description
0	6	Sand & gravel, brown
6	11	Gravel, 5"-, & sand, w/some clay, brown
11	21	Clay & gravel, 3"-, brown
21	32	Clay, brown, w/coarse sand & small gravel
32	38	Gravel & sand, cemented
38	52	Clay, brown, soft, sandy, w/some cs & small gravel
52	55	Gravel, 3"- & sand, cemented, brown
55	57	Gravel, 3"- & sand, med, cemented, brown
57	67	Gravel, 1/2"-, cem, w/some clay, brown
67	70	Gravel, 1-1/2"-, cem, w/some clay, brown
70	76	Clay, brown, w/claystone & some gravel, small
76	84	Clay, brown, sandy, & claystone
84	90	Gravel, 3/4"-, & sand, cem, w/some clay, brn
90	93	Clay, brown, sandy, & claystone
93	105	Gravel, 3"-, & clay, tan-brown
105	115	Basalt, gray, hard
115	118	Basalt, blk & red, fractured, med
118	124	Basalt, red & blk, fractured, med
124	125	Basalt, drk red & blk, frac, w/some cs
125	130	Basalt, drk red & blk, frac, med
130	131	Basalt, drk gray & red, frac, med
131	132	Basalt, drk gray & red, frac, med-hard
132	140	Basalt, drk red, frac, med
140	180	Basalt, gray, w/some frac, hard
180	191	Basalt, gray, fractured, hard
191	192	Basalt, blk & red, ves, medium, w/cs, blue-grn
192	193	Basalt, blk & red, brkn, ves, med, w/some cs, blue-grn
193	200	Basalt, brown, med, some frac, some cs, blue-grn
200	203	Basalt, gray, w/some brown
203	206	Basalt, brn & gry, med-hd, frac, w/some cs, blue-grn
206	207	Basalt, lt gray, frac, med-hard
207	215	Basalt, gray, frac, hard
215	216	Basalt, gray, med, broken, w/some cs, blue-grn
216	220	Basalt, gray & brown, med, brkn, ves, w/cs, blue-grn
220	225	Basalt, gray & red, med, brkn, w/some cs, blue-grn
225	230	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
230	235	Basalt, gray, med-hard, brkn
235	237	Basalt, gray, hard, frac

237	241	Basalt, gray & brown, hard, frac
241	243	Basalt, gry & brn, med-hd, frac, w/some cs, blue-grn
243	244	Basalt, gray, med-hard, frac, w/some cs, blue-grn
244	250	Basalt, gray, hard, frac
250	252	Basalt, gray & brown, med-hard, frac
252	258	Bslt, gry & brn, med, brkn, ves, w/some cs, blue-grn
258	268	Basalt, gray, med-hard, frac
268	275	Basalt, gray & brn, med, brkn, w/some cs, blue-grn
275	285	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
285	295	Basalt, gray, med-hard, frac
295	300	Basalt, gray, med, brkn, w/some claystone, blue-grn
300	313	Basalt, gray, med-hard, frac
313	315	Basalt, gray & brn, med, brkn, w/some cs, blue-grn, & sandstone, lt brown
315	326	Basalt, gray & brown, med, brkn, ves, w/cs, blue-grn
326	328	Basalt, gray, med, brkn
328	338	Basalt, gray, hard, brkn
338	341	Basalt, gray, med-hard, brkn, w/some cs, blue-grn
341	343	Bslt, gry, frac, hard, some ves, w/some cs, blue-grn
343	349	Basalt, gray, ves, hard, w/some cs, blue-grn
349	353	Basalt, gray w/green, ves, hard
353	358	Basalt, gray, w/some frac, hard
358	365	Basalt, gray w/blue, ves, hard
365	367	Basalt, gray w/some frac, hard
367	379	Basalt, gray, frac, some ves, hard, w/some cs, blue
379	393	Basalt, gray, w/some blue, frac, hard
393	398	Basalt, gray, hard
398	412	Basalt, gray, w/some frac, hard
412	419	Basalt, gray, ves, med, w/cs, blue-grn
419	433	Basalt, gray, ves, frac, med, w/some cs, blue-grn
433	478	Basalt, gray, frac, some ves, hard
478	499	Basalt, gray, frac, some ves, hard, w/cs, blue-grn
499	569	Basalt, gray, some frac, hard
569	572	Basalt, black & gray, frac, hard
572	576	Basalt, gray, frac, hard
576	578	Basalt, gray, frac, hard, w/some cs, blue
578	581	Basalt, grn-gray, med, frac, w/clay & cs, gray
581	583	Bslt, gry-brn, frac, ves, med, clay & cs, brn-blue-grn
583	586	Basalt, gry & brown w/grn, frac, ves, med
586	597	Basalt, gray, frac, ves, med, w/cs, blue-grn
597	602	Basalt, gray w/blue, frac, ves
602	622	Basalt, gray, frac, hard
622	627	Basalt, gray, frac, w/some ves, hard
627	659	Basalt, gray, frac, hard
659	662	Basalt, gray & red-brn, med-hard, frac
662	666	Basalt, rusty-red, med-soft, ves, w/cs, blue-grn
666	672	Basalt, red-brn, med-soft, w/cs, light grn

672	674	Basalt, gray-brn, med-hard, frac, ves
674	704	Basalt, gray, hard, frac
704	714	Basalt, gray & brn, med-soft, ves, brkn
714	717	Basalt, black, med-soft, ves, brkn
717	719	Basalt, black, med-soft, brkn, ves, w/cs, light grn
719	724	Basalt, drk gray & brn, w/some cs, blue-grn
724	726	Basalt, gray, med-hard, frac, w/some cs, blue-grn
726	728	Basalt, gray, hard, broken, ves
728	739	Basalt, gray, hard, fractured
739	740	Basalt, drk gray, hard, fractured
740	743	Basalt, drk gray, hard, frac, some quartz
743	754	Basalt, black, soft, some quartz, cs layers, grn
754	759	Basalt, gray & brown, med-soft, ves, cs, grn
759	787	Basalt, dk gray, med-soft, ves, some cs, grn
787	790	Basalt, dk gray, hard, fractured
790	793	Bslt, dk gry, med-hard, frac, ves, some quartz & cs, grn
793	796	Basalt, gray, hard, frac
796	805	Basalt, dk gray, med-hard, frac, ves
805	808	Basalt, gray, med-hard, broken
808	812	Basalt, gray, med-hard, frac
812	816	Basalt, gray, hard, frac
816	826	Basalt, med, dk gray, med-hard, frac
826	834	Basalt, dk gray, med-hard, frac, ves
834	838	Basalt, gray, med-hard, frac
838	851	Basalt, gray, hard, frac
851	854	Bslt, gry & grn, md-sft, well frac, some cs, blk-grn
854	861	Basalt, brown, med, well frac, w/cs, yellow
861	868	Basalt, gray, hard, frac
868	869	Basalt, brown & gray, med, well frac, w/cs, yellow
869	874	Basalt, gray, hard, frac
874	884	Basalt, blk, med-soft, ves, w/cs, blue-grn
884	887	Basalt, dk gray, med-hard, frac, some ves
887	890	Basalt, dk gray, med-hard, frac
890	898	Basalt, dk gray, med, brkn, ves, w/cs, blue-grn
898	903	Basalt, brn-red, med, brkn, ves, w/cs, blue-grn
903	905	Basalt, gray & brn, med, brkn, ves, w/cs, blue-grn
905	909	Basalt, gray, med-hard, frac, some ves, w/some cs, blue-grn
909	916	Basalt, gray, med-hard, frac
916	931	Basalt, gray, hard, frac
931	940	Basalt, dk gray, med-hd, brkn, ves, w/cs, blue-grn
940	942	Basalt, dk gray, med-hard, brkn
942	961	Basalt, dk gray, hard, frac, w/some quartz
961	969	Basalt, gray, m-h, frac, some cs, gray
969	977	Basalt, gray, soft, brkn, ves, w/cs, blue-grn
977	983	Basalt, brn, broken, soft, w/cs, blue-grn
983	985	Basalt, red-brn, brkn, soft, w/clay & cs, brn-grn

985	987	Basalt, soft, brkn, ves⁄ claystone, blue-grn & brn
987	989	Basalt, dk gry, brkn, soft, w/cs, blue-grn, some quartz
989	991	Basalt, gray-brn, med, brkn, w/cs, blue-grn
991	993	Basalt, gray & brown, med, frac
993	995	Basalt, dk gray, med, frac, w/cs, blue-grn
995	999	Basalt, brn, med, frac, w/some cs, blue-grn
999	1002	Basalt, gray, med, frac, w/some cs, blue-grn
1002	1017	Basalt, gray, hard, frac
1017	1018	Basalt, gray & red, brkn, med-soft, w/cs; blue-grn
1018	1019	Basalt, red, brkn, ves, med, w/cs, blue-grn
1019	1020	Basalt, gray w/red, brkn, med, ves, w/cs, blue-grn
1020	1029	Basalt, gray, med, brkn, ves, w/cs, blue-grn
1029	1036	Basalt, brown, med, frac
1036	1062	Basalt, gray, hard, frac
1062	1064	Basalt, gray, frac, med-hard
1064	1067	Basalt, brn-gray, frac, med
1067	1069	Basalt, yellow & red, frac, med-soft, w/some clay
1069	1074	Basalt, yellow & red, some ves, brkn, soft
1074	1077	Basalt, yellow-brn, brkn, some ves, med-soft
1077	1080	Basalt, red-brn, brkn, some ves, soft
1080	1091	Basalt, red, brkn, some ves, soft
1091	1092	Basalt, dk red w/some yellow-brn, brkn, ves, soft
1092	1094	Basalt, gray, frac, med
1094	1095	Basalt, brn w/orange, ves, frac, med, w/cs, blue
1095	1100	Basalt, brn-gray, ves, frac, med, w/some cs, blue
1100	1103	Basalt, gray w/red, frac, med, some quartz
1103	1108	Basalt, gray w/blue, frac, some ves, med-hard
1108	1112	Basalt, gray, some ves, frac, med-hard, w/cs, blue-grn
1112	1174	Basalt, gray, frac, hard
1174	1176	Basalt, gray, some red, med-hard, frac, w/some cs, blue-grn
1176	1178	Basalt, gray & red, med, frac, w/cs, blue-grn
1178	1179	Basalt, red, med-soft, frac, w/some sandstone, coarse, blue-grn
1179	1180	Basalt, red, med, frac, w/some ves
1180	1185	Basalt, red-brn, med-hard, frac
1185	1189	Basalt, red w/some drk gray, med-soft, ves
1189	1192	Basalt, brown w/some red & gray, med, brkn, some ves
1192	1193	Basalt, brn, med-hard, frac, some ves
1193	1194	Basalt, gray-brn, med-hard, frac
1194	1245	Basalt, gray, med-hard, frac
1245	1267	Basalt, gray w/some brn, med-soft, brkn, ves, w/cs, blue-grn, & some ss, blue-grn
1267	1268	Bslt, gry w/some brn, md-sft, brkn, ves, w/cs, blue-grn, w/some ss, crse, blue-grn
1268	1275	Basalt, gray & brownish red, med-soft, brkn, ves
1275	1282	Basalt, gray w/some brn, med-hard, frac

Appendix E: Parameters Used in Delineation Model

Delineation Method: ☐ Calculated Fixed Radius ☐ Enhanced CFR ☒ Analytical
☐ Numerical ☐ Hydrogeologic Mapping

Pump Rate (Q in ft^3/day): **Well 3: 6214** **Well 4: 24858** **Well 5: 31073**
Source: ☒ System ☐ Water Resources Dept ☒ Estimated from Population
☐ Comparable Community ☐ Pump Capacity ☐ 90% of Safe Yield

Nature of the Aquifer:
☐ Unknown
☐ Unconfined
☐ Semiconfined
☒ Confined
Nature of confining unit: *basalt*
Depth to 1st confining unit: *187* feet
Thickness of confining unit: *88* feet
Depth to 2nd confining unit:
Thickness of confining unit:
☐ Depth to Willamette A: feet; Willamette B: feet

Aquifer Characteristics:
Lithology: ☐ Cobbles/Gravel ☐ Sand ☐ Gravel ☐ Sand and Gravel ☐ Sandy Silt ☒ Layered Volcanic Rocks
☐ Fractured Volcanic Bedrock ☐ Fractured Sedimentary Bedrock
☐ Other: _____ ☐ Unknown
Thickness (b): 20 feet
Effective Porosity (n): 0.25
Hydraulic Conductivity (Permeability): 8640 ft^2/day ☐ NA
☒ Estimated from lithology
☐ Specific Capacity (Well Report)
☐ Published Report
☐ Aquifer Test
Hydraulic Gradient: 0.001 Flow Direction: 135° ☐ NA
☐ Published Report
☒ Graphical Solution
☐ Field Measurements
☐ Model Results
Irrigation Wells Accounted for:

Aquifer Name: *Columbia River Basalt (CRB)*

Appendix F: Sensitivity Summary: City of Echo Well #3

Highly Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
☐	☒	Unconfined Aquifer: Cobbles/gravel
☐	☒	Unconfined Aquifer: Fractured bedrock
☐	☒	Fractured Confined Aquifer <50 feet Below the Surface
☐	☒	Other Aquifer (describe: .....
☐	☒	Organic Chemical Detection: .....
☒	☐	Inorganic Chemical Detection (>50% MCL) ..... ***Lead @ 0.034mg/L in 1989***
☐	☒	Source-related Coliform: total ..... fecal ..... Date .....
☐	☒	Nitrate-N≥ 5mg/L: Concentration ..... Date .....
☐	☒	Well Construction/Setback or Monitoring Deficiencies from Site Visit: ....
☒	☐	Well Report Missing/Unavailable
☒	☐	Casing Seal Missing/Unknown
☐	☒	Inappropriate Casing Seal Depth (depth recommendation: .....)
☐	☒	Inappropriate Casing Seal Material:
☐	☒	Casing Seal Not Constructed Properly:.....
☐	☒	Traverse Potential >5 (Not performed on TNCWS)
☐	☒	Infiltration Potential >7 (Not performed on TNCWS)

Moderately Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Shallow (<50 feet) Confined Alluvial Aquifer and Thin (<15ft) Confining Unit
☐	☒	Deep Unconfined Aquifer
☐	☒	Fractured Bedrock at Surface
☐	☒	Aquifer Character unknown
☐	☒	Commingling of Aquifers Suspected
☐	☒	Nitrate-N 1-4.9 mg/L: Concentration ..... Date .....
☒	☐	Inorganic Chemical Detection (<50% of MCL): barium arsenic chromium fluoride
☐	☒	Well Construction Deficiencies from Site Visit.....
☒	☐	Well constructed prior to 1979
☐	☒	Other Wells Score ≥ 400
☒	☐	Soil with TOT <65 hours or lack of soil information in DWPA
☐	☒	Infiltration Potential 4 to ≤ 7 (Not performed on TNCWS)
☐	☒	Surface water within 500 feet

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked "yes" indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments .....
.....

Sensitivity Analysis Completed by: Jeffrey J Frederick ..... **Date:** 7/19/02 .....

Appendix F: Sensitivity Summary: City of Echo Well #4

Highly Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
☐	☒	Unconfined Aquifer: Cobbles/gravel
☐	☒	Unconfined Aquifer: Fractured bedrock
☐	☒	Fractured Confined Aquifer <50 feet Below the Surface
☐	☒	Other Aquifer (describe: .....
☐	☒	Organic Chemical Detection: .....
☒	☐	Inorganic Chemical Detection (>50% MCL) ..... ***Lead @ 0.034mg/L in 1989***
☐	☒	Source-related Coliform: total ..... fecal ..... Date .....
☐	☒	Nitrate-N≥ 5mg/L: Concentration ..... Date .....
☐	☒	Well Construction/Setback or Monitoring Deficiencies from Site Visit: ....
☐	☒	Well Report Missing/Unavailable
☐	☒	Casing Seal Missing/Unknown
☐	☒	Inappropriate Casing Seal Depth (depth recommendation: .....)
☐	☒	Inappropriate Casing Seal Material:
☐	☒	Casing Seal Not Constructed Properly:.....
☐	☒	Traverse Potential >5 (Not performed on TNCWS)
☐	☒	Infiltration Potential >7 (Not performed on TNCWS)

Moderately Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Shallow (<50 feet) Confined Alluvial Aquifer and Thin (<15ft) Confining Unit
☐	☒	Deep Unconfined Aquifer
☐	☒	Fractured Bedrock at Surface
☐	☒	Aquifer Character unknown
☐	☒	Commingling of Aquifers Suspected
☐	☒	Nitrate-N 1-4.9 mg/L: Concentration ..... Date .....
☒	☐	Inorganic Chemical Detection (<50% of MCL): barium arsenic chromium fluoride
☐	☒	Well Construction Deficiencies from Site Visit.....
☐	☒	Well constructed prior to 1979
☐	☒	Other Wells Score ≥ 400
☒	☐	Soil with TOT <65 hours or lack of soil information in DWPA
☐	☒	Infiltration Potential 4 to ≤ 7 (Not performed on TNCWS)
☐	☒	Surface water within 500 feet

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked "yes" indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments .....
.....

Sensitivity Analysis Completed by: Jeffrey J Frederick ..... **Date:** 7/19/02 .....

Appendix F: Sensitivity Summary: City of Echo Well #5

Highly Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Unconfined Aquifer: Shallow (< 100 Ft), No significant clay layers
☐	☒	Unconfined Aquifer: Cobbles/gravel
☐	☒	Unconfined Aquifer: Fractured bedrock
☐	☒	Fractured Confined Aquifer <50 feet Below the Surface
☐	☒	Other Aquifer (describe: .....
☐	☒	Organic Chemical Detection: .....
☒	☐	Inorganic Chemical Detection (>50% MCL) ..... ***Lead @ 0.034mg/L in 1989***
☐	☒	Source-related Coliform: total ..... fecal ..... Date .....
☐	☒	Nitrate-N≥ 5mg/L: Concentration ..... Date .....
☐	☒	Well Construction/Setback or Monitoring Deficiencies from Site Visit: ....
☐	☒	Well Report Missing/Unavailable
☐	☒	Casing Seal Missing/Unknown
☐	☒	Inappropriate Casing Seal Depth (depth recommendation: .....)
☐	☒	Inappropriate Casing Seal Material:
☐	☒	Casing Seal Not Constructed Properly:.....
☐	☒	Traverse Potential >5 (Not performed on TNCWS)
☐	☒	Infiltration Potential >7 (Not performed on TNCWS)

Moderately Sensitive Source: ☒ Yes ☐ No

Yes	No	
☐	☒	Shallow (<50 feet) Confined Alluvial Aquifer and Thin (<15ft) Confining Unit
☐	☒	Deep Unconfined Aquifer
☐	☒	Fractured Bedrock at Surface
☐	☒	Aquifer Character unknown
☐	☒	Commingling of Aquifers Suspected
☐	☒	Nitrate-N 1-4.9 mg/L: Concentration ..... Date .....
☒	☐	Inorganic Chemical Detection (<50% of MCL): barium arsenic chromium fluoride
☐	☒	Well Construction Deficiencies from Site Visit.....
☐	☒	Well constructed prior to 1979
☐	☒	Other Wells Score ≥ 400
☒	☐	Soil with TOT <65 hours or lack of soil information in DWPA
☐	☒	Infiltration Potential 4 to ≤ 7 (Not performed on TNCWS)
☐	☒	Surface water within 500 feet

1. Note that it is possible for a single system to have criteria from both the high and moderately sensitive lists. Having a criterion checked "yes" indicates that this characteristic contributes to the sensitivity at the indicated level.

Additional Comments .....
.....

Sensitivity Analysis Completed by: Jeffrey J Frederick ..... **Date:** 7/19/02 .....

APPENDIX H
Source Water Assessment 2007

City of Echo
Source Water Assessment

Diane Berry, City Administrator
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Updated 2-20-07

Section One

INTRODUCTION:

Traditionally, water systems have relied on proper water system management, water quality monitoring, and if necessary, water treatment to ensure that the water they serve meets drinking water standards.

The 1996 Amendments to the Safe Drinking Water Act requires that all states, through a "**proactive**" approach to conduct a Source Water Assessment for public water systems within their boundaries. This thought process was a shift from the **"reactive"** approach, understanding that preventative measures regarding contamination are less costly than treatment actions of found contaminated water.

The state of Oregon through Department of Human Services-Drinking Water Program and Department of Environmental Quality has completed an assessment report to assist public water system in completing drinking water protection programs. The Source Water Assessment, which facilitates the wellhead protection program, consists of:

a) The identification of the area that directly overlies that part of the aquifer supplying drinking water to the well or spring,
b) Provides an inventory of potential sources of contamination within that area,
c) Performs an evaluation of the susceptibility of the water system to contamination from those sources.

The information found in this report (Wellhead Protection Program) identifies and prioritizes those possible weaknesses in the water system which will assist management personnel to understand those items of weakness which are often overlooked.

The wellhead protection program establishes protocol to:

a) Raise the awareness level of those consumers in regard to activities which may cause harm to the drinking water supply,
b) Establish procedures to supply clean drinking water for both short and long term intervals in the event that the water is deemed unsafe for consumption,
c) Provide a conduit with both local and regional emergency services to assist in the response to a crisis with the thought of controlling the situation with the drinking water being a priority.

With the collective information from the Source Water Assessment (SWA), delineation and potential contaminant source inventories (PCS), the wellhead protection program

will outline the area at the surface that overlies that part of the aquifer that supplies groundwater to the wells.

The City of Echo supplies water to approximately 240 connections that involve serving a population of 700 consumers and businesses. The water is supplied to the population from three (3) drinking water wells. These well(s) are listed as permanent water sources. Wells #4 and #5 are considered the primary source of water with Well #3 being used as a back up supply of water. The reservoir capacity for The City of Echo is 350,000 gallons; with a daily average usage to be approximately 380,000 gallons; which gives the consumers approximately one (1) day(s) during the summer and about a 3 day supply from November through March in the event of a disruption in water supply or contamination found in the water supply (well).

COMMUNITY OUTLINE:

The City of Echo is a small community with a population of approximately 700 people located 188 miles east of Portland, Oregon, and just south east of the City of Hermiston, in Umatilla County. The community is considered rural and primarily dominated by irrigated and non-irrigated farmland. Approximately ten
(10) percent of the area is occupied by residential and commercial land use practices. The area lies approximately 635 feet above sea level (downtown) with Well 5 at about 750 feet above sea level. Average monthly temperatures are between 63.0 and 41.5 maximum, minimum respectively. The area surrounding the City of Echo receives approximately eight to ten (8-10) inches of precipitation, annually. The majority of the crops grown on the hillsides consist of wheat, other grains, potatoes and cannola with Echo Meadows (across the Umatilla River from Echo) primarily producing corn, alfalfa and cattle rearing. Vineyards are being developed directly across the river on the hillsides west of Echo and production is expected to increase in the next several years.

Section Two

DELINEATION

INTRODUCTION:

Groundwater is obtained by drilling through a distance of soil, sediments and bedrock in which the open spaces in the soil are filled with air. As the depth of the drilling increases, those open spaces of air will become filled with water. This is groundwater and the water table has just been penetrated. Groundwater does not occur as underground rivers, pools and veins, but rather occurs within the open spaces within the geologic materials. This geologic materials that contain water and that can yield the water to a well is called an aquifer.

Virtually without exception, the groundwater originates as precipitation at the surface that sinks through the soil and percolates down to the water table. The downward percolating water has to pass through whatever is at the surface or just below it. As it does so, the water can dissolve contaminants and carry them downward to the aquifer. The fact that groundwater originates at the surface is what makes it vulnerable to contamination. Recharging groundwater can carry contaminants downward into the aquifer, which in large enough quantities; can make the water become contaminated.

DELINEATION METHOD OF THE WELLHEAD PROTECTION AREA:

The delineation for the City of Echo's water system was performed by Department of Human Services-Drinking Water Program using an **analytical method** model. The analytical method incorporates the groundwater gradient into the calculations. Because of the more site specific nature of this model, only the next ten (10) years of groundwater supply is identified. Based on the analysis, the primary aquifer supplying water to the City of Echo is the **Columbia River Basalt (CRB).**

METHOD LIMITATIONS:

The analytical method does not allow for the incorporation of complex boundaries such as streams and formation contacts can be checked with local water levels and in the case of numerical models, can incorporate variations in aquifer properties.

AQUIFER GEOLOGY CHARACTERISTICS:

The **Columbia River Basalt aquifer**, which supplies water to the City of Echo is a confined layered basalt aquifer with several hydraulically connected water baring zones between 275 feet and 674 feet below the surface with additional water bearing zones between 979 and 1039 feet (well #4) and 1070 to 1270 feet (well #5). The main wells (#4 and #5 produce from the lower zones (979 to 1039 feet and 1070 to 1270 feet.)

According to well log #5 the first water bearing fracture depth is estimated to be 662 feet, with the well log #4 showing water was first found at a depth between 353 and 382 feet. Well #4 was deepened in May of 1993, in which the static water level rose from 382 to 195 feet. The static water level for well #3, (as reported by the driller) as 95 feet below the surface. The first water bearing fracture is estimated to be overlain by approximately 5 feet of silty soil, 15 feet of clay-stone and 225 feet of basalt. The layered volcanic Columbia River Basalt aquifer produces water from fractured inter-flow zones. Well #3 produces water from several shallow zones between 275 feet and 674 feet. Well #4 and #5 produce water from deeper inter-flow zones. The massive basalt flow interiors immediately above the aquifer are likely to be low permeability and probably serve as a confining layer. **Therefore, we consider the aquifer penetrated by the City of Echo Water system to be a confined volcanic basalt flow with a confining layer thickness of at least 225 feet.**

TIME OF TRAVEL:

The area identified within the drinking water protection area is designed to approximate the next ten (10) years of groundwater supply for the City of Echo Water System. Additional five-year and two-year time-of-travel zones are identified inside each drinking water protection area. The area within each of the two-year time-of-travel zones shown is specifically used as a conservative estimate of the survival time of some viruses in groundwater.

DELINEATION UPDATE SCHEDULE:

The delineation performed by Department of Human Services-Drinking Water Program was completed in July 2002. An updated version of the delineation should be performed in July 2007. Upon completion of the drinking water protection plan and approval from the office of Department of Environmental Quality for certification, the update for the wellhead protection program will not be considered until April 2009, but it is recommended that the wellhead protection plan coincide with that of the delineation, so to bring the overall drinking water protection plan into some uniformity.

Section Three

INVENTORY OF POTENTIAL CONTAMINANT SOURCES

INTRODUCTION:

The intent of analyzing a drinking water protection area for potential contaminant sources is to identify and locate any contaminants of concern within the drinking water protection area of the City of Echo. Significant sources of contamination can be defined as any facility or activity that stores, uses, or produces the contaminants of concern and has sufficient likelihood of releasing such contaminants into the environment. These would-be contaminants at high enough levels could contribute to concentrations in the drinking water supply that would then deem the water non- drinkable. The inventory provides:

- Information on the locations of potential contaminant sources, especially those that present the greatest risks to the water supply;
- An effective means of educating the local public about potential problems;
- A reliable basis for developing a local management plan to reduce the risks to the water supply.

Contaminants can reach the groundwater supply from activities occurring on the land surface or below it. Primary focuses on the following potential contaminant sources regulated under the federal Safe Drinking Water Act and are listed below:

- Contaminant regulated under the Safe Drinking Water Act, which includes those contaminants that have a maximum contaminant level – MCL.
- Micro-organisms such as Cryptosporidium, Viruses, Giardia lamblia, bacteria.
- Inorganic Compounds – nitrates and metals.
- Organic Compounds – solvents, petroleum compounds and pesticides.

METHODOLOGY:

In completing this inventory, Department of Environmental Quality (DEQ) used readily available information including review of DEQs and other agencies' databases of currently listed sites: The state and federal regulatory databases includes:

DEQ Environmental Clean up site Information System (ECSI) which includes the USEPA National Priorities List (NPL) and CERCLA list:
DEQ leaking underground storage tank (LUST) list:
DEQ registered underground storage tank (UST) list:
DEQ Source information system (National Pollutant Discharge Elimination System) list:
DEQ Active Solid Waste Disposal Permits:
DEQ Dry Cleaners List:
State Fire Marshall (SFM) Hazardous Materials Handlers (HAZMAT) site list:
USEPA (RCRA) generators list:

USEPA (RCRA) Treatment, Storage Disposal, Facility Permits List:
DEQ Hazardous Waste Management Information System (HWIMSY) list:

Department of Environmental Quality verified the presence and approximate location of potential contaminant sources within the drinking water protection area by consulting with local community members and / or driving through the area (windshield survey). Public water system officials or someone knowledgeable of the area, were interviewed to identify potential contaminant sources that are not listed elsewhere in databases and / or maps. The Groundwater Technician met with Public water system's supervisor to discuss relative items regarding location and concern of potential contaminant sources.

RISK RANKING RESULTS:

The following potential contaminant sources are listed according to the relative risk level that has been designated to a particular potential contaminant source and its proximity to the wellhead. The list is intended to assist the community in an orderly approach in implementing best management practices for those potential contaminant sources that are determined to possess higher and moderate risk levels to contaminating the water supply. Those potential contaminant sources that pose a lower risk will NOT be evaluated based on best management practices. Positions of potential contaminant sources can be found in Appendix C Figure 2:

Four (4) potential contaminant source locations with four (4) potential contaminant sources were identified as a relative risk ranking of ***moderate and / or high*** inside the two (2) year time-of-travel. **Note: the two underground storage tanks identified on Table 1 at Echo Mobile Station and Echo Bulk Plant have been removed and are outside the Drinking Water Protection Area.**

Three (3) potential contaminant sources locations with four (4) potential contaminant sources were identified as a relative risk ranking of ***moderate and / or high*** were identified between the two (2) and ten (10) time-of-travel.

PCS SUSCEPTIBILITY:

The purpose for the "Susceptibility" of the drinking water protection area is to review the potential contaminant sources and assist in the prioritization of the community efforts for minimizing the risks associated with those threats. The susceptibility analysis is dependent of four (4) factors; **a)** identify the location of the drinking water protection area, **b)** sensitivity of the constructed intake, **c)** sensitivity of the aquifer to contamination and **d)** the occurrence and distribution of ***high and moderate*** potential contaminant sources within the drinking water protection area.

By overlaying the potential contaminant sources map onto the aquifer sensitivity map, we begin to understand where the potential contaminant sources are located, and if the

location of such sources is conducive to infiltration probability, therefore the contamination factor could be increased.

This susceptibility analysis is being used to develop best management practices for those potential contaminant sources that are recognized to be a concern. In the succeeding section, BEST MANAGEMENT PRACTICES, an outline of the potential contaminant sources posing a risk categorized either ***high or moderate risk*** will be addressed with the high risk sources given the most attention.

In general, the land uses activities which pose the greatest threat to the drinking water supply are those that are closest to the wells and have the highest associated risk ranking. All ***high and moderate risks*** that occur within the drinking water protection area will be addressed to reduce the potential risk of the contaminant.

Table. City of Echo Water System: Susceptibility as a Function of PCS Risk, TOT Zone, and Aquifer Sensitivity

	2-Yr TOT			*2- to 5-Yr TOT*			*5- to 10-Yr TOT*		
	High	*Mod*	*Low*	*High*	*Mod*	*Low*	*High*	*Mod*	*Low*
High Risk PCSs	1			1			1		
Moderate Risk PCSs	3			1					
Low Risk PCSs									
Total PCSs	4			2			1		

Based on the above table, those risks that are shaded with grey will be addressed in the best management practices, Section Four. Most efforts from the drinking water protection team will be delegated to mitigating the highest potential contaminant sources within the two (2) year time-of-travels, 2-5 year time-of-travel and 5-10 year time-of-travel respectively.

Listed below, in order of risk and susceptibility, are the potential contaminant sources that will be addressed in the best management practices section of the wellhead protection plan. Lower risk potential contaminant sources, regardless of their location to the well, will not be discussed in Section Four.

PCS / Aquifer Susceptibility Correlation: 2 YEAR TIME-OF-TRAVEL

Potential Contaminant Source:	Level of Risk:	Aquifer Sensitivity:
Confirmed Leaking tank	Higher	Higher
Above Ground storage tank	Higher	Higher
Transportation Corridor	Moderate	Higher
Irrigation Canal	Moderate	Higher

PCS / Aquifer Susceptibility Correlation: 2-10 YEAR TIME-OF-TRAVEL

Potential Contaminant Source:	Level of Risk:	Aquifer Sensitivity:
Underground storage tank (x2)	Higher	Higher
Confirmed Leaking tank	Higher	Higher
Irrigated Crops	Higher	Higher

MICROBIAL SUSCEPTIBILITY:

The Source Water Assessment specifically includes an evaluation on the basis of aquifer characteristics, water intake construction, potential microbial contaminations stemming from surface water bodies, septic tanks and drain fields and sewer lines, along with a few other sources that are not relevant to this water system. The focused area is the two (2) year time-of-travel that will yield groundwater supplies for the City of Echo public water system. Based on the source water assessment results provided by the Department of Human Services-Drinking Water Program, **the aquifer is not considered susceptible to viral contamination.**

Well #3 is located approximately 30 feet in a down grade position to the irrigation canal, which could have the possibility of an overflow, which may place the well in a compromising position in regard to flooding or erosion. A concrete slab was constructed approximately 2 feet above ground level which may divert any overflow water from the irrigation canal. Note: this well was **drilled in 1951, but** due to problems with the original seal and contamination problems, it was reworked and resealed in 1979 when the city constructed the new water system.

Well #4 was drilled in August 1974 and was deepened in May 1993. The annular space between the 10-inch casing and the 14-inch hole in the upper 45 feet was filled with cement, with an additional seal extending to ~220 feet and a split seal between ~660 feet and 951 feet. **This seal appears to have been constructed properly.**

Well #5 was originally drilled in January 1994. The annular space between the 20-inch casing and the 20-ich hole in the upper 107 feet was filled with bentonite/cement, and the 12 inch casing was sealed to a depth of 955 feet. **The well log indicates that special construction approval was obtained for this well. It appears that the seal was constructed properly.**

Note: *Both wells # 4 and # 5 are located up grade from the irrigation canal, which eliminates any possibility of flooding due to canal overflow.*

Nitrate concentrations have been identified in the monitoring history, although the Sept. 2006 testing detected no nitrates. History: 1-24-05 0.3 m/gl; 03-03-04 1mg/l; 1-08-03 0.20 mg/; 02-27-02 0.30 mg/l. The maximimum contamination level (MCL) for

nitrates is 10.0 mg/l. During the rainy season, nitrates will be in lower concentrations due to dilution by recharging rainfall.

Total coliform have been found within the public water system, which was determined to be within the distribution system and may not indicate that there was a problem at the source. The water system should continue with sampling at the wellhead to rule out problems associated with the source.

Sodium levels have been found (49 mg/L) that exceed the 20mg/L level. It is recommended that area doctors be notified so they can take this into account for their patients on a reduced sodium diet. There is not a current MCL for sodium.

Lead & Copper testing was completed in **September 2006 and no lead or copper were detected**. The testing requirements for lead and copper, as shown on the table below, have dropped in frequency because of the low levels detected. This indicates that the aquifer is ***moderately sensitive*** to potential contaminant sources at the surface or shallow subsurface.

Action Levels: Lead = 0.0155 mg/l Copper = 1.35 mg/l

Lead and Copper 90th Percentile Results

Sample Date	Date Received	Round	Sample Count	Duration	Lead (mg/l)	Copper (mg/l)
Aug 26, 2003	Oct 20, 2003	0007	5	3Y	0.0020	0.0110
Sep 13, 2000	Oct 30, 2000	0006	10	3Y	0.0010	0.0200
Nov 13, 1997	Oct 12, 1998	0005	10	YR	0.0016	0.0090
Oct 29, 1996	Oct 12, 1998	0004	10	YR	0.0013	0.0130
Jun 15, 1995	Jul 19, 1995	0003	10	YR	0.0000	0.0000
Feb 24, 1994	Mar 31, 1994	0002	20	6M	0.0050	0.0000
Aug 03, 1993	Aug 20, 1993	0001	20	6M	0.0000	0.0500

Inorganic detections of barium, fluoride, arsenic and chromium have been detected at the source, which indicates that the source is ***moderately sensitive.*** The casing seals do deteriorate with time; therefore the aquifer is considered ***moderately sensitive*** from surface activities. It is in the best interest of the water system to reduce the potential for future viral contamination through compliance with all Oregon Department of Human Services-Drinking Water Program **setback standards** related to the public drinking water supply sources.

Chemical	Results mg/l	MCL	Date
Arsenic	.0012	0.01	01/24/05
Barium	.016	2.0	02-27-02
Flouride	.90	4.0	02-27-06
Chromium	.002	0.10	1-14-97*

*chromium has not been detected in the three tests since 1997 (1999, 2002, 2005)

To further enhance the drinking water protection area and the points of concern, Section four (4), best management practices, will also include a review of the aquifer sensitivity to assist in the understanding of depth of water table, geology materials, infiltration potential, well construction, other wells and monitoring history. Review of these categories will bring into focus how important the actions that occur above the surface may affect the water table below the surface.

For example, if a contaminant is released to soils in an area of high sensitivity, it is likely that contamination of the aquifer will occur if remedial action is not taken. Particular areas that are categorized with high sensitive soils indicate that a contaminant could reach the water table in less than 65 hours.

Section Four

BEST MANAGEMENT PRACTICES

INTRODUCTION:

This section of the wellhead protection program outlines the best management practices associated with those potential contaminant sources. The section is divided into categories **a)** those factors that will naturally determine the aquifer distinctiveness to vulnerability, **b)** those potential contaminant sources that have been determined to have the highest risk ranking to the drinking water supply based on the proximity to the wellhead in terms of distance and aquifer susceptibility.

AQUIFER SUSCEPTIBILITY:

Aquifer susceptibility depends on two factors; **1)** are there potential contaminant sources within the drinking water protection area and **2)** is the aquifer sensitive to contamination, i.e. is it likely that a contaminant at the surface would migrate to the water table and into the well or otherwise stated, the natural environment's characteristics that permit migration of a contaminant into the aquifer.

AQUIFER SENSITIVITY:

After the drinking water protection area has been identified, aquifer sensitivity to contaminants inside the drinking water protection area can be evaluated. Aquifer sensitivity refers to those factors characteristic of the aquifer and overlying materials, in addition to those that are imposed upon the aquifer, **such as well construction**, that increase the potential for both surface and subsurface contaminants to gain access to the aquifer. **Those factors related directly to the well or well field are conditions that can be corrected by the water system, thus potentially lowering the overall sensitivity.** Factors considered during the sensitivity analysis are described below:

- Depth to First Water Bearing Zone:
- Aquifer Characteristics:
- Overburden Thickness:
- Soil Types:
- Infiltration Potential:
- Water Intake Construction
- Other Wells:
- Microbial Sensitivity:

Each of the preceding elements either contributes or hinders the downward movement of water, water that will come into contact with contaminants, which will eventually become part of the drinking water supply. An explanation as to the above factors will be

presented in order to assist in the understanding of the analysis with a **colored coded risk** level for the City of Echo's Water supply.

High Sensitivity Risk

Moderate Sensitivity Risk

Low Sensitivity Risk

- DEPTH OF FIRST WATER BEARING ZONE: LOW SENSITIVITY RISK

The depth to the aquifer (first water bearing fracture) is intercepted at a level of 382 feet originally in Well #4, but was deepened in May 1993. At this time the most significant water bearing zone was at a level of 979 -1039 feet according to the well log. The first water-bearing zone for Well #5 was at 662 – 674 feet. The aquifer's static water level in the well (when the pump is at rest) is reported to be 195 and 153 feet, respectively below ground level. **The aquifer is considered to be a confined volcanic basalt flow aquifer with a confining layer of at least 255 feet.**

- AQUIFER CHARACTERISTICS: LOW SENSITIVITY RISK

The aquifer consists of massive basalt flow interiors immediately above the aquifer, formed by large volumes of magma welled up through fissures and spread out in broad sheets. This area is part of one of the largest accumulations of basaltic rock in the world, which was formed having low gas content, a factor that makes it quite dense. The zones of dense basalt have lower hydraulic conductivity and effective porosity but are, nevertheless, generally capable of transmitting considerable water. (Freeze and Cherry 1979)

- OVERBURDEN THICKNESS: LOW SENSITIVITY RISK

The estimated confining layer thickness of at least 255 is considerable when diagnosing the potential for contaminants to enter the aquifer. With 15 feet of clay-stone overlaying the basalt, the aquifer overburden thickness is considered to be low risk.

- SOIL TYPES: MODERATE SENSITIVITY RISK

The entire drinking water protection area has been determined to be surrounded with high sensitivity soils, which allow for potential contaminant sources to possibly travel to the water table in less than 65 hours. See Appendix D Figure 3.

- INFILTRATION POTENTIAL: LOW SENSITIVITY RISK

The Infiltration Potential (IP) is an estimate of the ability of water or other contaminants to infiltrate from the surface to the aquifer. It is based on (1) the depth to the aquifer, (2) an estimate of the weighted permeability of the material between the surface and the aquifer, a parameter referred to as the Traverse Potential (TP), and (3) the hydraulic surplus, or amount of water available from precipitation and/or irrigation at the surface that is able to infiltrate into the aquifer. Both IP and TP scoring in Oregon vary from 1 to 10. A TP value of 1 indicates that the materials above the aquifer are of very low permeability and/or are of great thickness. An IP value of 1 indicates that it takes the available recharge water a long time to reach the aquifer.

- WELL INTAKE CONSTRUCTION: MODERATE SENSITIVE RISK

A public water system's sensitivity to contamination is dependent not only on aquifer characteristics but also the integrity of the well(s) and/or spring boxes used to extract or collect water for distribution. An improperly constructed well or spring box can become a direct conduit for contaminants to enter the aquifer. The real protection from potentially contaminated shallow water is the casing seal. This seal is put in place by drilling a larger hole that is at least four (4) inches greater in diameter than the final casing. The casing seal, by law, must be placed a minimum of 18 feet below the surface, however, it should be placed to a depth that is controlled by the local geology. Well #3 was drilled before 1979, but was upgraded and resealed when other water system improvements were made in 1979 & 80.

- OTHER WELLS: LOW SENSITIVITY RISK

Other wells that fall in close proximity to the public water supply well and/or spring may provide a conduit for contaminants to reach the local aquifer if their construction is inadequate or has been compromised. When other wells are determined to be within the drinking water protection area, it is necessary to conclude when and how the wells were constructed or adequate means of repair or abandonment that will suffice to secure the aquifer below. In compiling information of other wells in the drinking water protection area, an equation is used to determine the other well score.

Other well score = (No. of wells 1979 or younger) + 4 x (No. of wells older than 1979)

Scores > 400 points = moderate sensitivity risk
Scores 225 – 400 points = lower sensitivity risk.

The other well score for the City of Echo is 10. Well reports indicate that four (4) wells are within the section containing the public water system's wells. Two of the four wells were drilled pre-1979. The other well score of 10 indicates that there is no significant risk to the public water system at this time. Significant risk score equals 400.

- MICROBIAL SENSITIVITY: LOW SENSITIVITY RISK

Most groundwater contamination originates at the surface (accidental / deliberate spills, chemical applications, roadway / parking lots run-off) or in shallow subsurface (undergrounds storage tanks, septic systems, injection wells), therefore a review of the water quality monitoring results provide valuable information regarding aquifer sensitivity. The review of the water quality monitoring history include all volatile organic compounds (VOC), synthetic organic compounds (SOC), inorganic compounds (IOC) nitrate and coliform monitoring results. Required routine monitoring for nitrate and coliform occurs more frequently than that for VOC, SOC, IOC, therefore nitrate and coliform are particularly useful as indicators of contaminant pathways into the aquifer. Therefore, any aquifer is considered **highly sensitive** when the yielding water meets the following criteria of contamination:

- Nitrate concentrations of 5 mg/L or greater;
- Source related coliform detections;
- Any VOC or SOC detections;
- IOC detections > 50% of the EPA established MCL:

If a highly sensitive aquifer exists in conjunction with a source of fecal contamination, the drinking water source is considered to be susceptible to microbial contamination. If the current construction or condition of the water intake (wells or spring boxes) allows for the migration of shallow water into the aquifer and /or distribution system and a fecal contaminant source is present near the intake, the drinking water source should be considered susceptible. Based on the source water assessment results provided by the Department of Human Services-Drinking Water Program, **the aquifer is not considered sensitive to viral contamination.**

AQUIFER RELATED FACTORS:

The following results outlined are from the source water assessment report and encompass only those factors that are regarded as creating a ***high or moderate risk*** to the aquifer, as well as their location to ***high or moderate sensitive areas of the aquifer.***

- SOIL SENSITIVITY IN THE PROTECTION AREA:

The soil type in the area is conducive to allowing contaminants to migrate towards the aquifer with relative ease. An education awareness program through informational fliers will aid in keeping people living within the drinking water protection area conscious of small spills of automotive and household cleaners and hazardous materials.

- WATER INTAKE CONSTRUCTION:

The City of Echo should **observe proper setback standards** according to the Department of Human Services-Drinking Water Program.

POTENTIAL CONTAMINANT SOURCES RISKS:

There are a total of seven (7) potential contaminant source locations that are rated ***high and moderate risks*** found within the drinking water protection area, which encompasses the City of Echo's well(s). The total numbers of potential contaminant sources within the drinking water protection area are nine (9).

POTENTIAL CONTAMINANT SOURCES RESULTS:

High Risk:

- Confirmed Leaking tank (x2)
- Above Ground storage tank
- Golf Course

Moderate Risk:

- Transportation Corridor (Railroad)
- Irrigated Crops
- Irrigation Canal
- Underground storage tank (x2)

BEST MANAGEMENT PRACTICES:

The concept surrounding best management practices is to develop an awareness to those facilities and activities that may pose a potential threat to the drinking water protection area, thus reducing the risk associated with such. Improper or indifferent attitudes will only raise the potential level of risk when discussing drinking water supplies. It is apparent the cost associated with best management practices is predictably less than trying to remediate water that is contaminated beyond the standards designated by both Federal and State regulations. The following list is those potential contaminant sources that were deemed ***a high or moderate risk*** in terms of contamination of the drinking water source. It is these items that this section of the wellhead protection program will devise an approach for establishing methods in order to reduce the potential risk.

The following list is ascertained by an established two factors; **a)** the risk levels of the potential contaminant sources and **b)** the proximity of the contaminant source to the well(s). A high risk ranking on a potential contaminant source is NOT necessarily determined to be categorized at the top of the list of concerns. A high risk source that is found a greater distance from the well is judged lower than a moderate risk source that is closer to the water supply.

In developing this outline, the order found below is speculation to the severity prospective of the contaminant source in the drinking water protection area. It is by no means steadfast, but subjective on the basis of information gathered to complete this plan.

High Risks:

- Confirmed Leaking Underground storage tank: (x2) -1 gone
- Above Ground Storage Tanks
- Golf Course

Moderate Risks:

- Transportation Corridor: (railroad)
- Irrigated Crops
- Irrigation Canal
- Underground Storage Tanks (x2)-both removed & out of mapped area

- CONFIRMED LEAKING UNDERGROUND STORAGE TANK: (X2) HIGH RISK

(Confirmed Leaking Tank / DEQ List) Existing contamination from spills, leaks and improper handling of stored materials may impact the drinking water supply. Pending the installing type, soil type and years in existence, transportation of organic compounds may reach the ground water in a relatively short time period. The two locations considered to be a concern are a farm located approximately one-half mile from the nearest well, and the local elementary school's heating oil tank. In discussion with the public works director, the school's underground storage tank was replaced and remediation of the site has been completed; thus reducing the level of risk from **high to lower** per Department of Environmental Quality Table 3.3 / Ranking of potential contaminant sources. In fact the school did a major renovation in 2004 and now uses propane for heat with above ground tanks.

If a leaking underground storage tank has been suspected within the drinking water protection area, then the following steps can be taken to determine the extent of the pollution:

- ABOVE GROUND STORAGE TANKS HIGH RISK

Above ground storage tanks may leak, or spillage during filling and product removal will result in ground contamination and the potential for leaching into the ground water. Impervious ground material or secondary containment will greatly reduce for such

materials gaining access to the soils. A key note with above ground storage tank is the ease in which a leak may be detected and repaired.

- GOLF COURSE: HIGH RISK

A golf course established within the drinking water protection area will add to the concern of potential contaminant sources, i.e. fertilizers and pesticides, getting into the soil and eventually entering the water table and aquifer. Chemical storage and proper handling procedures should be insured by the management team at the golf course.

- UNDERGROUND STORAGE TANKS (X2) MODERATE RISK

Underground storage tanks are a source of large volumes of materials that easily may percolate into the soils and ground water. The transferring of gasoline and other large quantity substances, when spilled, migrates through soils and is a cause for many sources of ground water that cannot be used. Secondary containment, leak detection equipment and daily monitoring (i.e. check level of fuels) are practices, to insure materials are secured and maintained in the tanks.
A call to DEQ on February 20, 2007 indicates that the underground storage tanks on their list for the former Echo Mobile Station Site on Main Street has been removed and the Echo Bulk Plant tanks on N. Thielsen Street have also been removed.

- TRANSPORTATION CORRIDOR: (RAILROAD) MODERATE RISK

Rail transport increases the risks for leaks and spills of fuels and other hazardous materials that may impact the drinking water supply. Installation and maintenance of tracks may contribute to increased erosion and slope failure causing turbidity in drinking water supply. Over application of weed control agents and pesticides may result in the impact of the drinking water supply. The City of Echo should **notify the railroad** to make them aware of the proximity of the rail line to the drinking water protection area. By informing the railroad of the established area, the railroad can notify City of Echo Public Works Director or Manager of the water system and/or other officials who respond to a spill, that the occurrence of a spill is within the drinking water protection area, which will allow for proper closure of suspected contaminated wells. Knowledge of such will help in the expedition of the clean up of the area. Improved practices of application of weed control agents should be performed according to manufacturer's guidelines. According to DEQ underground tanks that were on the railroad property have been removed-2-20-07 phone call.

- IRRIGATED CROPS: MODERATE RISK

Over application or improper handling of pesticides or fertilizers may impact the drinking water supplies. Excessive irrigation may transport these materials to the ground water/

surface water through run-off. Drip irrigation crops such as vineyards and some vegetable are considered low risk to pollution of drinking water supplies. Since the area of crops is considerably distance (approximately 3000 feet) from the water intake source (well); relative small concern should be applied to the irrigated section of land. If the City of Echo wishes to send information and / or include the property owners as part of their information network, then only positive results should come about.

- IRRIGATION CANAL: MODERATE RISK

The irrigation canal flows through the drinking water protection area, supplying water to the agricultural community that grows wheat, other grains, pastureland, alfalfa, corn, cannola. The crops grown between Echo and the Umatilla River that use the irrigation canals are limited primarily to wheat and alfalfa. The irrigation canal may transport a hazardous substance rather quickly through the area, and pending the type of contaminant, may adversely affect the water table since the entire drinking water protection area has high ***soil sensitivity rating.*** The concern of the irrigation canal is the security of the canal to would be saboteurs. The irrigation is upgrade to only Well # 3, which in case of a canal break or overflows may cause the well to flood or erode the area. A concrete slab was placed over the surface area of the well and extends approximately two (2) feet above ground level, which will divert any water from entering the well bore hole.

FUTURE POTENTIAL CONTAMINANT SOURCES:

The City of Echo can assist any future growth within the drinking water protection area by continually participating in regular discussions with those already residing in the area. Like a community watch program, people can assist any potential new development by informing those of the boundaries of the wellhead protection area. Determining setback standards for the wells, incorporating land practices, and discussing well abandonment issues with neighbors will insure a sense of confidence among the users of the water.
Business and residential packages with brochure information regarding best management practices already established for the area can be included as **part of the permit application process.**

POTENTIAL THREATS TO THE DRINKING WATER SUPPLY:

The potential threats to the drinking water supply were evaluated from the inventory list prepared by the Department of Environmental Quality and those threats that are inherent with natural disasters, i.e. earthquakes, floods, fires. Also reviewed for thoroughness; the contingency plan addresses other potential concerns. See bulleted list below:

A. Mechanical problems i.e. pump failure, broken main lines, and power outage.
B. Detection of contaminants at the wellhead.
C. Chemical spill:
D. Sabotage / Terrorism; disgruntled employee or citizen.

PROTOCOLS FOR RESPONDING TO POTENTIAL INCIDENTS:

MECHANICAL INTERRUPTION:

In the event of a **mechanical interruption,** the City of Echo's public water system will rely on reservoir capacity of 350,000 gallons. In the event that a longer term interruption has been determined, then mandatory water conservation measures along with transportation of water from an outside source will be implemented.

- In the event of a power failure, call the power supplier to determine the longevity / extent of the outage;
- In the event of a pressure loss situation or leak, locate the problem, make adjustments or repairs, and disinfect the system and place back in service.
    - The majority of the water system can deliver water through a means of gravity, with the exception of a small group of homes just below the golf course.
- Rely on storage capacity of **one (1) day**(s) of usage.
- Make available telephone numbers of local equipment Rental Company to obtain back up power supply.
- Apply water conservation measures.
- Implement water replacement measures through transportation services

CONTAMINANT IN WATER SYSTEM:

Detections of a contaminant at the well will be responded to based on the type of contaminant and if contaminant reaches or exceeds the maximum contaminant levels (MCL) of the substance. If the contaminant is found during regular monitoring procedures, but is **below** the MCL, then monitor testing adjustments based on Department of Human Services-Drinking Water Program recommendations will be implemented. If concentrations of the substance exceed the MCL, the following procedures will be followed:

- Shut down the contaminated well, or source of contamination and follow public notices requirements from Oregon Department of Human Services-Drinking Water Program;
- Wells # 4 and # 5 are primary source of water with Well #3 used as a secondary (back-up) supply of water. Each well can be shut down and isolated from the rest of the water system.
- Determine if water in reservoir and/ or system is contaminated;
- Determinate where the source of contamination, if backflow contamination, then shut down affected area;
- Implement containment procedures to prevent it from spreading throughout entire distribution system;
- After containment of contaminated area, flush the contaminant from the system, test, disinfect and place back in service;
- Implement conservation program when contaminated system will be out of service for a period that is beyond the capacity of the reservoir, or more than 24 hours;
- Send statement to the local news agency, i.e. paper or broadcast;
- Notify residents and businesses about local conservation measures.

CHEMICAL SPILL:

Chemical Spill within the drinking water protection area:

Response to a large chemical / petroleum spill depends upon the time-of-travel zone in which the spill occurs.

- Notify Umatilla County Emergency Response Office (HAZMAT);
  - Specify that spill is within drinking water protection area.
- Notify local office of Oregon Department of Transportation;
- Follow notification procedures outlined on the emergency response flow chart. Found at the end of the appendices;
- Allow only trained personnel to enter the contaminated HOT zone;
- Employ a method to dike or ditch the area maintaining sufficient distance between workers and spilled materials;
- Notify local residents of situation and begin conservation measurements.
- Leave clean up to responsible personnel;
- Determine the speed in which the chemical may infiltrate into the soil for future possibilities of groundwater contamination.

SABOTAGE / TERRORISM:

Depending on the type of vandalism / terrorism encountered, different parts of the plan could go into effect immediately. For the worst case scenario, a lethal contaminant would be to the water source:

- The wells should be shut down immediately;
- Send news release to the local media;
- Implement water conservation measures;
- Contact local, county and state agencies;
- Locate alternative source of water, if necessary;
- Work cooperatively with the regulatory agencies during the investigation.

Review of the existing public water system will determine where the points of vulnerability are found as well as the methods, practices and barriers to be employed to strengthen the public water system in the event of a disgruntled employee, citizen or terrorist should choose to attempt to incapacitate the system.

NATURAL DISASTERS:

Review of the history of the types of natural disasters that have occurred in the area of the City of Echo during the past 50 years will assist in providing information on the relief operations if such event should occur.

flood-However since the city's wells are sealed groundwater wells and not surface water sources, impact of flood water on wells would be rare, and there is no history over the years of flooding with it impacting the city's well water.

The City of Echo's public water system has storage capacity from three (3) wells of 350,000 gallons. Based on the preceding water usage numbers, water can be supplied to the consumers on the following proximities of time, with ***NO conservation efforts*** being factored into the equation The 300,000 gallons per day usage in the summer time is largely due to the maintenance and usage from the golf course.

- Winter Months Usage: 3.0 – 4.0 days
- Summer Month Usage: 1.0 – 2.0 days

In the event of an emergency, the minimum water needs of the community must be met with water meeting applicable health standards. **Short term** options are determined to meet the needs of the consumers for approximately four (4) hours, while **long term** options must consider an alternative water supply.

The Wellhead protection program will evaluate the capacity of the reservoir in order to determine the supply of water usage based on time continuum. This will determine the necessary steps to implement in order to meet both long term and short term water supplies.

During a time of emergency, the water line supplying the golf course can be shut off from the water system, which will allow that existing supply of water to flow to the residential customers. One small area near the golf course, water has to be pumped in order to be received by the consumers. The remainder of the water system can actually be operated through a means of gravity. Even with the booster pump down, there is gravity flow that would meet health division standards for all but two homes near the cemetery and the cemetery.

SHORT TERM:

- Bottled water supplied to consumers on an as needed basis.
- Implement conservation program.

INTERMEDIATE TERM:

- Bring water in from neighboring communities or farmers using tank trucks.
- Implement conservation program.

LONG TERM:

- Drill a new well.
- Develop treatment operations.
- Add additional storage, such as another resevoir

CONSERVATION MEASURES:

Conservation of water usage will reduce demands on the City of Echo's public water system in the event of an emergency situation. This element identifies the short and long term conservation procedures that could be put into practice as a function of user needs identified in prioritization of water usage.

Fire Department:

The Echo Rural Fire Department Volunteers will be given top priority in water usage in the event of a fire. The Echo Rural Fire Department Volunteers should be notified when emergency conservation measures are in effect so to identify ***alternative*** sources of water supply or fire response resources to ensure fire protection.

Business / Commercial:

Businesses will be informed that in the event of an emergency their water supply will be curtailed and that it is **in their best interest** to develop a conservation plan if they do not already have one implemented.

Residents:

Common conservation measures for residential use include limiting practices such as lawn watering, car washing, and laundry use. Conservation devices such as low flow toilets and shower heads should be installed. The Oregon Water Resources Department publishes a variety of informational pamphlets letting residential users know how to reduce water. Using such materials, the City of Echo's public water system should be able to identify procedures to limit water usage among residential customers and educate them prior to an emergency.

PUBLIC WATER SYSTEM Name: ***City of Echo***

Number Population Served: ***700***

Effective Plan DATE: ***July 11, 2005***

PRIORITY CONTACT LIST

PRINCIPAL WATER OPERATOR:

NAME: ***Darin Tuil, Public Works Dir.*** *PHONE:* ***541-376-8411/561-4883***

ASSISTANT EMERGENCY RESPONSE CONTACT:

NAME: ***Monte Naugher, PWII*** *PHONE:* ***541-376-8411/561-6879***
NAME: ***Diane Berry, City Admin.*** *PHONE:* ***541-376-8411/561-7468***

CITY COUNCIL/MAYOR:

NAME: ***Richard Winter, PhD*** *PHONE:* ***(541)376-8515/ w(541)567-5299***

CITY COUNCIL/COUNCIL PRESIDENT:

NAME: ***Pasquale Anolfo*** *PHONE:* ***(541)3768646 (w)-541-922-2226***

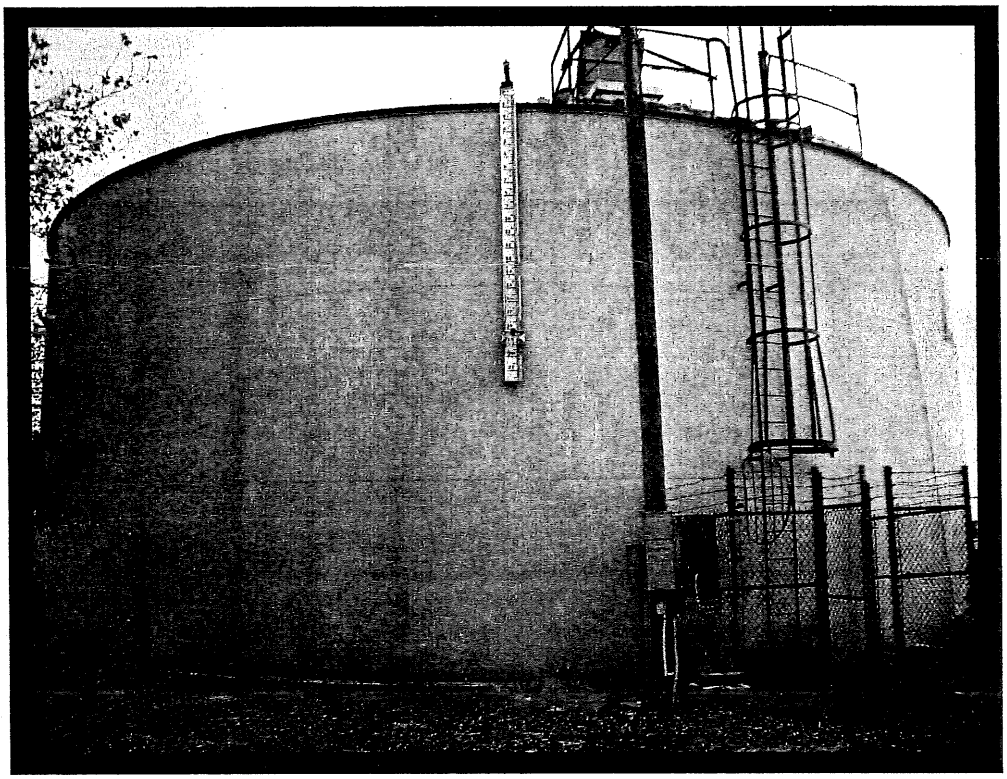
FIRE DEPARTMENT:

Echo Rural Fire Protection District Merle Gehrke, Chief *PHONE:* ***9-1-1 or 379-8580***

COUNTY EMERGENCY COORDINATOR:

NAME: ***Ray Denning*** *PHONE:* ***966-3705/9-1-1/276-7111***

APPENDIX I
LiquiVision Reservoir Inspection Report



Report of Procedures and Findings

From Internal, Underwater Inspection

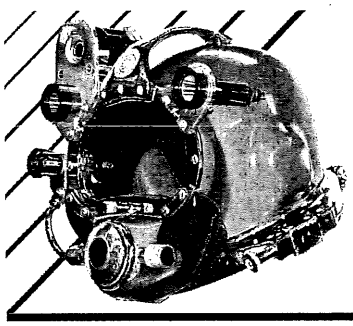
of

350K Reservoir

for

City of Echo

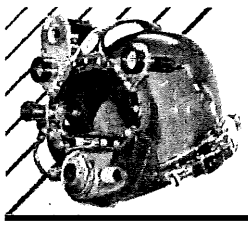
by



LiQuiVision TECHNOLOGY

DIVING SERVICES

711 Market Street, Klamath Falls, OR 97601, (800) 229-6959 www.divingservices.com



LiquiVision Technology
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Toll Free: (800) 229-6959
Phone: (541) 883-6473
Fax: (541) 883-1361

www.divingservices.com
liquivision@divingservices.com

November 27, 2007

Darren Tuil
City of Echo
P.O. Box 9
Suncadia, OR 97826

Underwater Inspection of 350K Reservoir

Following is a report of findings during the underwater inspection of your reservoir.

We keep our reports concise and brief. It will focus on issues of concern or areas that need attention. In order to see complete and detailed inspections please view each inspection video. We will give you our recommendations of actions that can be taken to improve areas of concern.

Color images of all areas that may be of concern or features of interest were taken via underwater digital camera. The images should give you a clear view of the conditions described. The video may give you another view and better understanding of any area that you may wish to look at more closely. The video recorded the images as they were taken in the order presented here. This allows easy reference between the video and inspection images.

METHODOLOGY:

The following specifications and purpose for each have been adopted by LVT as standards that are necessary to competently and safely perform dive operations in potable water tanks. All of these standards were utilized during the inspection of your reservoir.

Require Divers to use Dedicated Dry-Suits Made of a Material Suitable for Disinfection: ANSI/AWWA Standard. This prevents contamination of the water so the Diver's body does not come in contact with water. The only material suitable for disinfection is vulcanized rubber. Neoprene or shell dry suits are too porous for rapid chemical disinfection.

Use of Dry Commercial Diving Hard Hat: The commercial diving hard hat keeps the Diver's head and neck from having any contact with the water column. It prevents the diver from contaminating the water with saliva or mucous from his sinuses and/or nasal passages. It prevents any contamination of the water from sweat, skin, hair, or associated microorganisms found on the diver's body. Use of surface supplied air without hard hat (helmet) is unacceptable because saliva and mucous will escape through regulator and mask.

Beyond contamination issues a hard hat allows the diver to have full-time reliable voice communication. This is possible due to the fact that the diver does not have to hold a regulator mouthpiece between his teeth and his head is in an air pocket. Therefore, the microphone and speakers mounted inside the hard hat are as functional as they would be out of the water. Another advantage of the hard hat is that it allows for mounting of a video camera and lights. This allows the diver to video all work being accomplished.

External or Surface Air Supply: OSHA requires that surface air supply operations have two back up air sources. One is on site back up and the second is a diver carried reserve. LVT divers have a primary air source and two backup air sources. The primary air source is a gasoline engine driven compressor. The first backup air supply is comprised of two high pressure cylinders in the dive support trailer, which hold approximately 8 hours of air. The second emergency air backup is a small cylinder carried on the diver's back called a "bailout bottle". In the unlikely event that the diver finds himself without air he can manually turn on the bail out air supply, which provides enough air to safely exit the reservoir.

Disinfection of All Equipment With 200ppm+ Chlorine Immediately Prior to Entering System: This process Prevents contamination of water. All LVT equipment is properly disinfected prior to entering potable water.

Three Man Dive Team: In all instances a minimum three-man dive team is specifically required. If two divers are submerged then a five-man team is required. All dive team members must meet commercial training and/or experience requirements.

Full-Time Reliable Voice Communication between surface and Diver: The system allows for constant communication between the diver, and all surface personnel. The diver, dive controller in the support vehicle and the dive tender at the reservoir entrance point can communicate with each other at all times. In addition, customers can communicate with the diver at any time. It is apparent that full time communication with the diver is an important safety factor. But for purposes of a more efficient inspection, cleaning, and repair program this enables the diver to immediately discuss any observations he makes inside the reservoir. This is important when considering how difficult it is to pinpoint a specific area when inside a large water tank.

Because of constant communication with surface personnel and constant video viewing it is easy to locate and identify the observations made by the diver. It also saves a great deal of time and money when the utility staff can tell the diver how to deal with an extraordinary problem while the diver is there and able to perform the task at that moment.

Full time voice communication also allows for, and is the only way to have, accurate live voice input on video when recording.

Full-Time Live High Resolution Color Video: Allows for constant viewing of diver's work and observations. This has apparent safety considerations, but helps most when evaluating the work accomplished inside the reservoir. It is impossible for the diver to do a haphazard job or cause turbidity in the water column while he is under constant visual scrutiny. If a contractor cleans a reservoir without live video and then goes back and video records the interior subsequent to the work, it is impossible to tell whether the entire reservoir is being observed on the tape or how much sediment was stirred up into the water during the cleaning process. Regardless of how good a persons memory is, it is difficult to remember the details of the inside of a reservoir after spending as much as 8 or more hours cleaning it and then returning to video record the results and later

adding voice narration to explain what is on the silent video record. That is why LVT uses full-time, live video with full-time voice communication that is recorded simultaneously with the visual record. It is also important that the video camera is high resolution and that it have infinite focus.

TERMINOLOGY:

When describing the features or areas of interest inside the reservoir an image number is placed next to the description that corresponds with the inspection findings. At the end of the overview section a diagram is shown in a view looking from the top down. The diagram is shown with the entry hatch at the top, and this will be referred to as the 12:00 position.

Following the diagram are pictures of the pertinent areas of the reservoir and most of the locations that were inspected. Each picture is numbered and corresponds with the descriptions in the overview section. For more detail please refer to the time stamp on the picture and watch the video.

Following the picture section are references and definitions of the standards used during the inspection of your reservoir. These standards include: Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces – SSPC-Vis 2-82 & ASTM D 610-85 (1989, Cathodic Protection Definitions – NACE Standard RP0196-96 & RP0388-2001, Weld Surface Conditions - AWS B1.11: 2000 (An American National Standard), and Concrete Deformities Definitions – ACI 201.1R-92.

350K Reservoir

OVERVIEW OF RESERVOIR INSPECTED:

Customer Name:	City of Echo	**Reservoir Name:**	350K Reservoir
Manager:	Darren Tuil	Construction:	OG Steel
Job Number:	OR1660707R1T1	Capacity (gal.):	423,000
Date of Inspection:	November 27, 2007	Diameter or L x W:	57'
Report Writer:	John Williams	Height:	21'
Diver:	Casey Surber	Floor Square FT:	2,550'
Tender:	Jason Swanson	Date Built:	1980

N/A –not applicable **Excellent** (Ex.) –like new condition, no repairs needed. **Good** – Cosmetic only problems, repairs if wanted. **Fair**- Minor problems, repairs needed, not immediate. **Poor** –Major problems, structural or like, immediate repairs needed.

Component	Condition					Pic. #'s	Comments
	NA	Ex.	Good	Fair	Poor		
Site Security			X				Surrounded by a chain link fence along with the appropriate locks.
Reservoir Exterior							Minor surface corrosion throughout most of the tank.
1st Ring Wall			X			3	Rust Grade[2] **9.**
Top Ring Wall			X			5,6	Rust Grade[2] **9.**
Exterior Roof							Minor surface corrosion.
Roof 12:00			X				Rust Grade[2] **9.**
Roof 3:00			X			13	Rust Grade[2] **9.**
Roof 6:00			X				Rust Grade[2] **9.**
Roof 9:00			X			17	Rust Grade[2] **9.**
Roof Center			X			14	Rust Grade[2] **9.**
Exterior Ladder			X			1	Rust Grade[2] **10.**
Roof Vents			X			11,12 15,16	Rust Grade[2] **10.**
Exterior Telemetry			X			9	Appeared to be in good condition.
Liquid Level Indicator			X			2,10	Appeared to be in good condition.
Man Entries			X			4,7	Rust Grade[2] **9.**

350K Reservoir

Component	Condition					Pic. #'s	Comments
	NA	Ex.	Good	Fair	Poor		
Entry Hatch			X			8	Rust Grade[2] **10.**
Interior Ladder			X			18,19	Rust Grade[2] **9.**
Telemetry Sensor			X			20,35	Appeared to be in good condition.
Liquid Level Indicator			X			21,36	Appeared to be in good condition.
Interior Walls							Spots of minor surface corrosion along with some sediment staining.
1st Ring Wall			X			26,29	Rust Grade[2] **9.**
2nd Ring Wall			X				Rust Grade[2] **9.**
3rd Ring Wall			X				Rust Grade[2] **9.**
Interior Floor							Spots of minor surface corrosion.
Floor 12:00			X				Rust Grade[2] **9.**
Floor 3:00			X			27	Rust Grade[2] **9.**
Floor 6:00			X				Rust Grade[2] **9.**
Floor 9:00			X			30	Rust Grade[2] **9.**
Floor Center			X				Rust Grade[2] **9.**
Interior Man Entries			X			28,31	Rust Grade[2] **9.**
Support Columns							Spots of minor surface corrosion along with some sediment staining.
Center Support Column			X			32	Rust Grade[2] **9.**
Interior Overflow Pipe			X			25,33	Rust Grade[2] **8.**
Interior Inlet			X			24,34	Rust Grade[2] **8.**
Interior Outlet			X			22	Rust Grade[2] **8.**
Interior Drain/Scour			X			23	Rust Grade[2] **8.**
Interior Ceiling							Spots of minor surface corrosion.
Ceiling 12:00			X				Rust Grade[2] **9.**
Ceiling 3:00			X				Rust Grade[2] **9.**
Ceiling 6:00			X				Rust Grade[2] **9.**
Ceiling 9:00			X				Rust Grade[2] **9.**
Ceiling Center			X			37	Rust Grade[2] **9.**

350K Reservoir

1. Coating thickness readings are in mils. (39.37 mils = 1 millimeter)

2. Rust Grades

Grades	% of Surface Rusted	Description
10	0% - 0.01%	No rusting or less than 0.01% of surface rusted
9	0.01% - 0.03%	Minute rusting, less than 0.03% of surface rusted
8	0.03% - 0.1%	Few isolated rust spots, less than 0.1% of surface rusted
7	0.1%- 0.3%	Less than 0.3% of surface rusted
6	0.3% - 1%	Extensive rust spots, but less than 1% of surface rusted
5	1% - 3%	Rusting to the extent of 3% of surface rusted
4	3% - 10%	Rusting to the extent of 10% of surface rusted
3	10% - 16%	Approximately one sixth of the surface rusted (16%)
2	16% - 33%	Approximately one third of the surface rusted (33%)
1	33% - 50%	Approximately one half of the surface rusted (50%)
0	50% - 100%	Approximately 100% of the surface rusted

3. Weld Deformities

Unable to Evaluate	Good Condition	Porosity	Incomplete Fusion	Incomplete Penetration	Undercut	Underfill	Overlap	Cracks	Convexity / Concavity	Spatter
UE	GC	PS	IF	IP	UC	UF	OL	CK	CC	SP

4. Concrete Deformities

Unable to Evaluate	Good Condition	Cracks	Blistering	Chalking	De-Lamination	Pitting	Popouts	Scaling	Spalling	Warping
UE	GC	CK	BL	CH	DL	PT	PO	SC	SP	WA

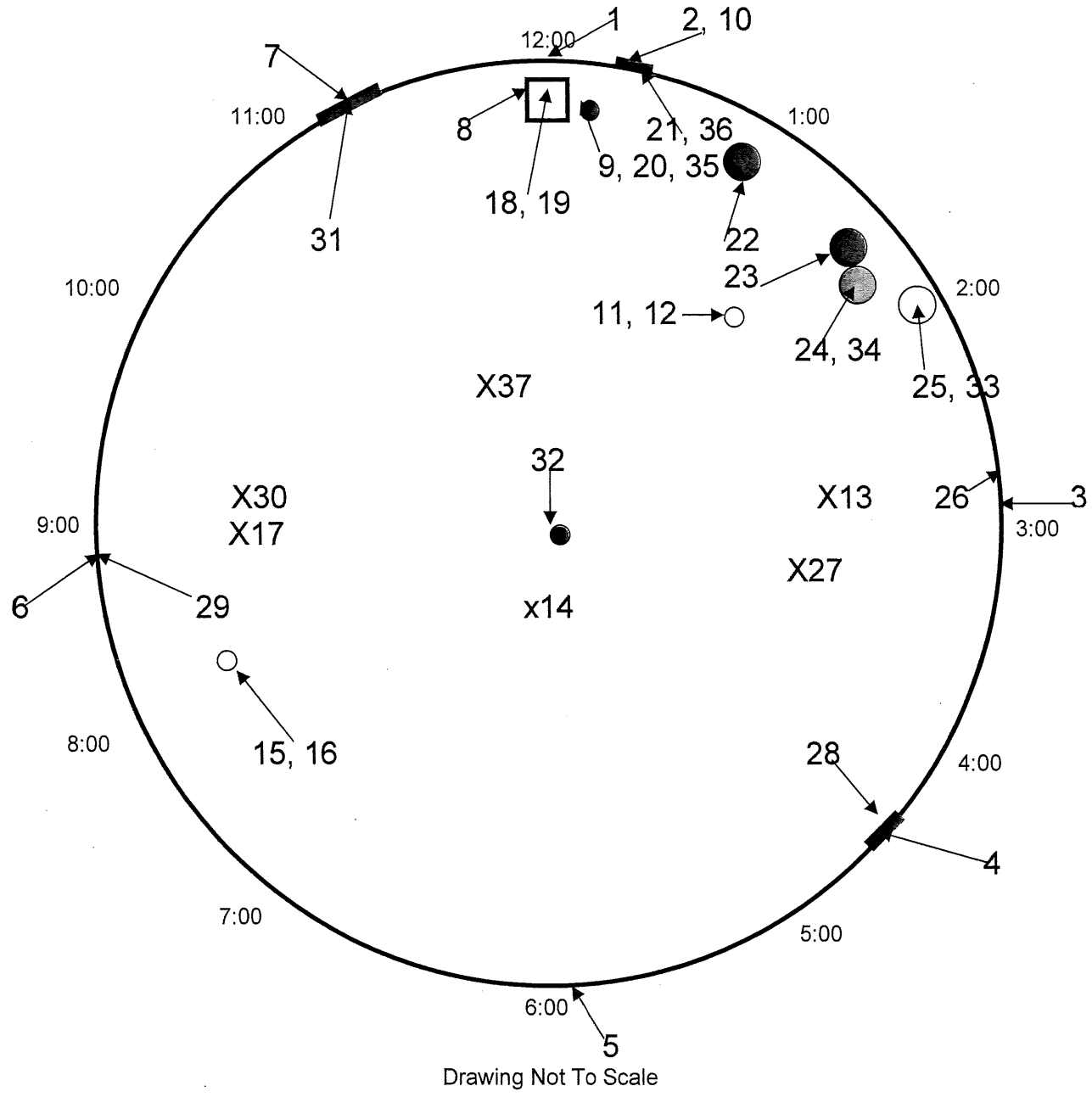
350K Reservoir

RECOMMENDATIONS:

Recommendation	Estimated Time - Hrs.
Perform a regular cleaning, inspection and repair cycle every 2-3 years in order to ensure superior water quality and proper maintenance of coating condition and appurtenances is performed.	Please contact our sales office for an estimate.
Total Estimated Hours	0

350K Reservoir

Reservoir Diagram



Drawing Not To Scale

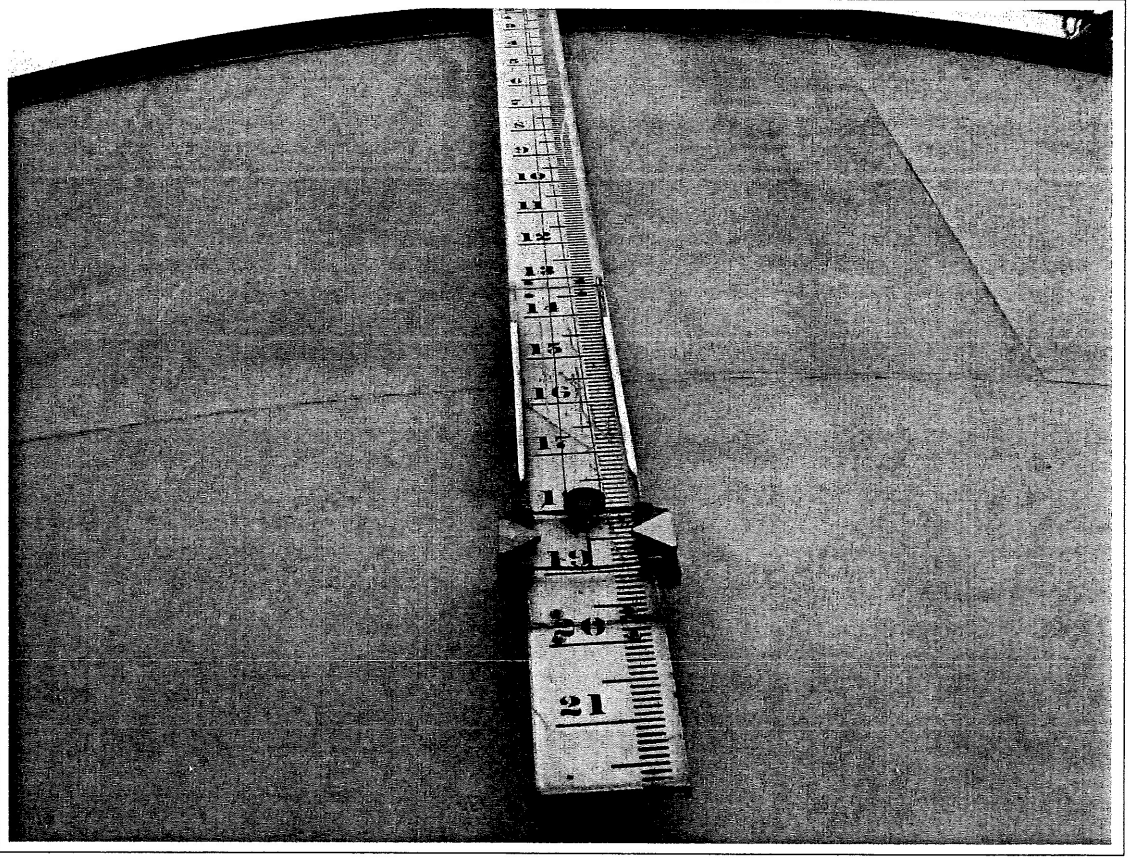
Entry Hatch	Overflow	Support Column
Inlet	Man Entry	Air Vent
Drain/Scour	Liquid Level Indicator	Telemetry
Outlet		

350K Reservoir

Image # **1**



Image # **2**



350K Reservoir

Image # **3**

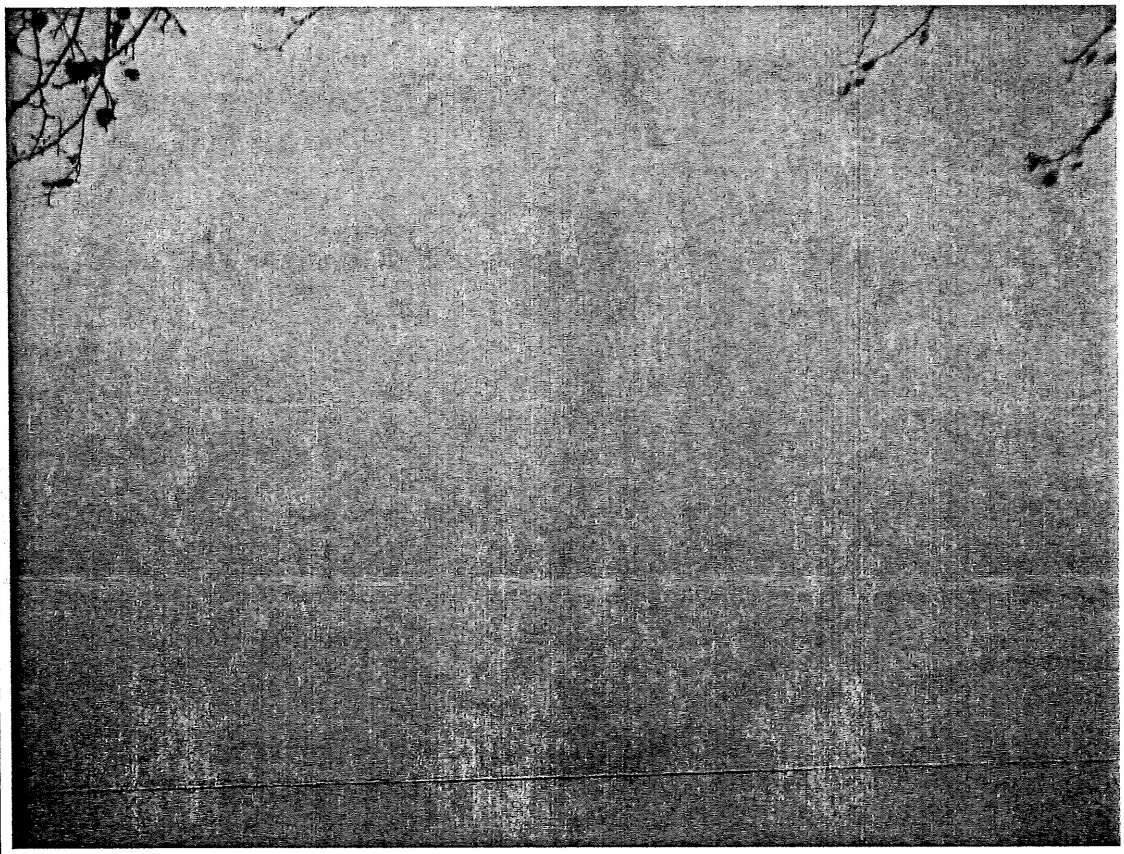
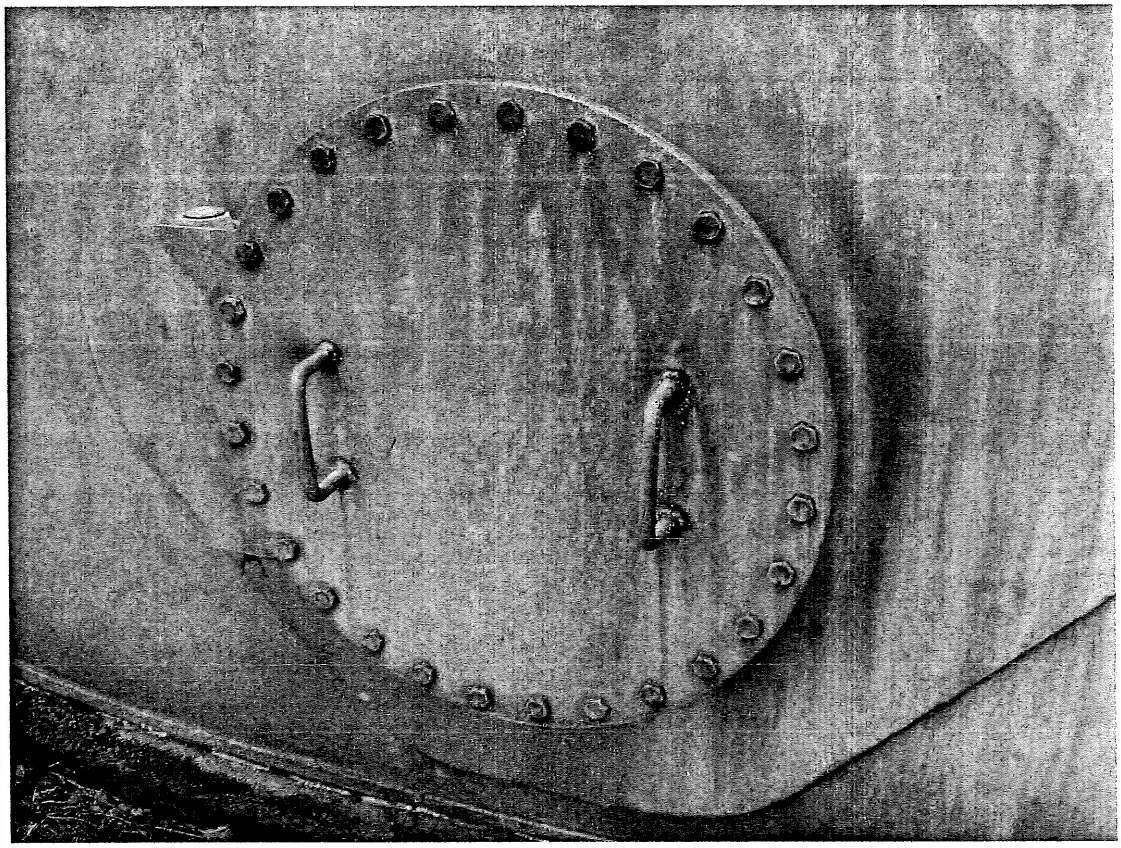
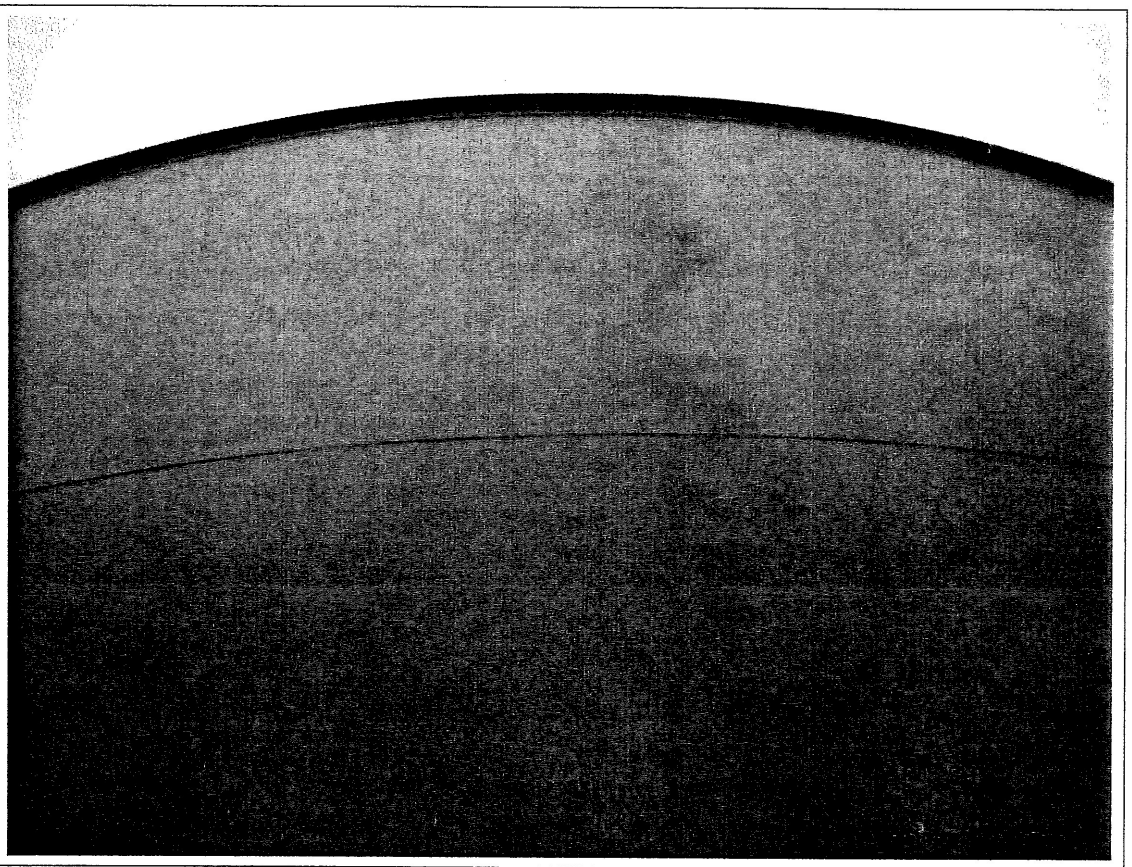
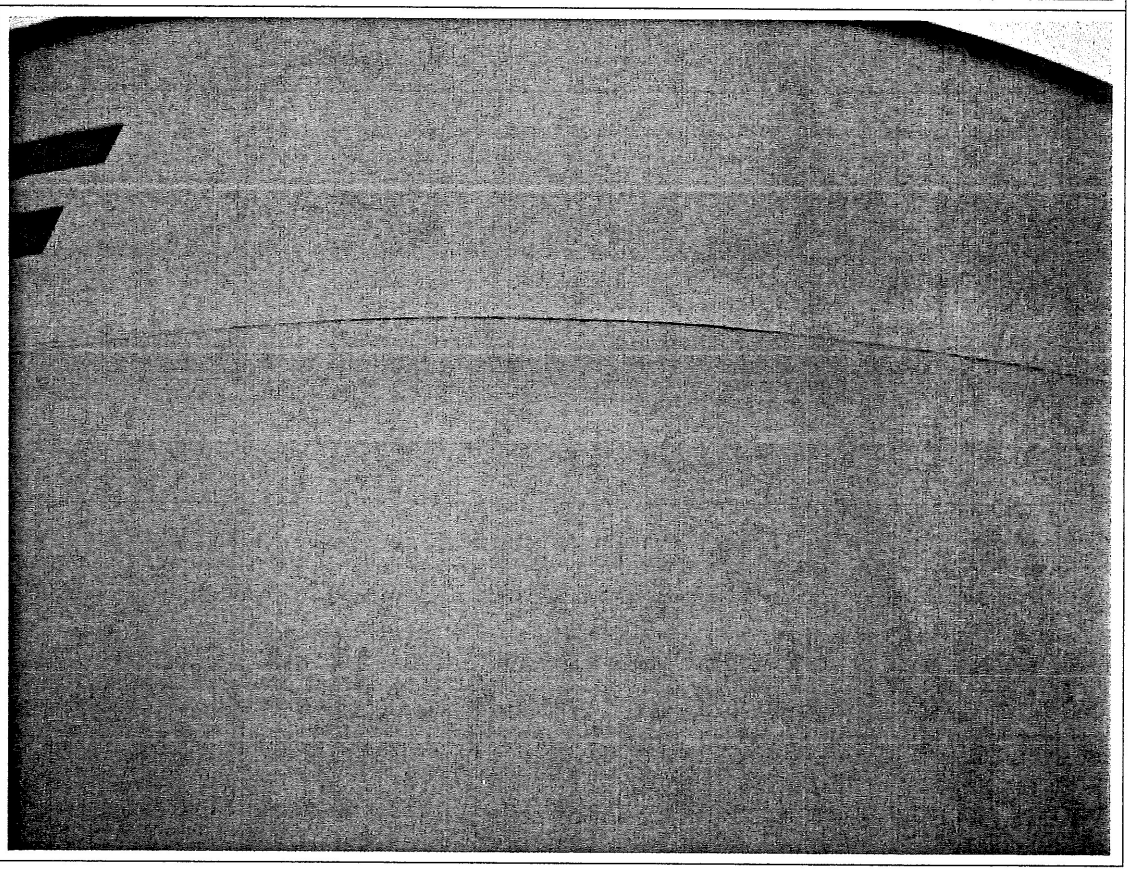


Image # **4**



350K Reservoir

Image # **5**	
Image # **6**	

350K Reservoir

Image # **7**

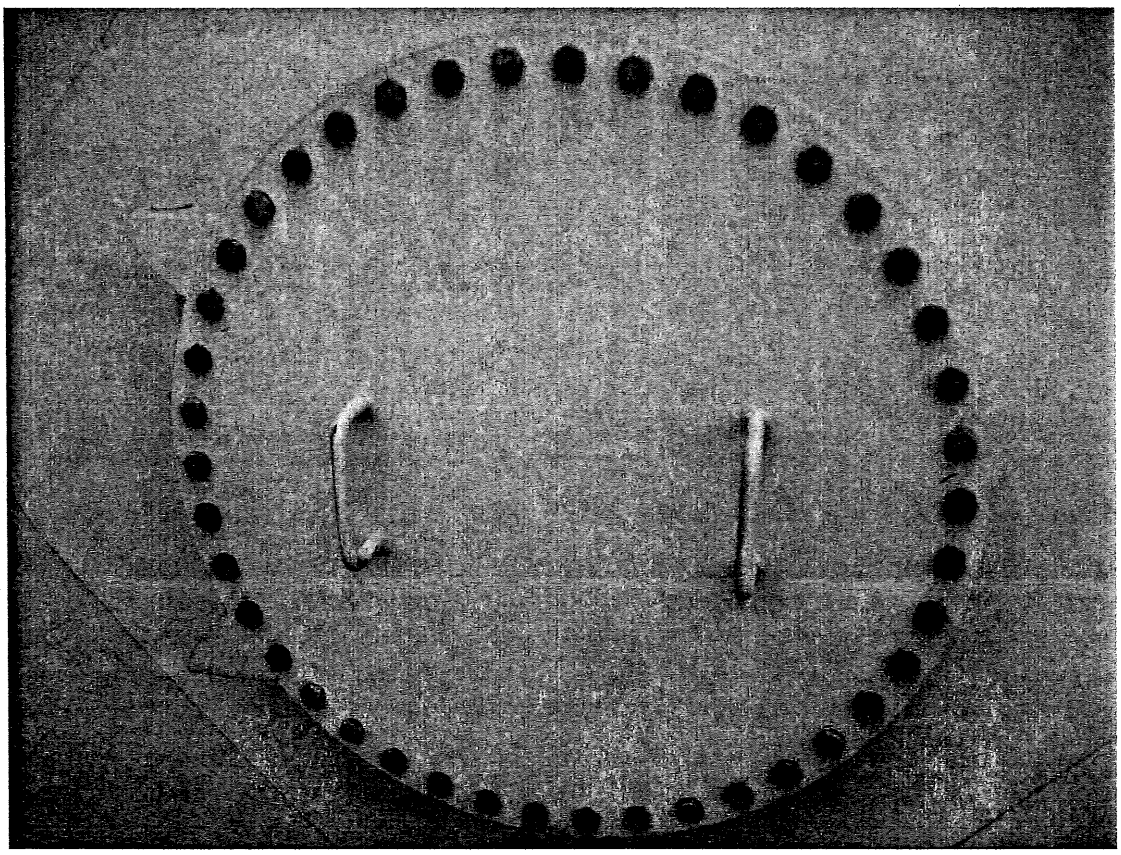
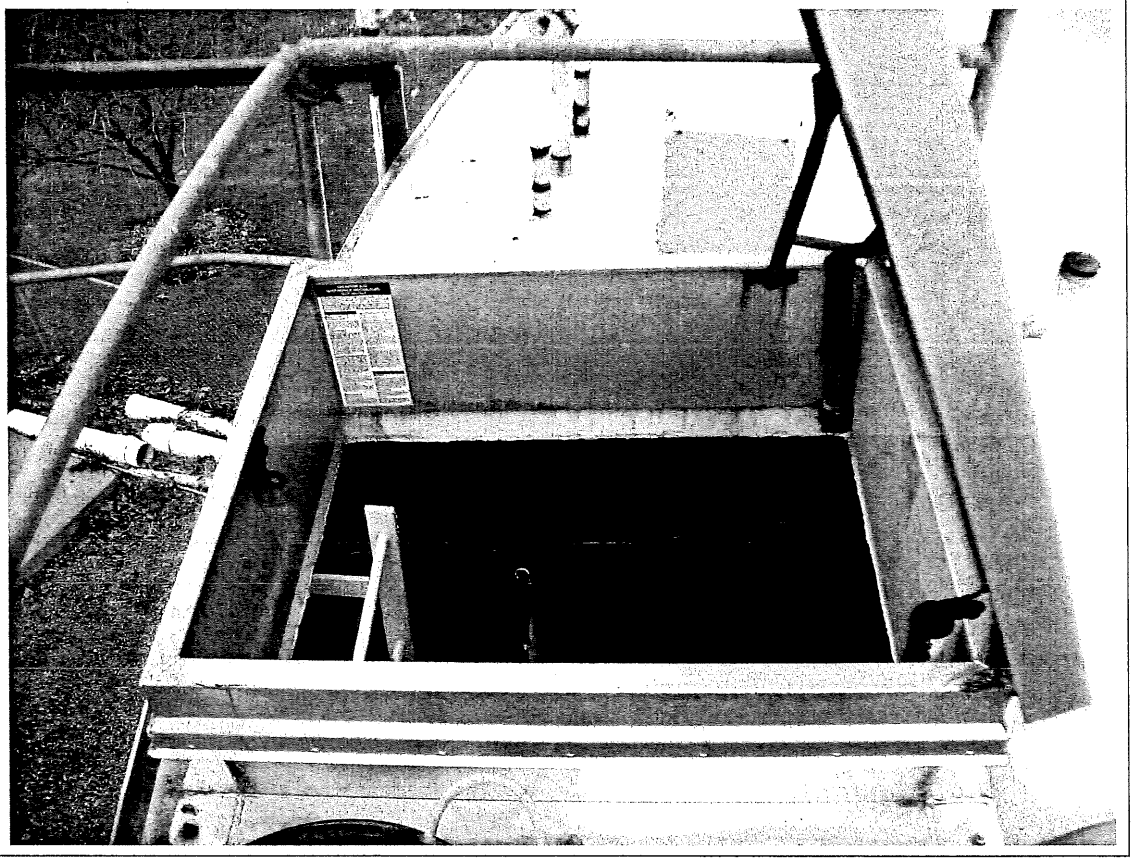
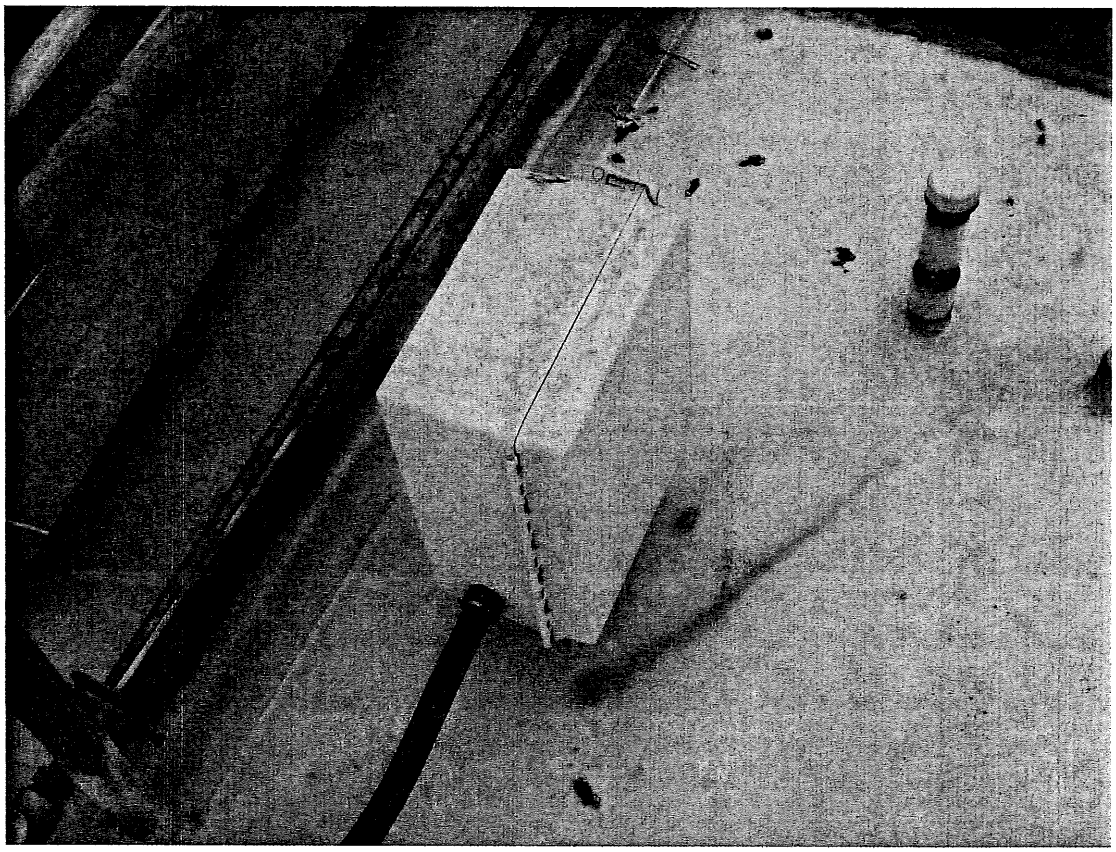
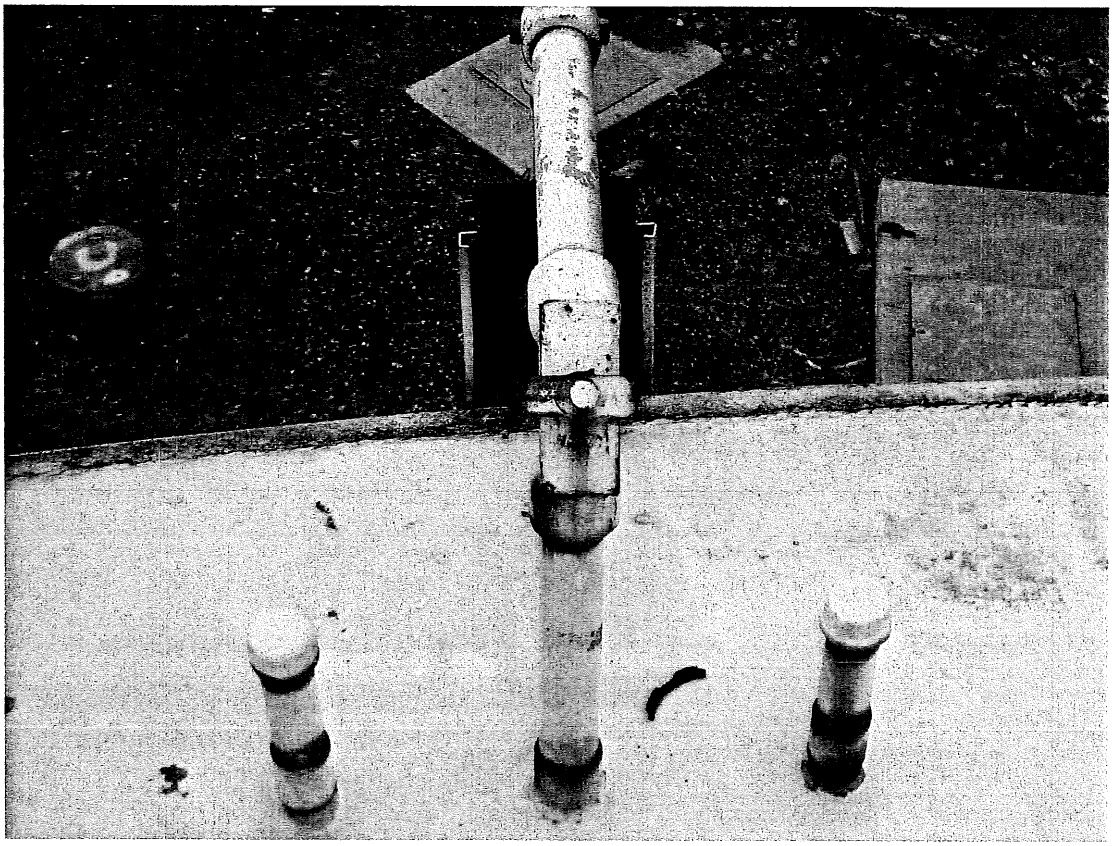


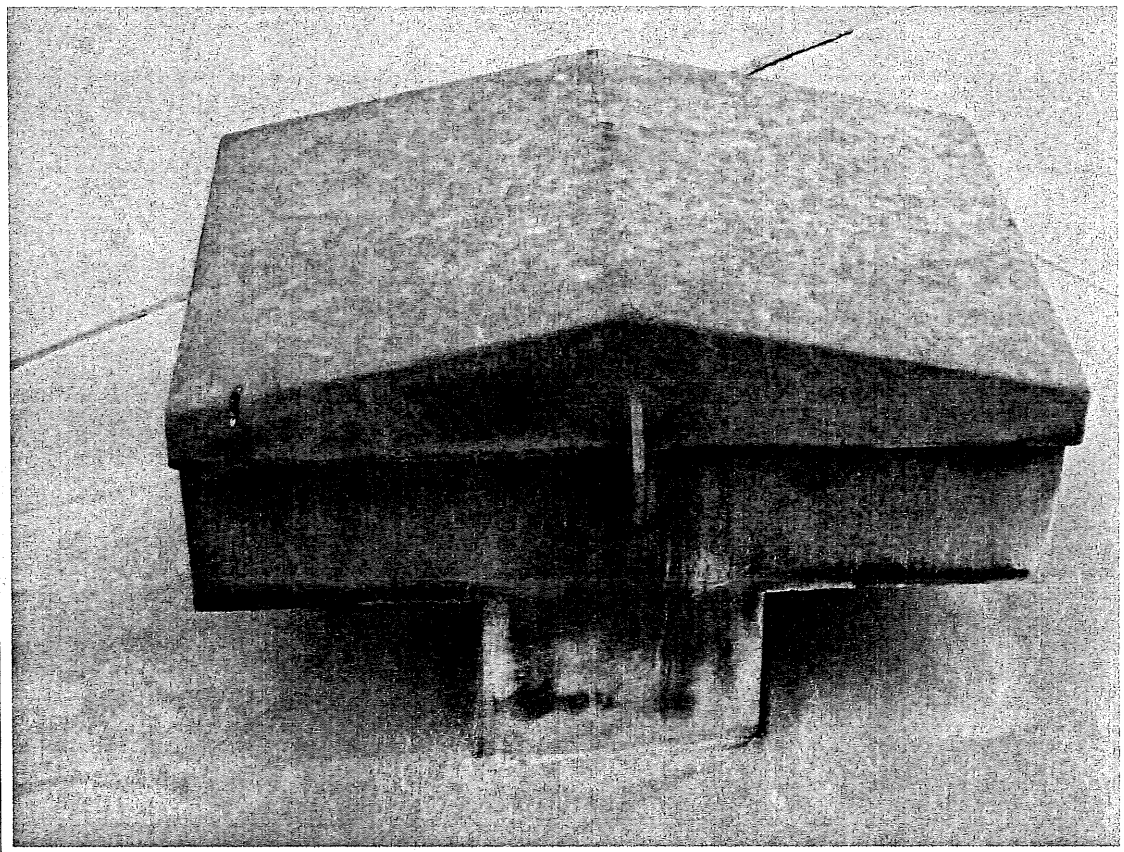
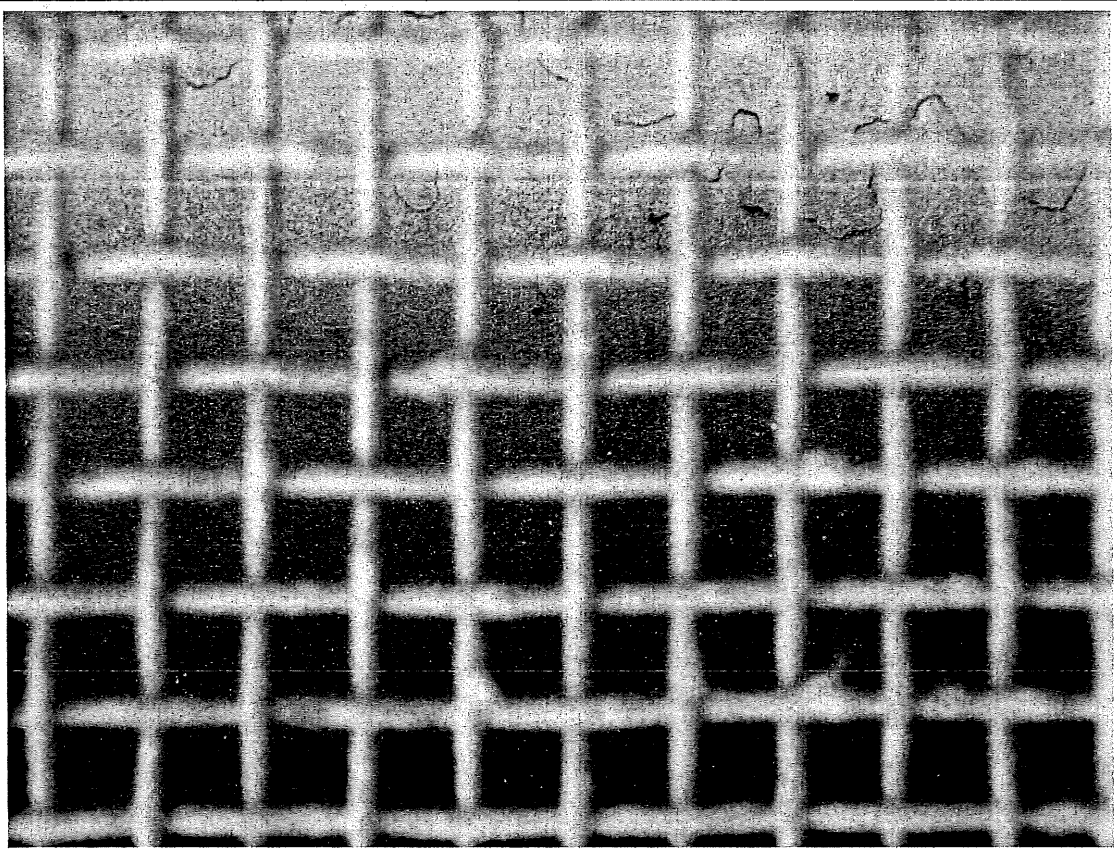
Image # **8**



350K Reservoir

Image # **9**	
Image # **10**	

350K Reservoir

Image # **11**	
Image # **12**	

350K Reservoir

Image # **13**

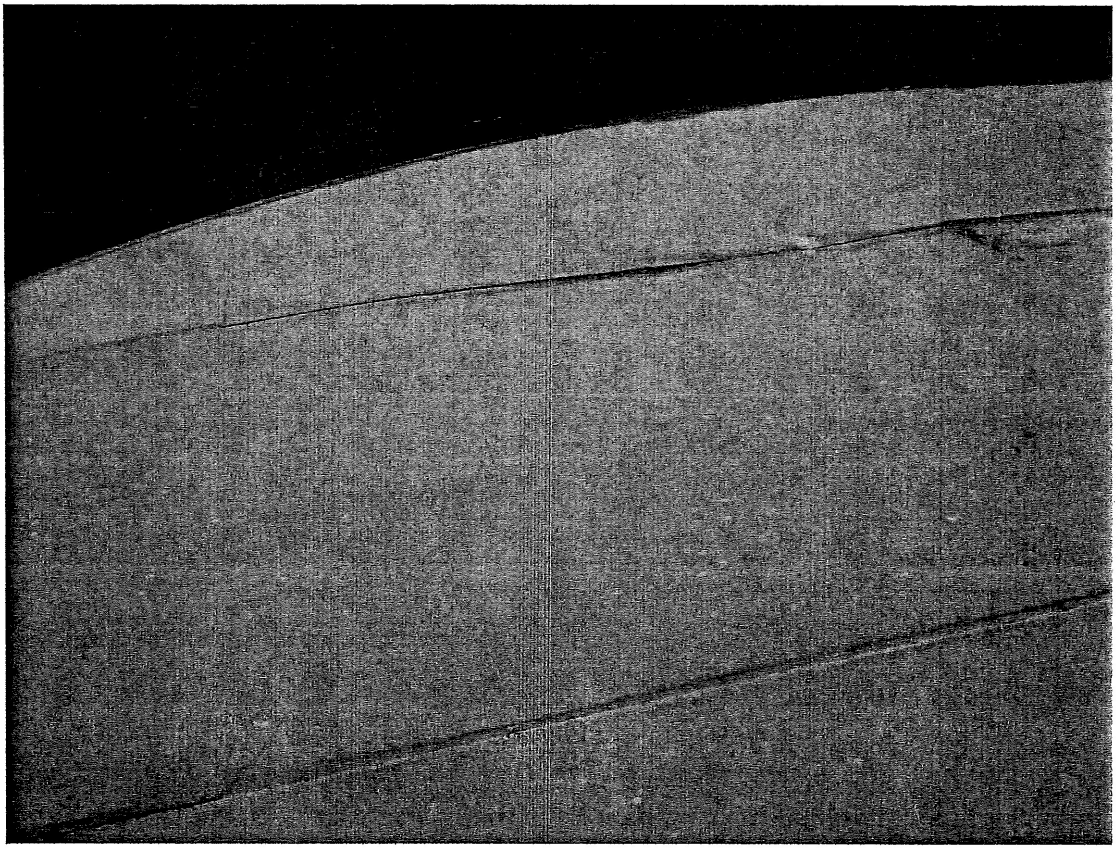
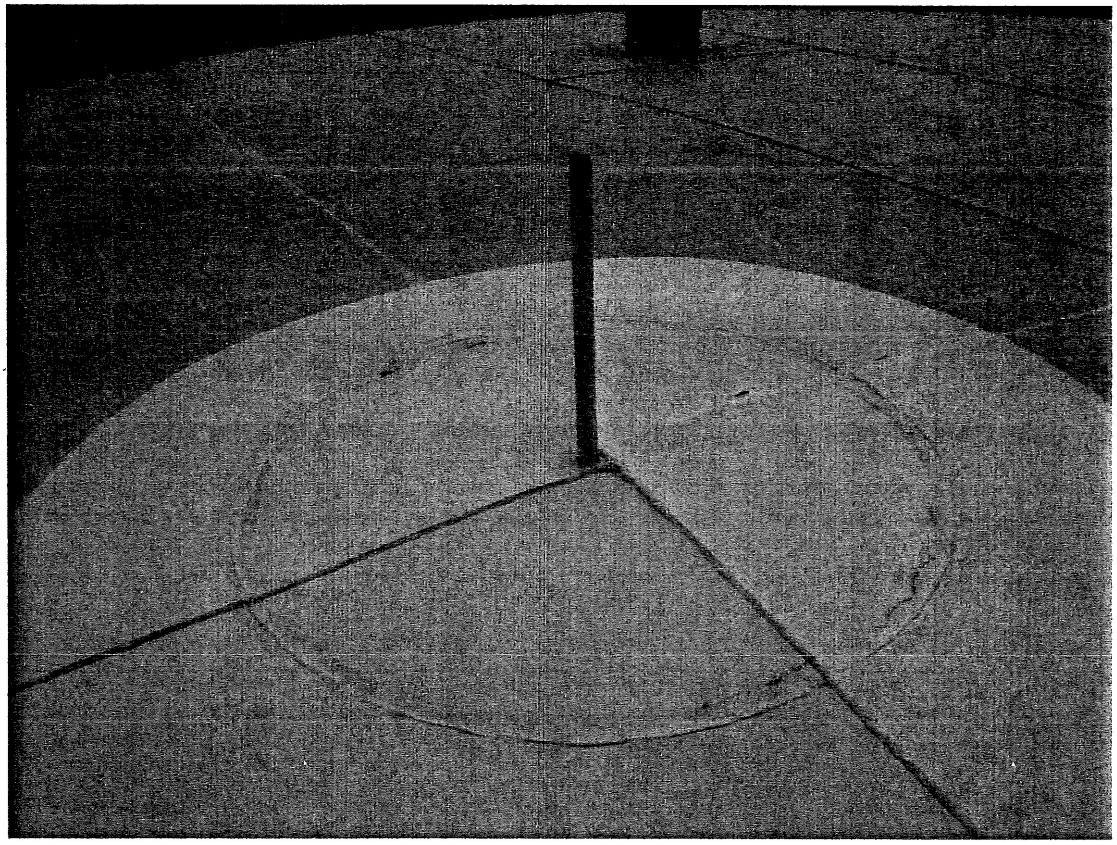
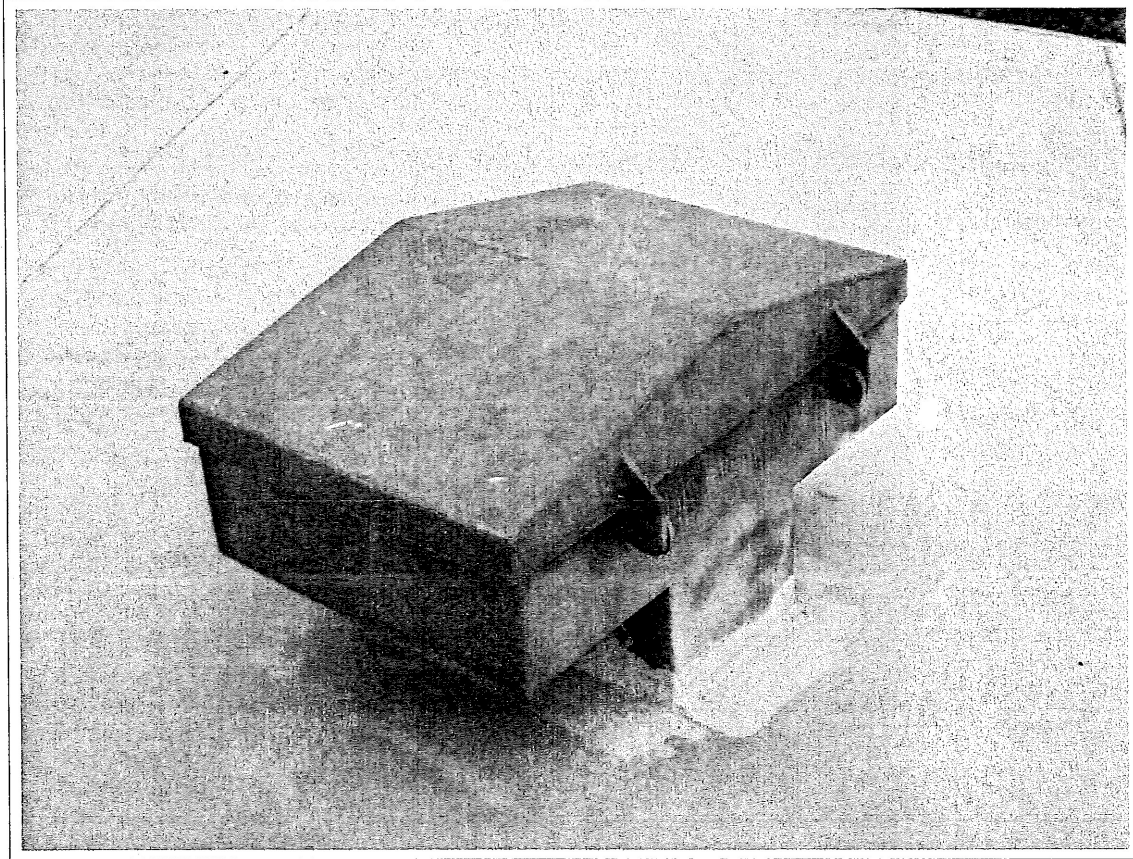
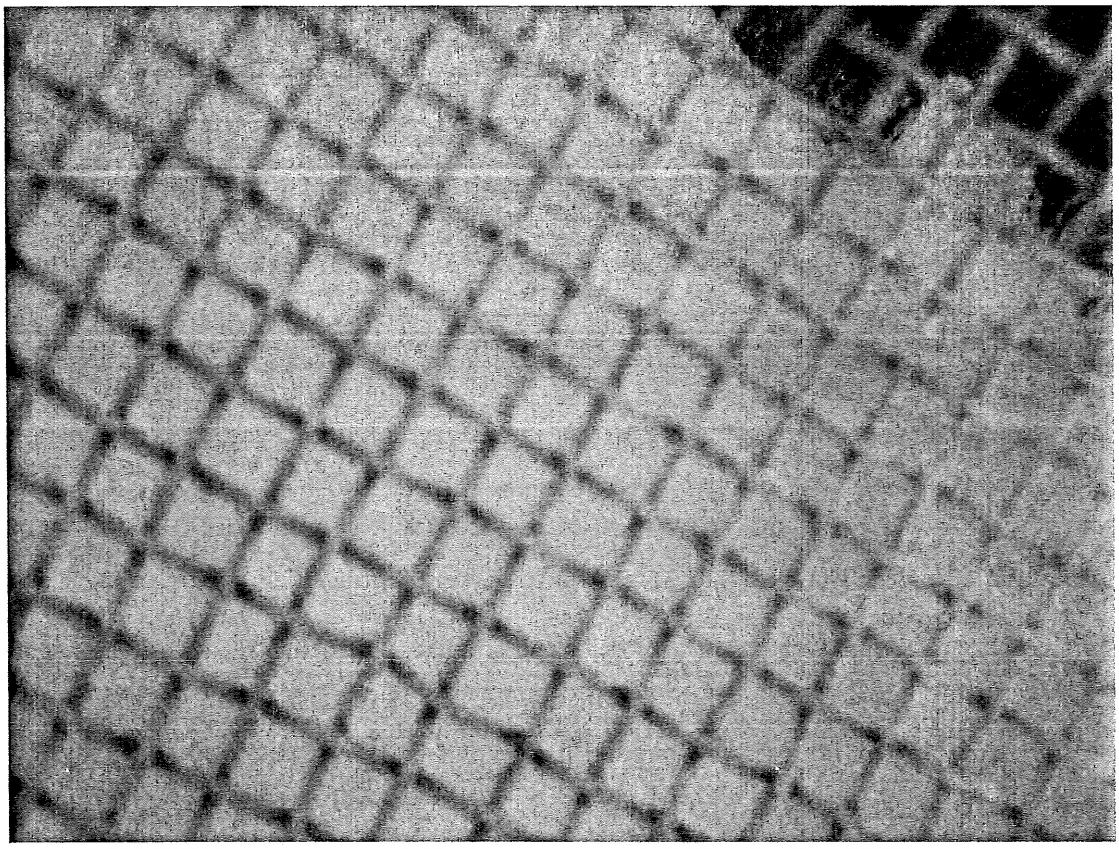


Image # **14**



350K Reservoir

Image # **15**	
Image # **16**	

350K Reservoir

Image # **17**

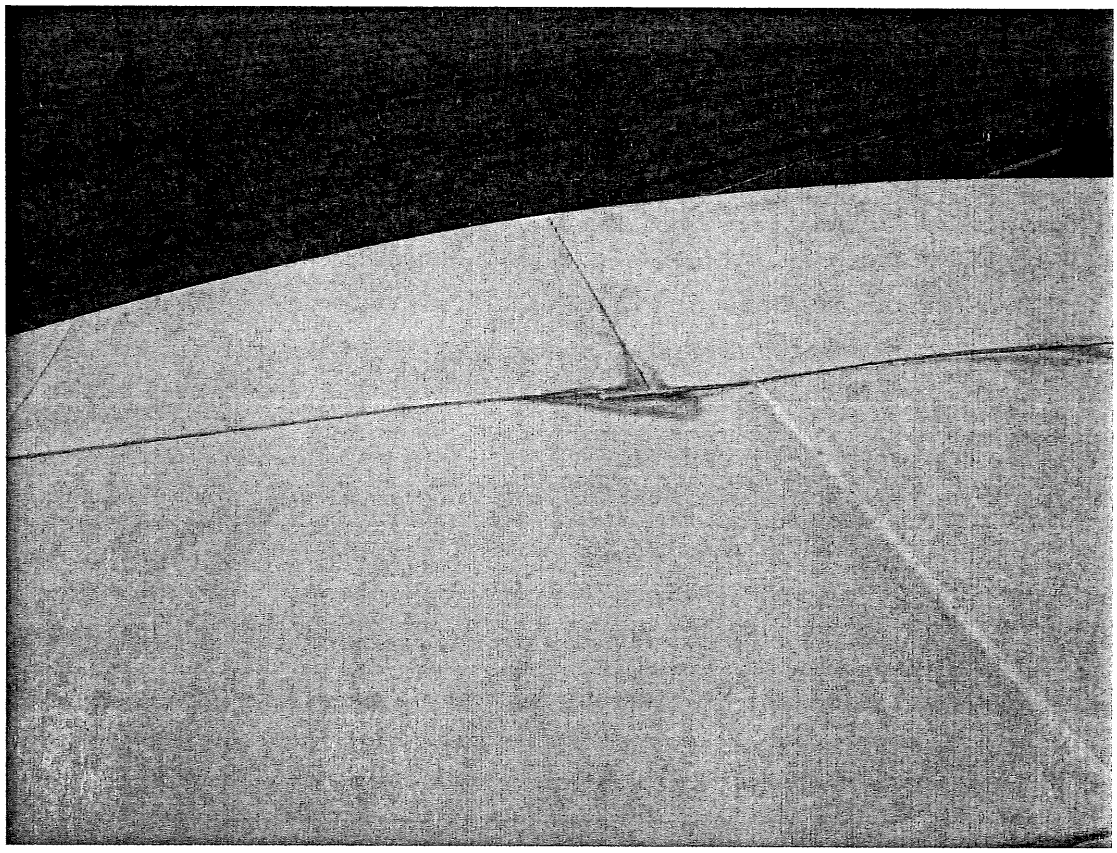
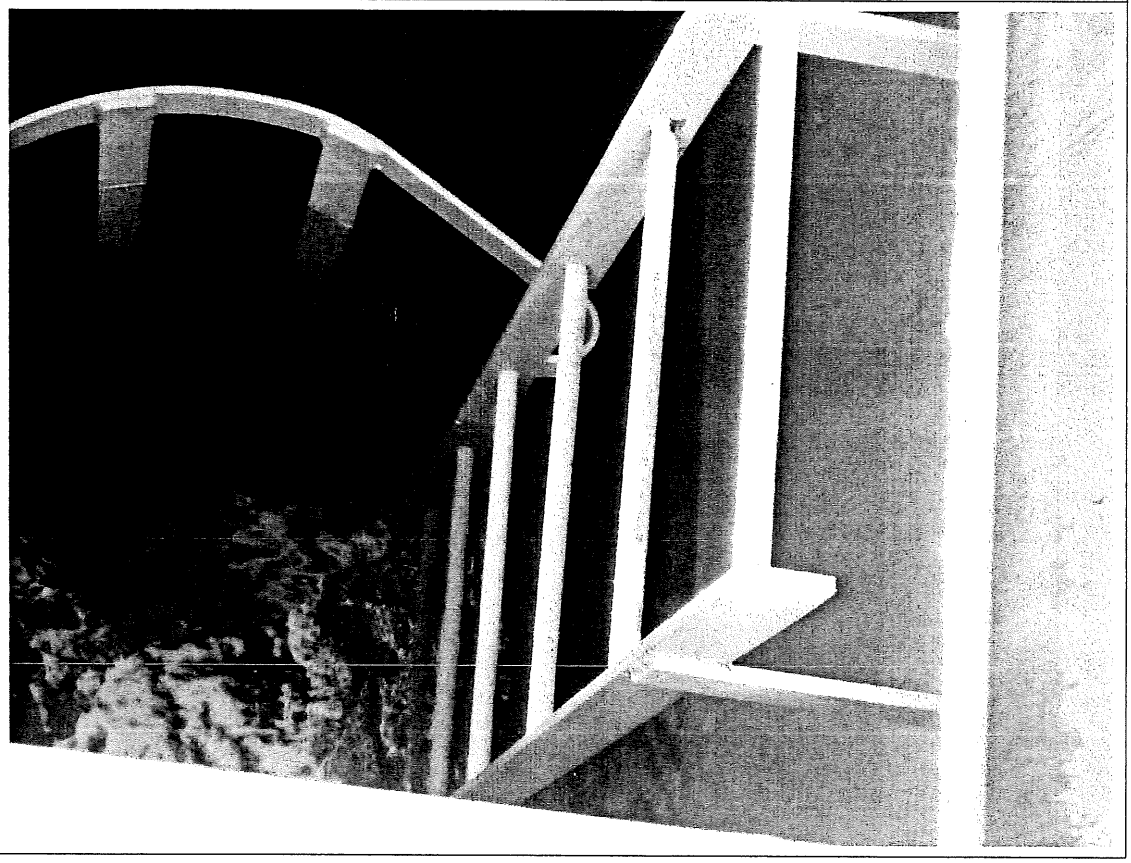


Image # **18**



350K Reservoir

Image # **19**

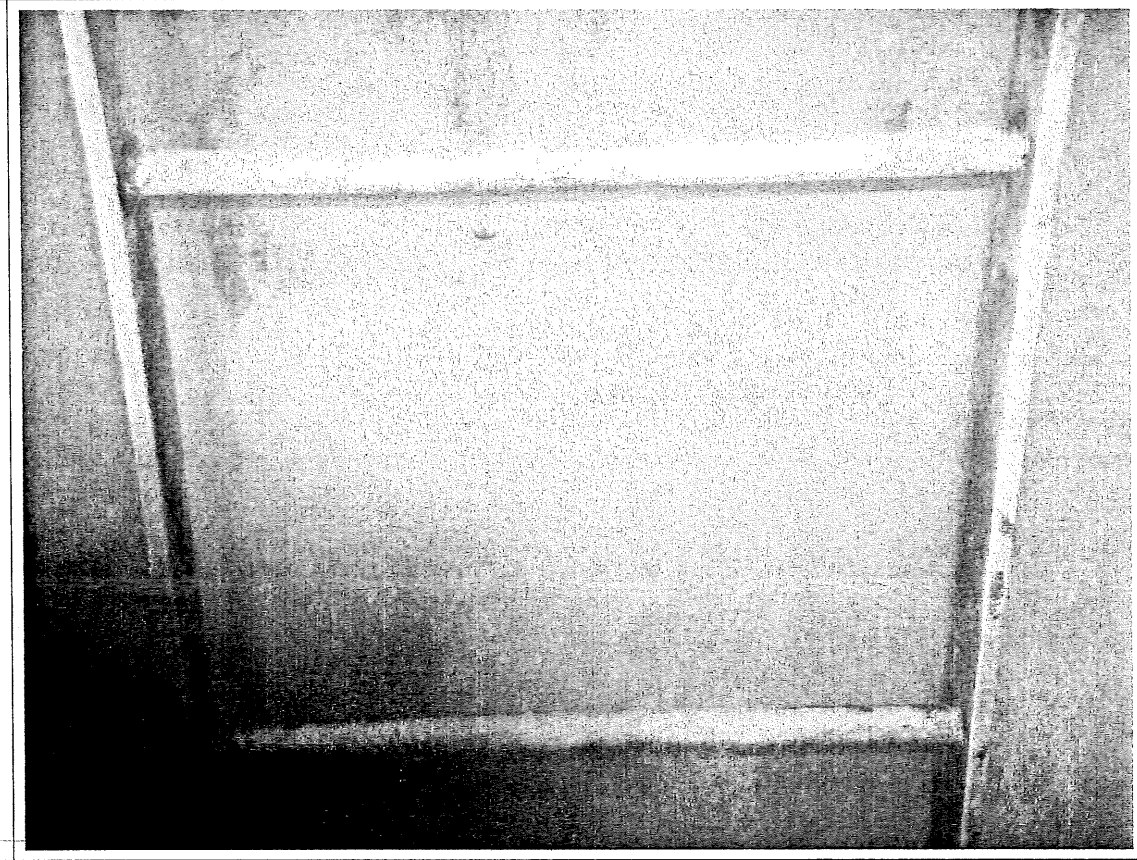
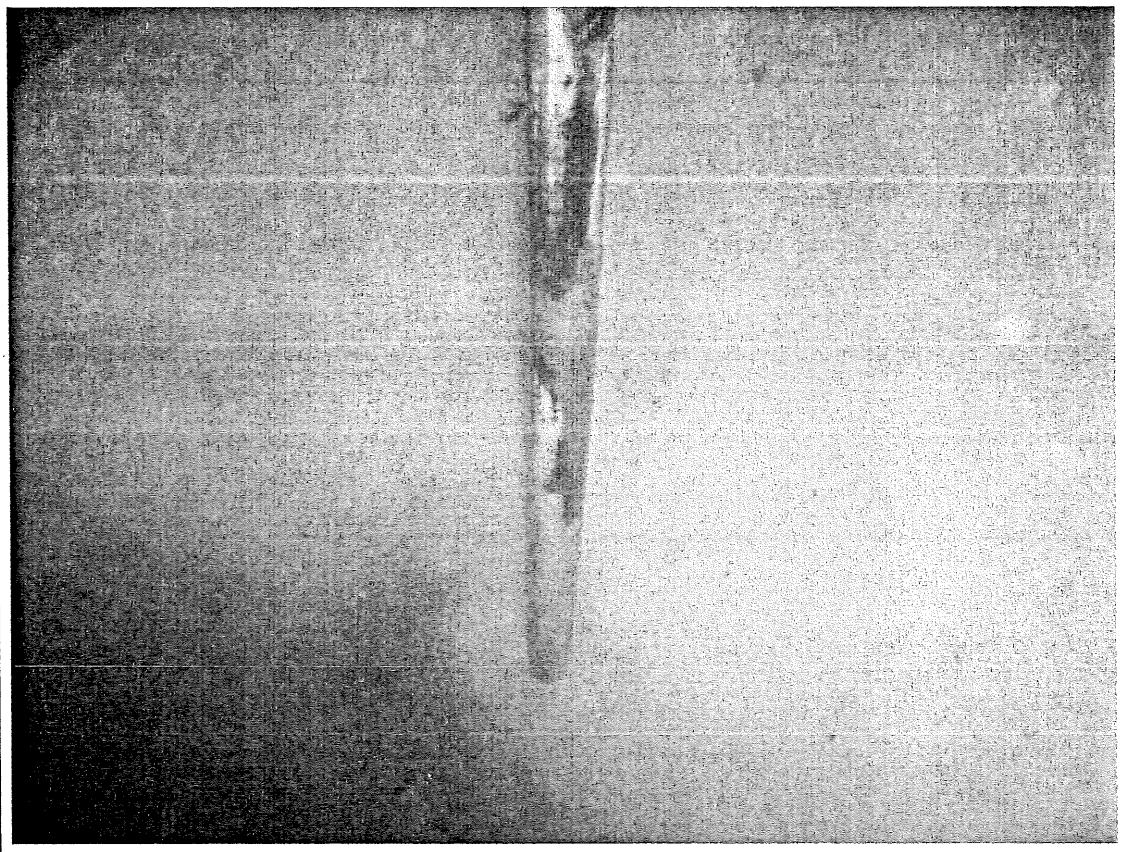


Image # **20**



350K Reservoir

Image # **21**

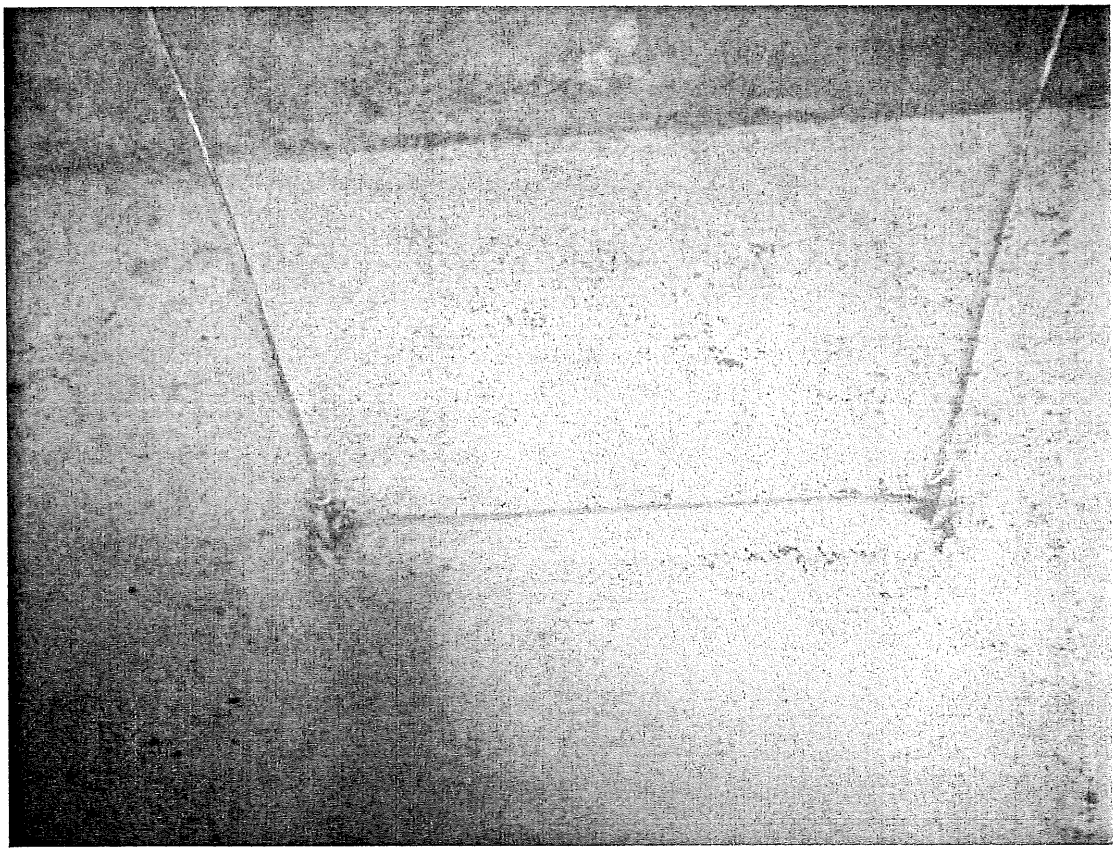
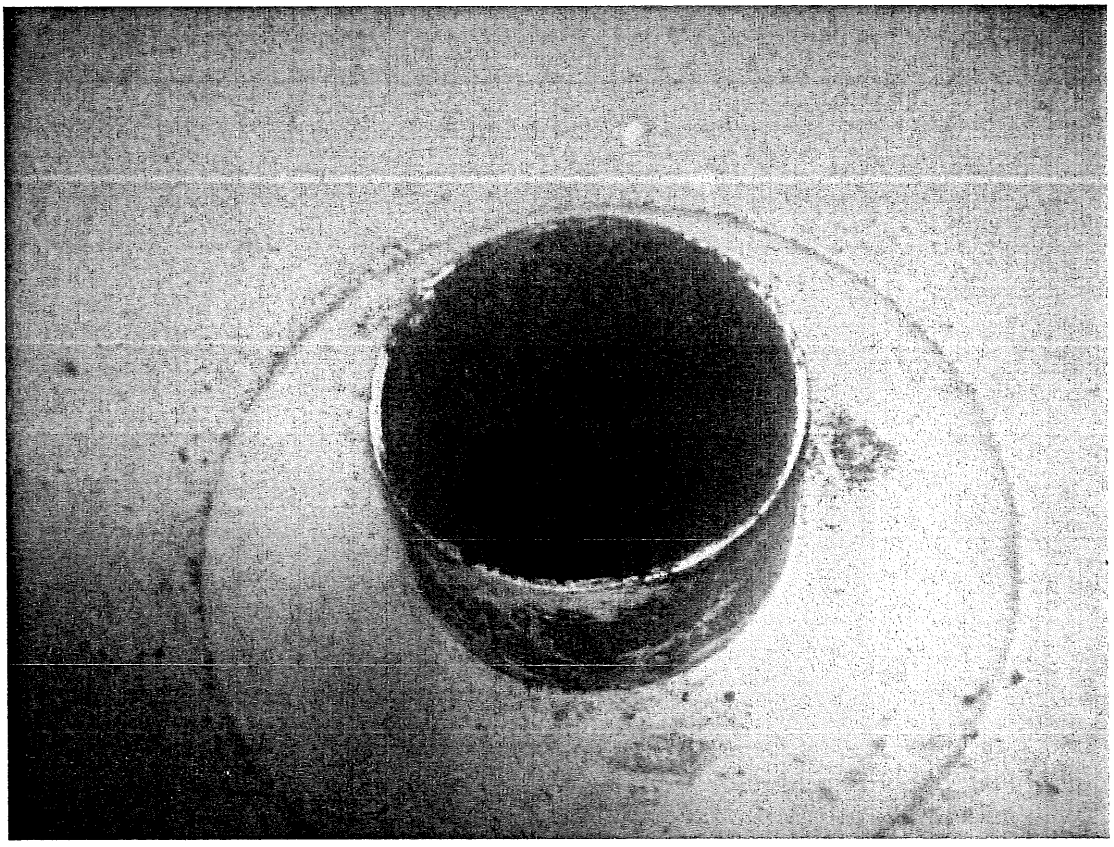


Image # **22**



350K Reservoir

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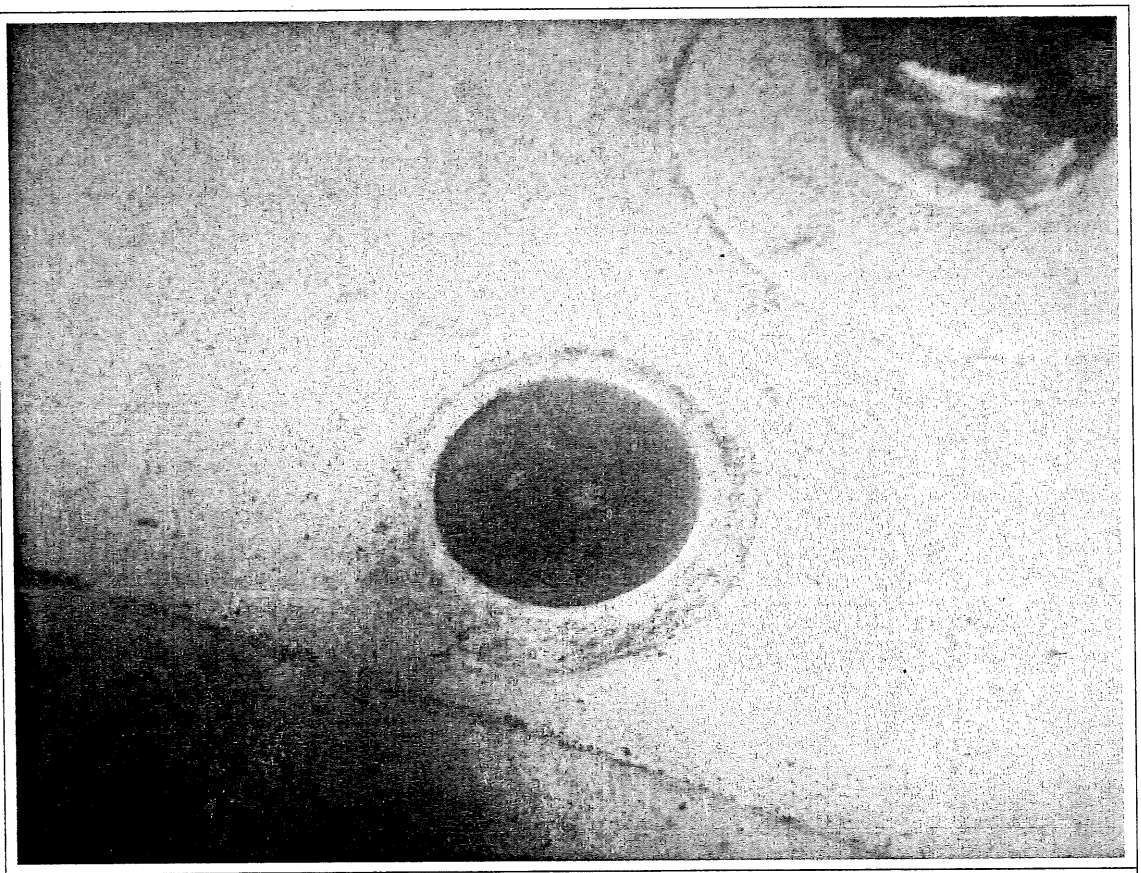
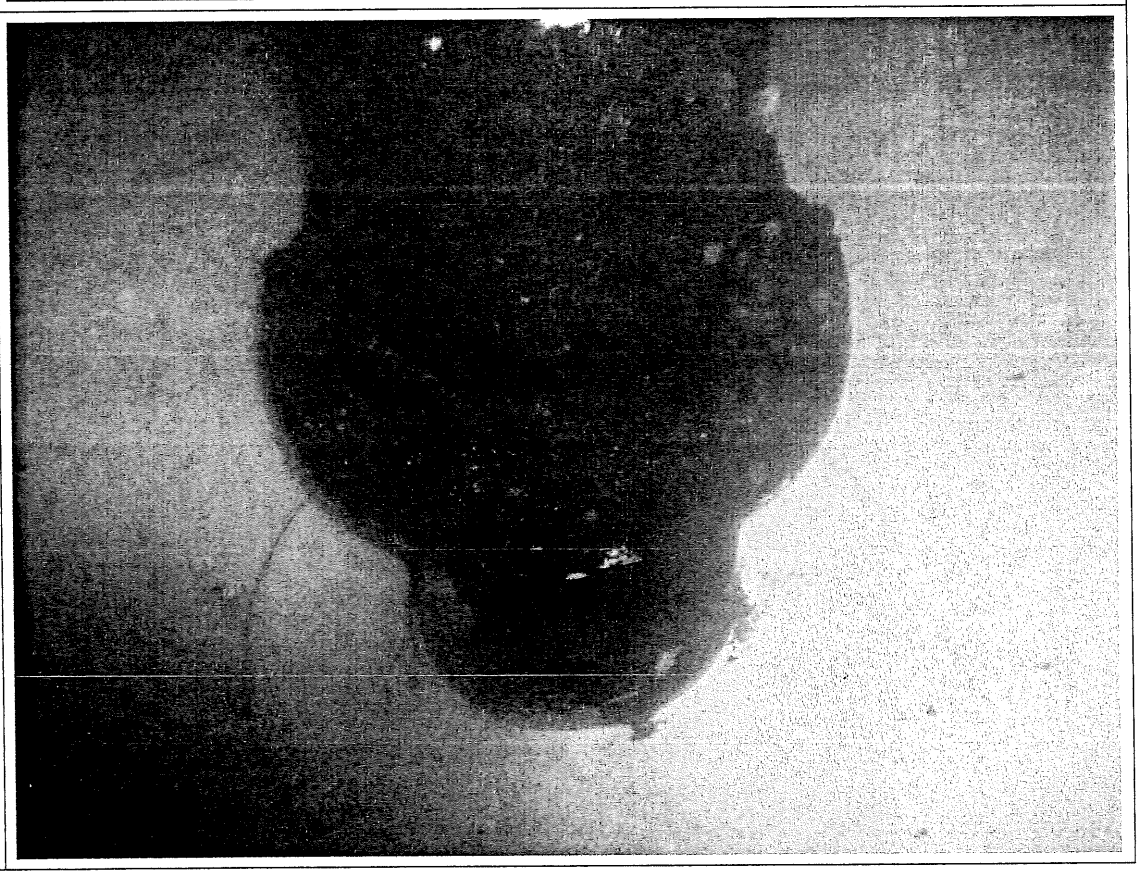
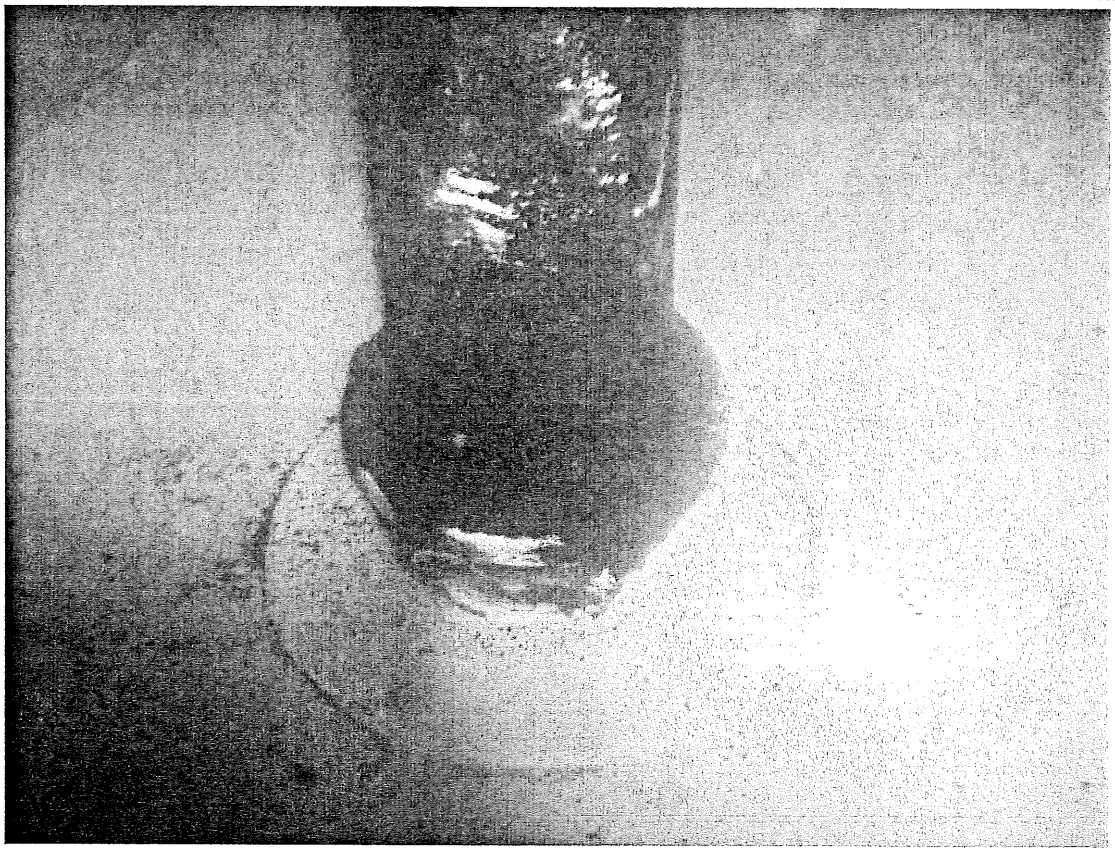


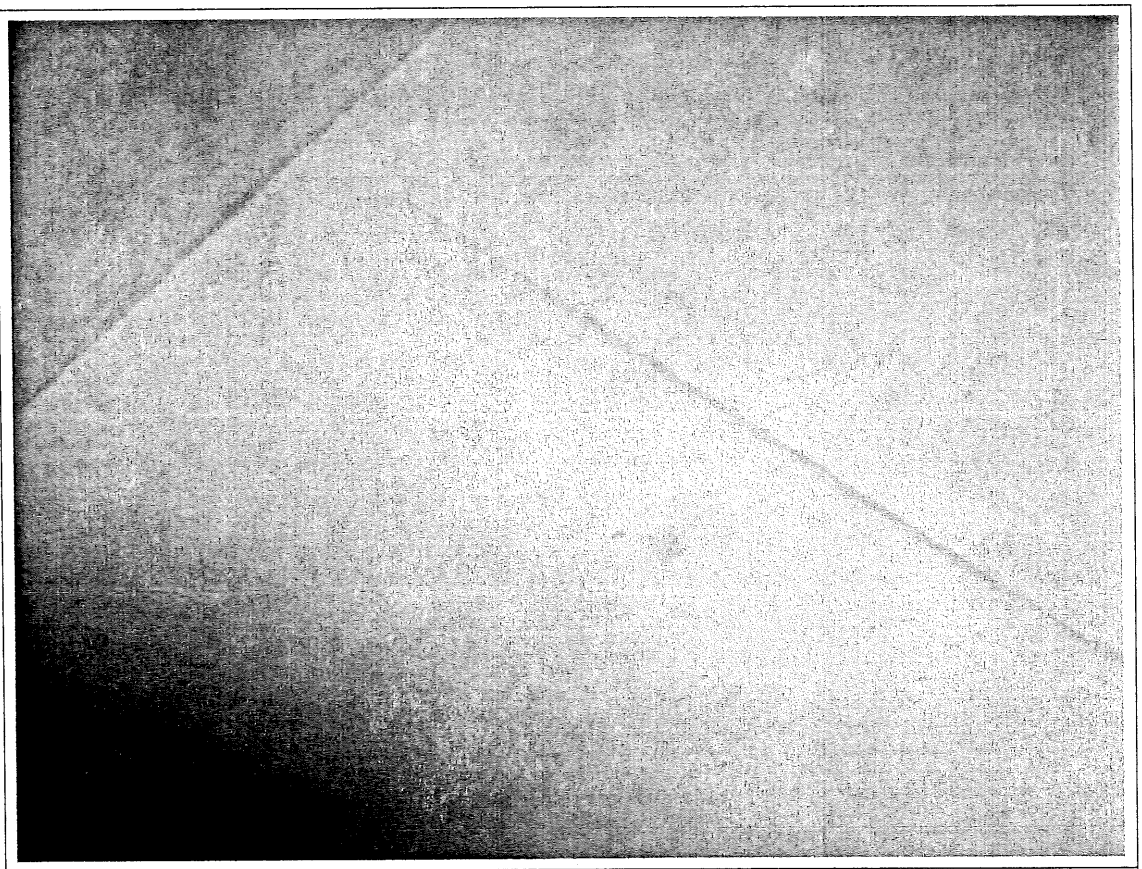
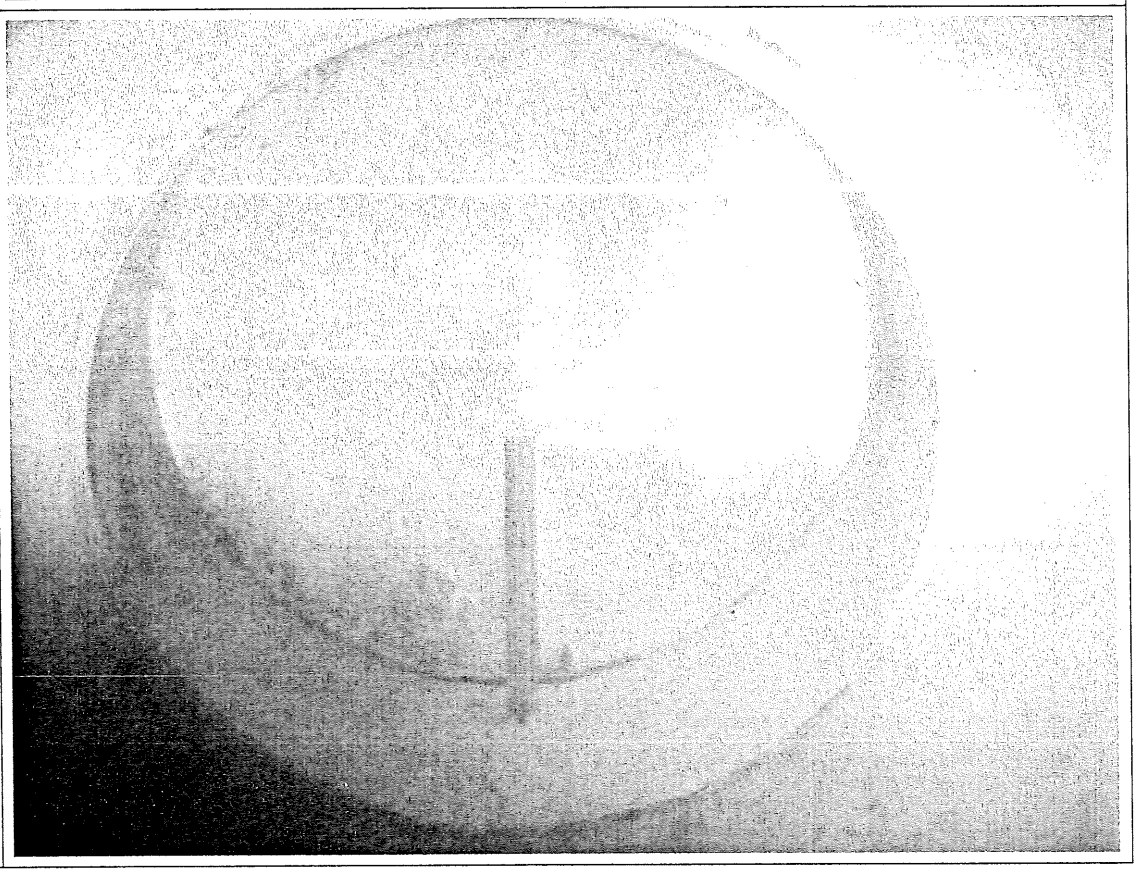
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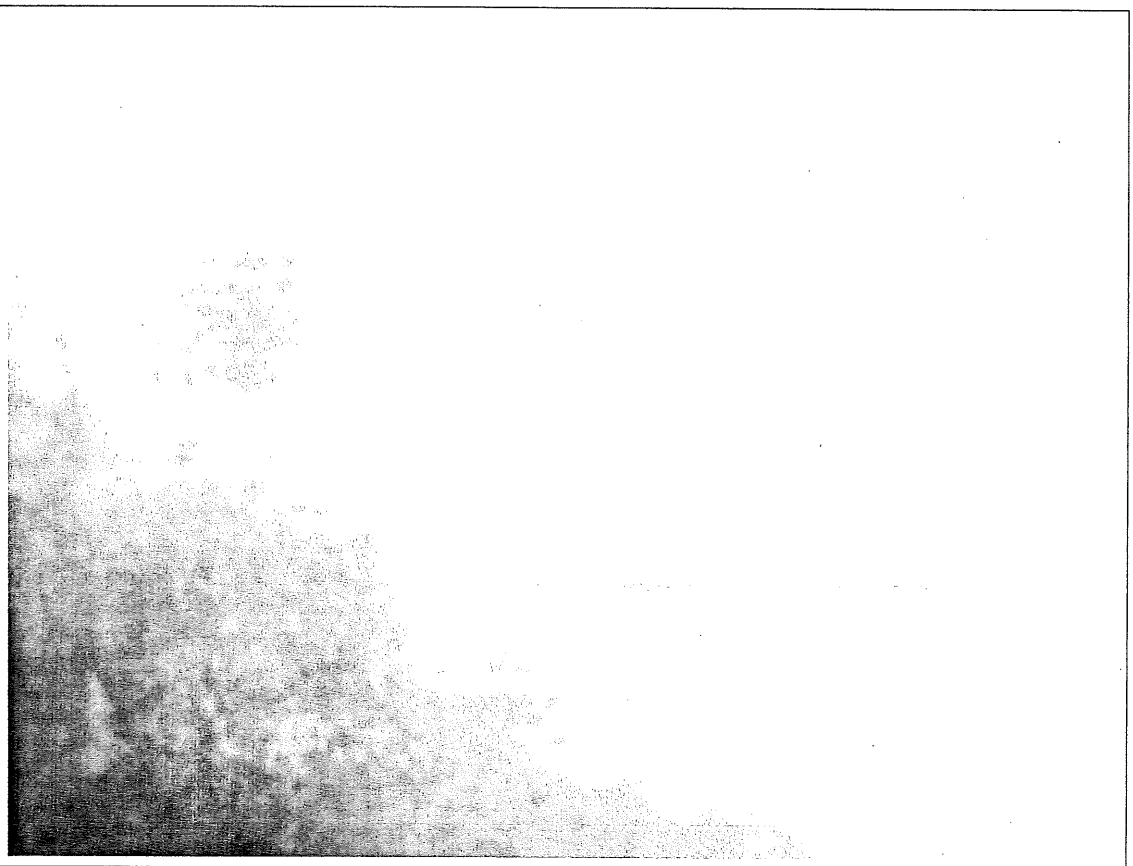
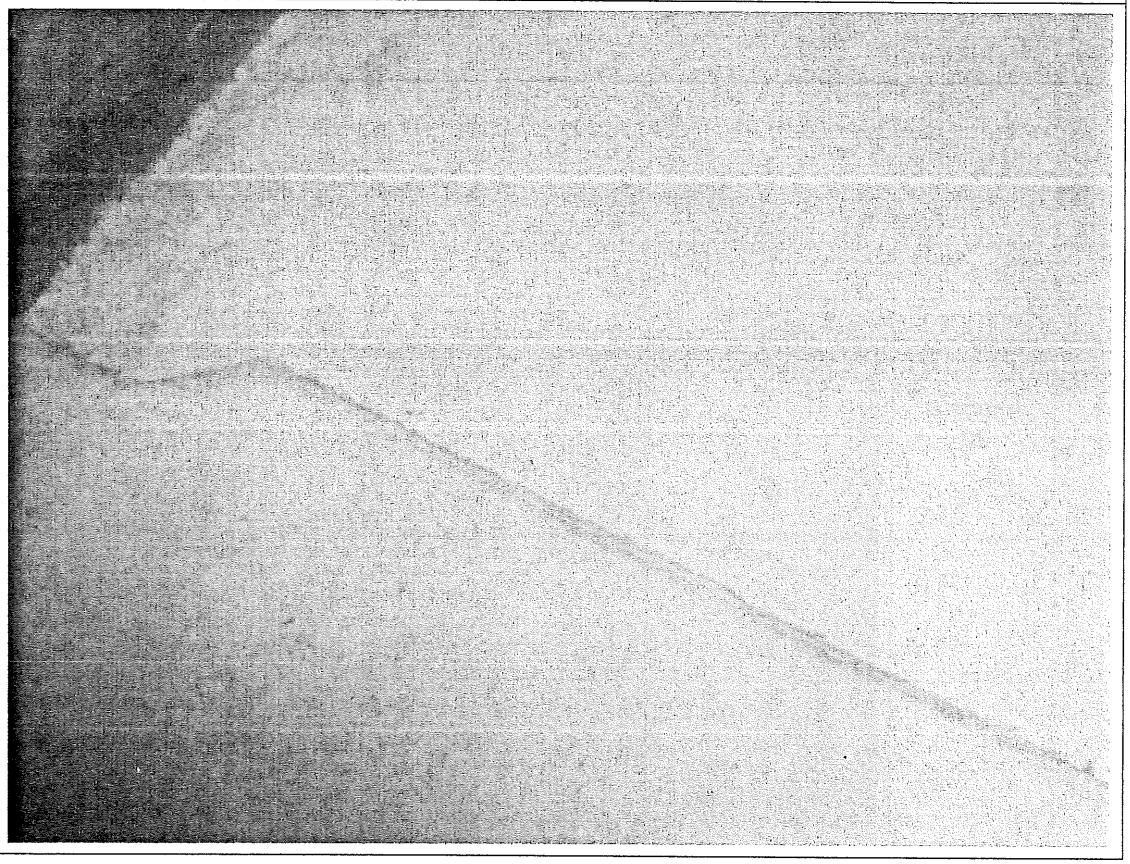
350K Reservoir

Image # **25**	
Image # **26**	

350K Reservoir

Image # **27**	
Image # **28**	

350K Reservoir

Image # **29**	
Image # **30**	

350K Reservoir

Image # **31**

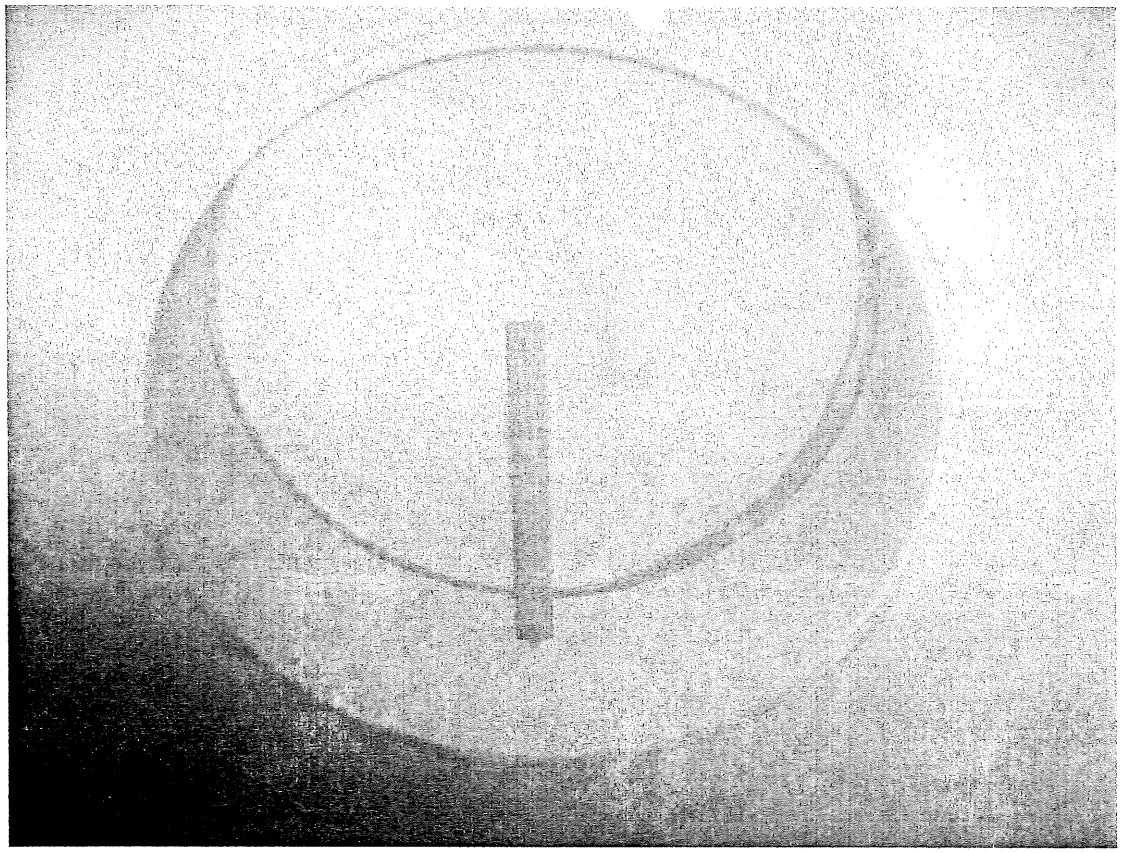
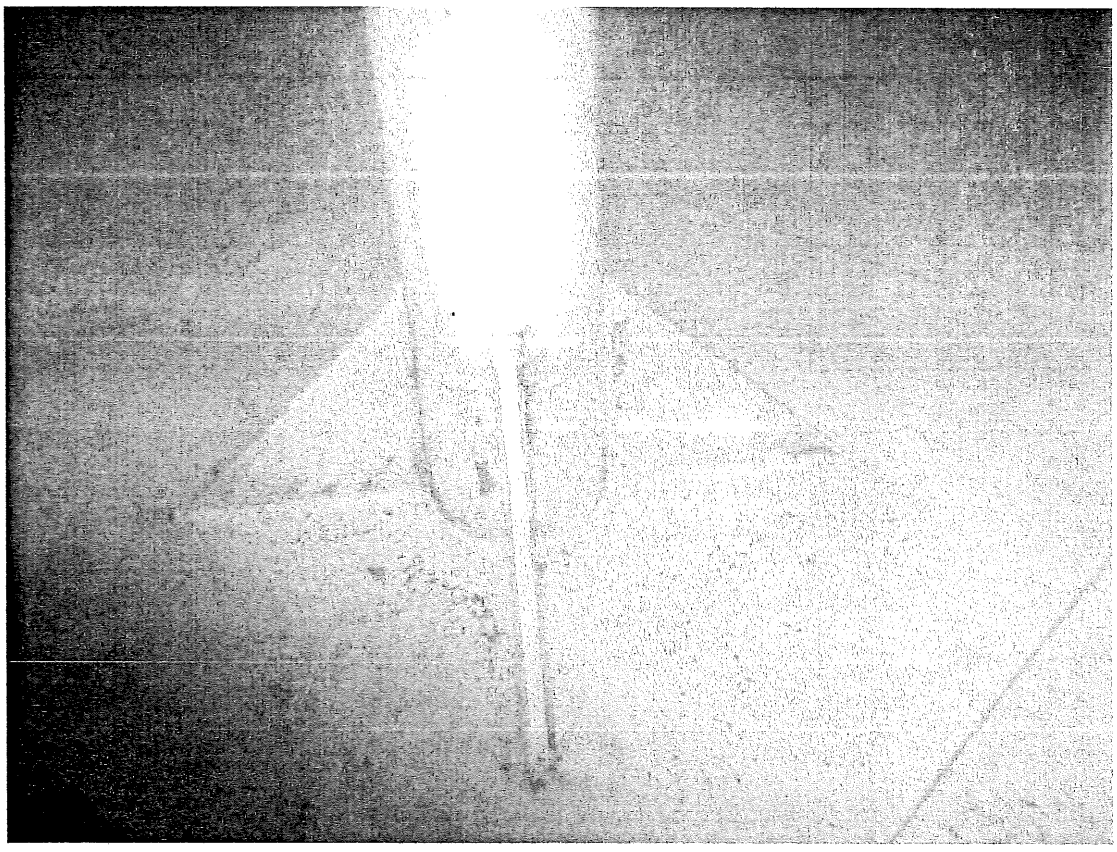


Image # **32**



350K Reservoir

Image # **33**

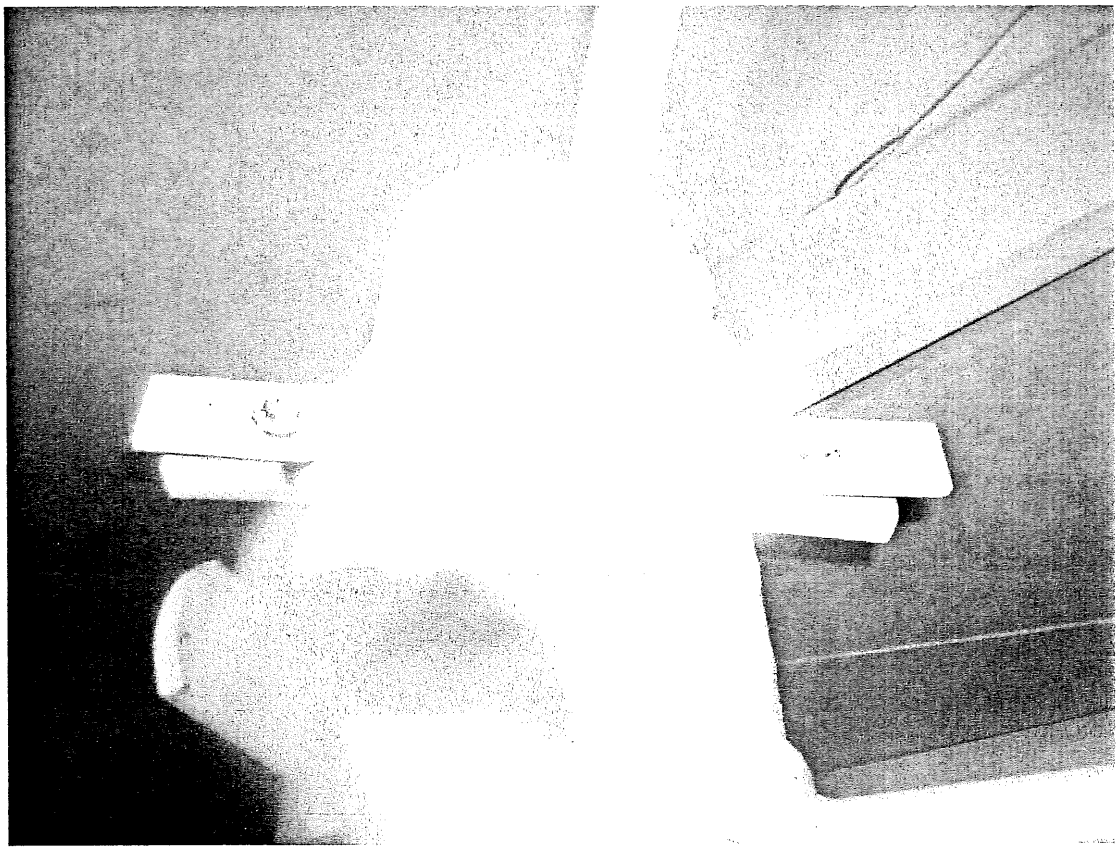
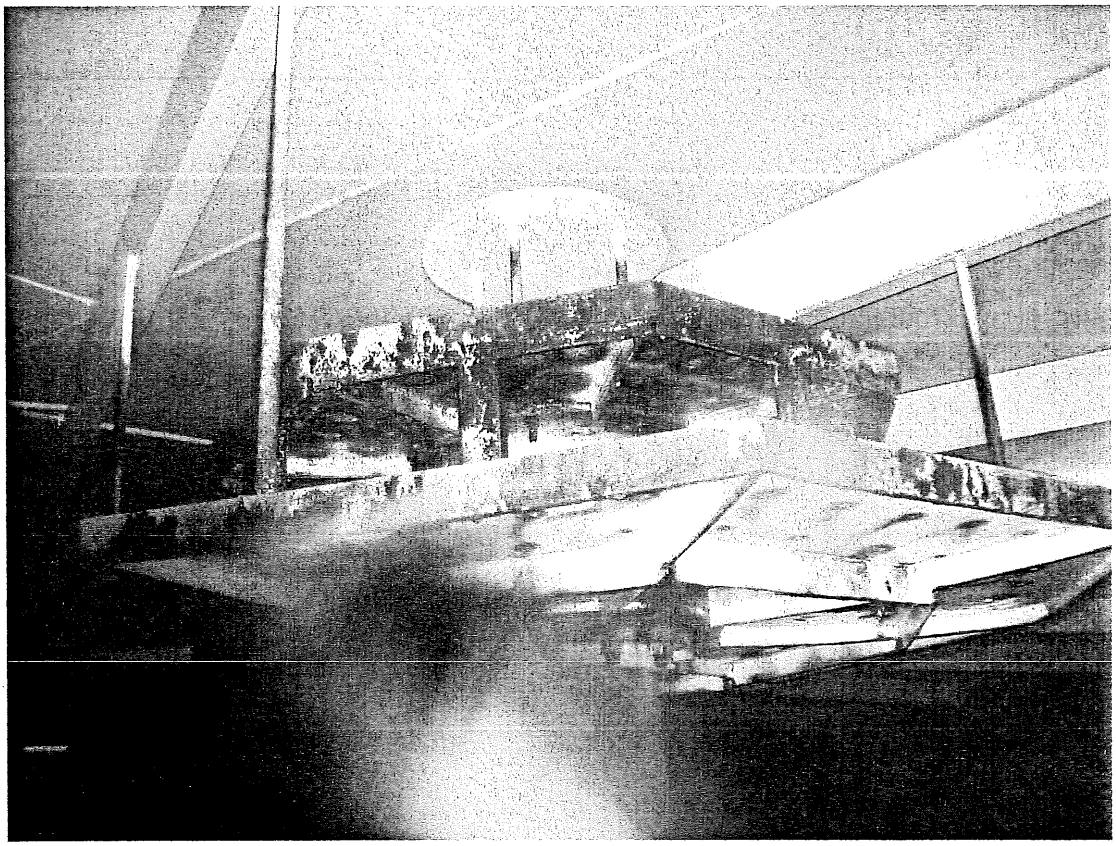


Image # **34**



350K Reservoir

Image # **35**

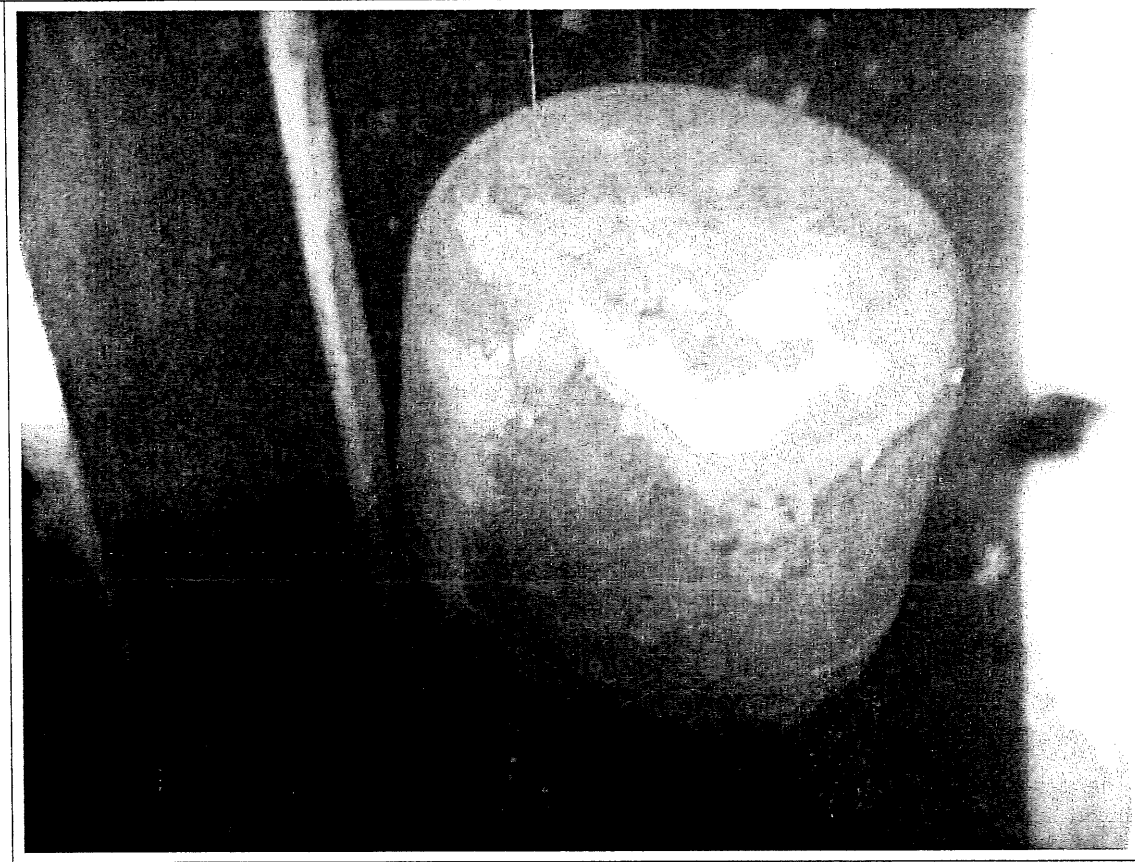
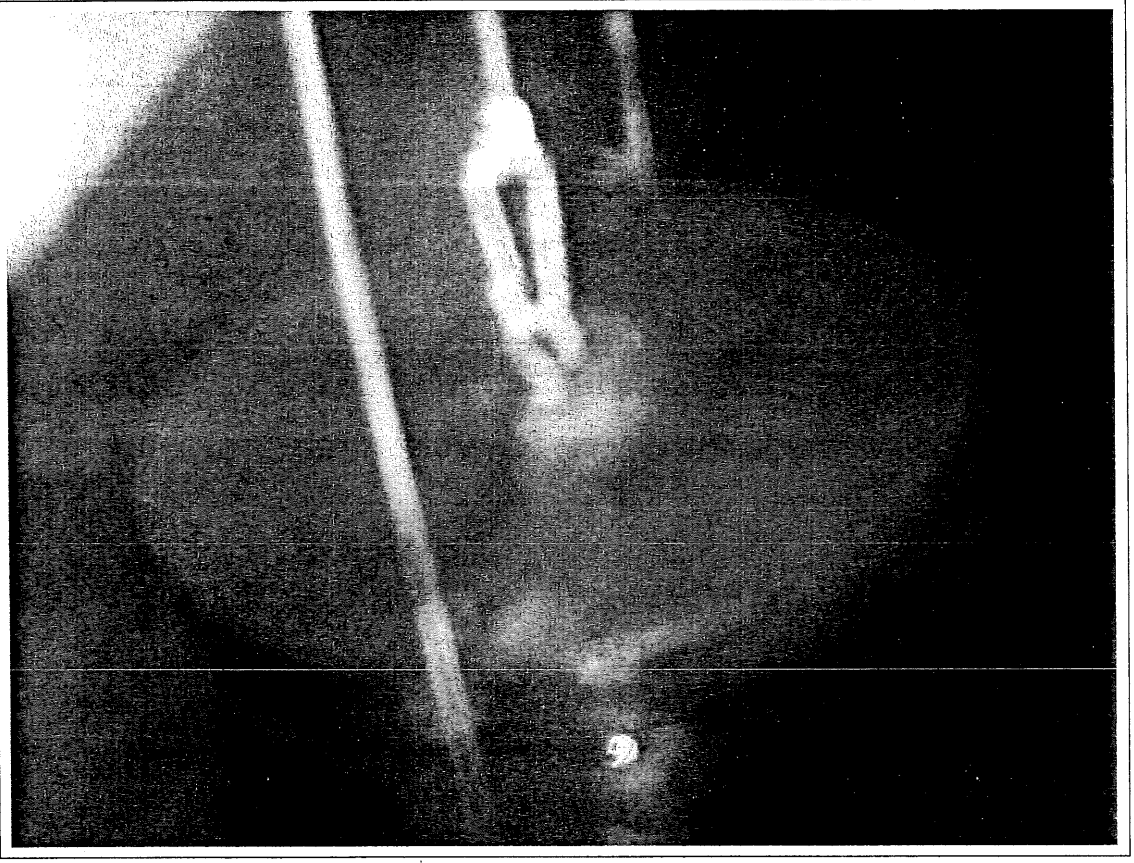
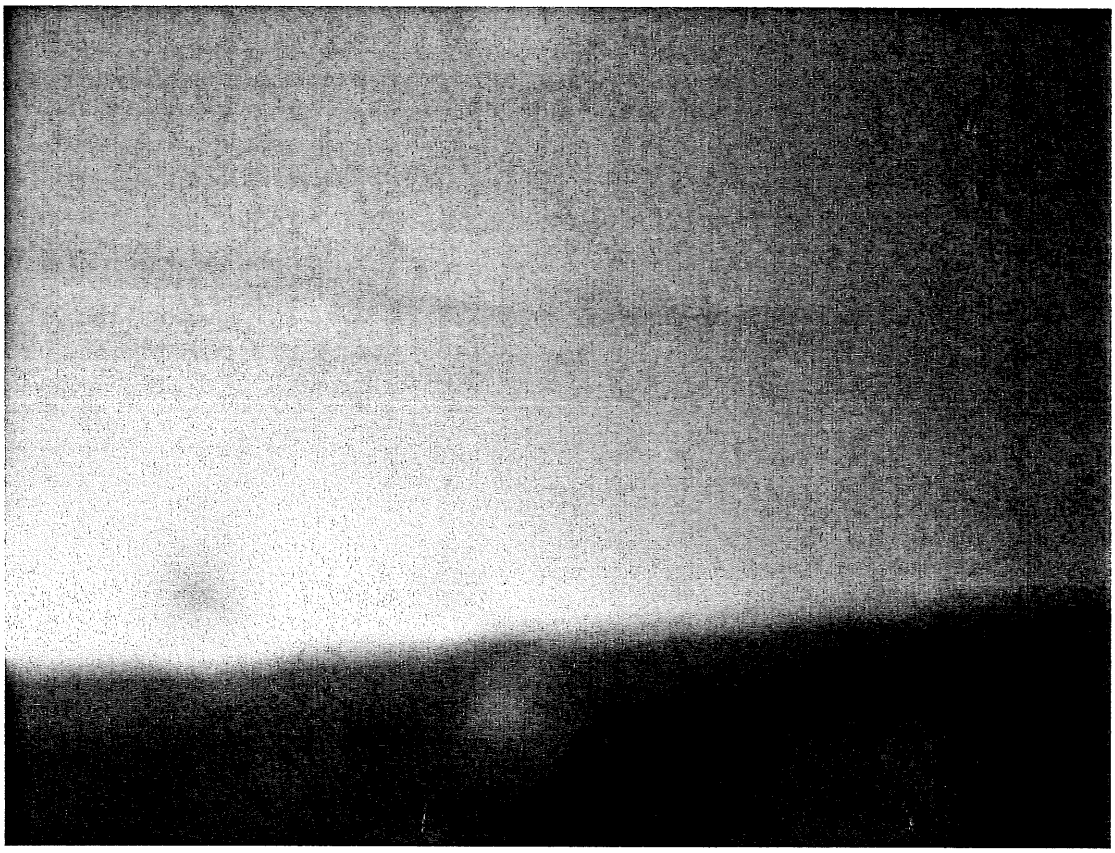


Image # **36**



350K Reservoir

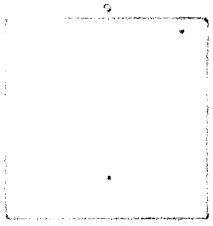
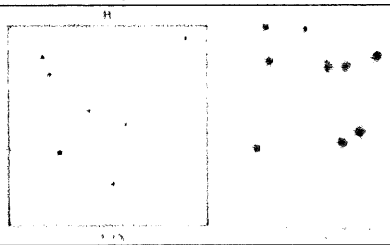
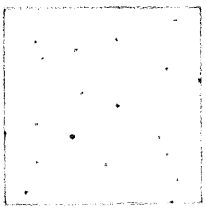
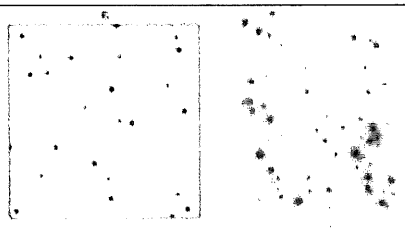
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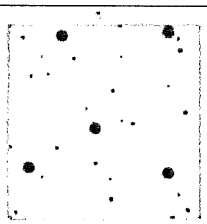
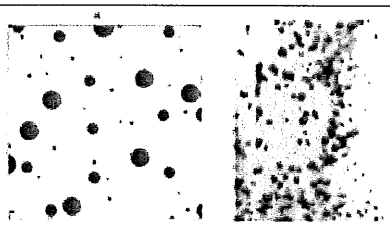
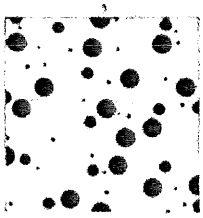
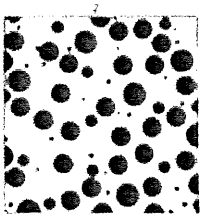
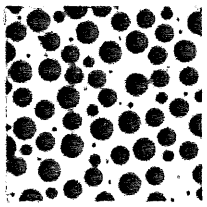
REFERENCES

Standard Method of Evaluating Degree of Rusting on Painted Steel Surfaces – SSPC-Vis 2-82 & ASTM D 610-85 (1989)

The graphical representations show examples of area percentages, which may be helpful in rust grading. The use of photographical reference standards requires the following precautions:

1. Some finishes are stained by rust. This staining must not be confused with the actual rusting involved.
2. Accumulated dirt or other material may make accurate determination of the degree of rusting difficult.
3. Certain types of deposited dirt that contain iron or iron compounds may cause surface discoloration that should not be mistaken for corrosion.
4. It must be realized that failure may vary over a given area and discretion must therefore be used in applying these reference standards.
5. In evaluating surfaces, consideration shall be given to the color of the finish coating, since failures will be more apparent on a finish that shows color contrast with rust, such as white, than on a similar color, such as iron oxide finish.
6. The photographic reference standards are not required for use of the rust-grade scale since the scale is based upon the percent of the area rusted and any method of assessing area rusted may be used to determine the rust grade.

Rust Grades[A]	Description	Graphical Representation
10	No rusting or less than 0.01% of surface rusted	Unnecessary
9	Minute rusting, less than 0.03% of surface rusted	
8[B]	Few isolated rust spots, less than 0.1% of surface rusted	
7	Less than 0.3% of surface rusted	
6[C]	Extensive rust spots, but less than 1% of surface rusted	

5	Rusting to the extent of 3% of surface rusted	
4[D]	Rusting to the extent of 10% of surface rusted	
3[E]	Approximately on sixth of the surface rusted (16%)	
2	Approximately one third of the surface rusted (33%)	
1	Approximately one half of the surface rusted (50%)	
0[F]	Approximately 100% of the surface rusted	Unnecessary

A. Similar to European Scale of Degree of rusting for Anti-Corrosive Paints (1961) (black and white).
B. Corresponds to SSPC Initial Surface Conditions E (0 to 0.1%) and BISRA (British Iron and Steel Research Association) 0.1%.
C. Corresponds to SSPC Initial Surface Conditions F (0.1% to 1%) and BISRA 1.0%.
D. Corresponds to SSPC Initial Surface Conditions G (1 to 10%).
E. Rust grades below 4 are of no practical importance in grading performance of paints.
F. Corresponds to SSPC Initial Surface Condition H (50 to 100%).

Cathodic Protection Definitions – NACE Standard RP0196-96 & RP0388-2001

Anode: The electrode of an electrochemical cell at which oxidation occurs. Electrons flow away from the anode in the external circuit. Corrosion usually occurs and metal ions enter the solution at the anode.

Anode Circuit: The path from a single anode or multiple anodes connected through a shunt, a resistor, and the connection to the tank.

Calcareous Coating: A layer consisting of calcium carbonate and other salts deposited on the surface. When the surface is cathodically polarized as in cathodic protection, this layer is the result of the increased PH adjacent to the protected surface.

Cathode: The electrode of an electrochemical cell at which reduction is the principal reaction. Electrons flow toward the cathode in the external circuit.

Cathodic Disbondment: The destruction of adhesion between a coating and the coated surface caused by products of cathodic protection.

Cathodic Protection: A technique to reduce the corrosion of a metal surface by making that surface the cathode of an electrochemical cell.

Coating: All components comprising the protective coating system, the sum of which provides effective electrical insulation of the coated structures from the electrolyte.

Conductivity: A measure of the ability of a material to carry an electric current. In water, this depends on the total concentration of the ionized substances dissolved and the temperature at which the measurement is made. It is the reciprocal of resistivity and is usually expressed in umhos/cm (uS/cm).

Corrosion: The deterioration of a material, usually a metal, that results from a reaction with its environment.

Current Density: The current to or from a unit area of an electrode surface.

Driving Voltage: The potential difference between the galvanic anodes and the tank wall when the cathodic protection system is in operation.

Electrode: A conductor used to establish electrical contact with an electrolyte and through which current is transferred to or from electrolyte.

Electrode Potential: The potential of an electrode in an electrolyte as measured against a reference electrode. (The electrode potential does not include and resistance losses in potential in either the solution or the external circuit. It represents the reversible work to move a unit of charge from the electrode surface through the electrolyte to the reference electrode.)

Electrolyte: A chemical substance containing ions that migrate in an electric field. For the purpose of this standard, electrolyte refers to the water, including the dissolved chemicals, in the tank.

Galvanic Anode: A metal that provides sacrificial protection to another metal that is nobler when electrically coupled in an electrolyte. This type of anode is the current source in one type of cathodic protection.

Holiday: A discontinuity in a protective coating that exposes unprotected surface to the environment. For the purpose of this standard, it is a bare spot in a coating that exposes tank internal metal surface to the stored water.

Impressed Current: An electric current supplied by a device employing a power source that is external to the electrode system. (An example is direct current for cathodic protection.)

Impressed Current Anode: An anode usually composed of substantially inert materials that are supplied with impressed current.

IR Drop: The voltage across a resistance in accordance with Ohm's law.

Polarization: The change from the open-circuit potential as a result of current across the electrode/electrolyte interface.

350K Reservoir

Polarized Potential: he potential of the tank that is the result of passage of cathodic protection current independent of the voltage drop in the electrolyte.

Reference Electrode: An electrode whose open-circuit potential is constant under similar conditions of measurement, which is used for measuring the relative potentials of other electrodes.

Resistivity: A measure of the specific resistance of a material to the passage of electric current. It is usually expressed in ohm-centimeters (ohm-cm) and is the reciprocal of conductivity.

Tank to Water Potential: The voltage difference between a submerged metallic portion of the tank and the water (electrolyte), which is measured with a reference electrode in contact with the water.

Weld Surface Conditions - AWS B1.11:2000 (An American National Standard)

Porosity: Porosity is a cavity-type discontinuity formed by gas entrapment during solidification or in a thermal-spray deposit. The discontinuity formed is generally spherical and may be elongated.

Scattered Porosity: Scattered porosity is porosity, which is uniformly distributed throughout the weld metal.

Cluster Porosity: Cluster porosity is a localized array of porosity having a random geometric distribution.

Piping Porosity: Piping porosity is a form of porosity having a length greater than its width that lies approximately perpendicular to the weld face. Also known as wormhole porosity.

Aligned Porosity: Aligned porosity, which is a localized array of porosity oriented in a line. The pores may be spherical or elongated. Aligned porosity is sometimes referred to as linear porosity.

Elongated Porosity: Elongated porosity, which is a form of porosity having a length greater than its width that lies approximately parallel to the weld axis.

Incomplete Fusion: Incomplete fusion is a weld discontinuity in which fusion did not occur between weld metal and fusion faces or adjoining weld beads.

Incomplete Joint Penetration: Incomplete joint penetration is joint root condition which weld metal does not extend through the joint thickness. The impenetrated and unfused area is a discontinuity described as incomplete joint penetration.

Undercut: Undercut is a groove melted into the base metal adjacent to the weld toes or weld root and left unfilled by weld metal. This groove creates a mechanical notch, which is a stress concentrator.

Underfill: Underfill is a condition in which the weld faces or root surface of a groove weld extends below the adjacent surface of the base metal.

Overlap: Overlap is the protrusion of unfused weld metal beyond the weld toe or weld root. Overlap is surface discontinuity that forms a mechanical notch and is nearly always considered rejectable.

Lamination: Lamination is a type of base-metal discontinuity with separation or weakness generally aligned parallel to the worked surface of a metal.

Seams and Laps: Seams and laps are base metal discontinuities that may be found in rolled, drawn, and forged products. They differ from laminations in that they appear on the surface of the worked product.

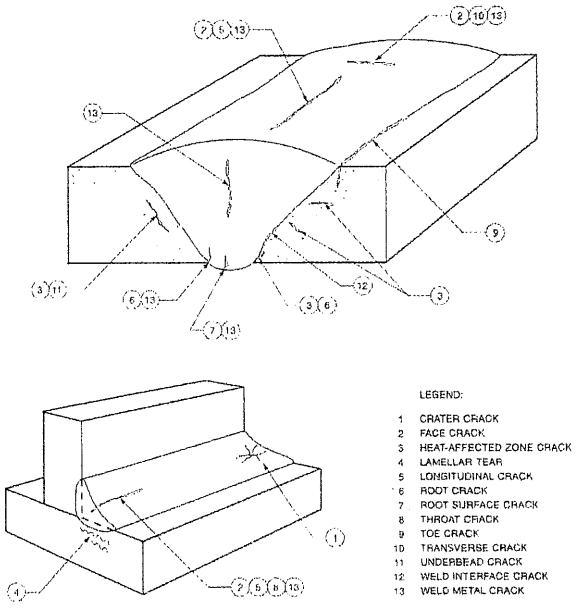
Cracks: Cracks are defined as fracture-type discontinuities characterized by a sharp tip and high ratio of length and width to opening displacement.

Longitudinal Cracks: Cracks that are parallel to the weld axis regardless of whether it is a centerline crack in weld metal or a toe crack in the base metal heat-affected zone.

Transverse Cracks: Cracks that is perpendicular to the axis of the weld. These may be limited in size and contained completely within the weld metal of they may propagate from the weld metal into the adjacent heat-affected zone and further into the base metal.

Hot Cracks: Hot cracks develop during solidification and are the result of insufficient ductility at high temperature. Hot cracks propagate between grains in the weld metal or at the weld interface.

Cold Cracks: Cold cracks develop after solidification



is complete. The cracks can form hours or even days after the weld is completed. Cold cracks propagate both between grains and through grains.

Throat Cracks: Throat cracks are longitudinal cracks oriented along the throat of fillet welds. They are generally, but not always hot cracks.

Root Cracks: Root cracks are longitudinal cracks at the weld root or in the root surface. They may be hot or cold cracks.

Crater Cracks: Crater cracks occur in the crater of a weld when the welding is improperly terminated. They are sometimes referred to as star cracks though they may have other configurations. Crater cracks are hot cracks usually forming a pronged star-like network.

Toe Cracks: Toe cracks are generally cold cracks. They initiate and propagate from the weld toe where shrinkage stresses are concentrated.

Underbead and Heat-Affected-Zone Cracks: Underbead and heat-affected-zone cracks are generally used interchangeably. They are generally cold cracks that form in the heat-affected zone of the base metal.

Slag Inclusions: Slag inclusions are nonmetallic products resulting from the mutual dissolution of flux and nonmetallic impurities in some welding and brazing processes.

Excessive Reinforcement: In groove welds, weld reinforcement is welding metal in excess of the quantity required to fill a joint. Weld reinforcement can be located at either the weld face or weld root surface, and is called face reinforcement and root reinforcement, respectively.

Convexity: Convexity is the maximum distance from the face of a convex fillet weld perpendicular to a line joining the weld toes.

Concavity: Concavity is the maximum distance from the face of a concave filled weld to a line joining the weld toes.

Arc Strikes: An arc strike is a discontinuity consisting of any localized remelted metal, heat affected metal, or change in the surface profile of any part of a weld or base metal resulting from an arc.

Spatter: Spatter consists of metal particles expelled during fusion welding that do not form a part of the weld.

Melt-Through: Melt through is visible root reinforcement produced in a joint welded from one side.

Weld Size: Weld size is a measure of critical dimension, or combination of critical dimensions of a weld.

Surface Oxidation: Surface oxidation of stainless steels and nickel alloys occurs whenever these alloys are exposed to the atmosphere while above 1000 degrees F known as sugaring with it becomes heavy.

Concrete Deformities Definitions – ACI 201.1R-92

Crack: A complete or incomplete separation of either concrete or masonry, into two or more parts produced by breaking or fracturing.

Checking: Development of shallow cracks at closely spaced but irregular intervals on the surface of plaster, cement paste, mortar or concrete.

Craze Cracks: Fine random cracks or fissures in a surface of plaster, cement paste, mortar or concrete.

Crazing: The development of craze cracks; the pattern of craze cracks existing in a surface.

D-Cracking: A series of cracks in concrete near and roughly parallel to joints, edges, and structural cracks.

Diagonal Crack: In flexural member, an inclined crack caused by shear stress, usually at about 45 deg to the axis; or a crack in a slab, not parallel to either the lateral or longitudinal directions.

Hairline Cracks: Cracks in an exposed concrete surface having widths so small as to be barely perceptible.

Pattern Cracking: Fine openings on concrete surfaces in the form of a pattern; resulting from a decrease in volume of the material near the surface, or increase in volume of the material below the surface, or both.

Plastic Cracking: Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic.

Shrinkage Cracking: Cracking of a structure or member due to failure in tension caused is external or internal restraints as reduction in moisture content develops or as carbonation occurs or both.

Temperature Cracking: Cracking due to tensile failure, caused by temperature gradient in members subjected to external restraints or by temperature differential in members subjected to internal restraints.

Transverse Cracks: Cracks that develop at the right angles to the long direction of the member.

Deterioration: 1) Physical manifestation of failure of a material (e.g., cracking, delamination, flaking, pitting, scaling, spalling, straining) caused by environmental or internal autogenous influences on hardened concrete as well as other materials; 2) Decomposition of material during either testing or exposure to service.

Disintegration: Reduction into small fragments and subsequently into particles.

Abrasion Damage: Wearing away of a surface by rubbing and friction.

Blistering: The irregular raising of a thin layer, frequently 25 to 300 mm in diameter, at the surface of placed mortar or concrete during or soon after completion of the finishing operation; blistering is usually attributed to early closing of the surface and may be aggravated by cool temperatures. Blisters also occur in pipe after spinning or in a finish plastic coat in plastering as it separates and draws away from the base coat.

Cavitation damage: Pitting of concrete caused by implosion, i.e., the collapse of vapor bubble in flowing water, which form in areas of low pressure and collapse as they enter areas of higher pressure.

Chalking: Formation of a loose powder resulting from the disintegration of the surface of concrete or of applied coating, such as cement paint.

Corrosion: destruction of metal by chemical, electrochemical or electrolytic reaction with its environment.

Curling: The distortion of an originally essentially linear or planar member into a curved shape such as the warping of a slab due to creep or to differences in temperature or moisture content in the zones adjacent to its opposite faces.

Deflection: Movement of a point on a structure or structural element usually measured as a linear displacement transverse to a reference line or axis.

Deformation: A change in dimension or shape.

Delamination: A separation along a plane parallel to a surface as in the separation of a coating from a substrate or the layer of a coating from each other, or in the case of a concrete slab, a horizontal splitting,

cracking or separation of a slab in a plane roughly parallel to, and generally near, the upper surface; found frequently in bridge decks and other types of elevated reinforced-concrete slabs and may be caused by the corrosion of reinforcing steel; also found in slabs on grade caused by development, during the finishing operation, of a plane of weakness below the densified surface; or caused by freezing and thawing, similar to spalling, scaling, or peeling except that delamination affects large areas and can often be detected by tapping.

Distortion: See Deformation

Dusting: The development of powdered material at the surface of hardened concrete.

Efflorescence: A deposit of salts, usually white, formed on a surface, the substance having emerged in solution from within either concrete or masonry and subsequently been precipitated by evaporation.

Erosion: Progressive disintegration of a solid by the abrasive or cavitation action of gases fluids or solids in motion.

Exfoliation: Disintegration occurring by peeling off in successive layers; swelling up and opening into leaves or plates like a partly opened book.

Exudation: A liquid or viscous gel-like material discharged through a pore, crack, or opening in the surface of concrete.

Joint Spall: A spall adjacent to a joint.

Pitting: Development of relatively small cavities in a surface; in concrete, localized disintegration, such as a popout; in steel, localized corrosion evident as minute cavities on the surface.

Peeling: A process in which thin flakes of mortar are broken away from a concrete surface, such as by deterioration or by adherence of surface mortar to forms as forms are removed.

Popout: The breaking away of small portions of a concrete surface due to localized internal pressure, which leaves a shallow, typical conical, depression.

Popouts, Small: Popouts leaving holes up to 10 mm in diameter, or the equivalent.

Popouts, Medium: Popouts leaving holes between 10 mm and 50 mm in diameter, or the equivalent.

Popouts, Large: Popouts leaving holes greater than 50 mm in diameter, or the equivalent.

Scaling: Local flaking or peeling away of the near-surface portion of hardened concrete or mortar; also of a layer from metal.

Scaling, Light: Loss of surface mortar without exposure of coarse aggregate.

Scaling, Medium: Loss of surface mortar 5 to 10 mm in depth and exposure of coarse aggregate.

Scaling, Severe: Loss of surface mortar 5 to 10 mm in depth with some loss of mortar surrounding aggregate particles 10 to 20 mm in depth.

Scaling, Very Severe: Loss of coarse aggregate particles as well as mortar, generally to a depth greater than 20 mm.

Spall: A fragment, usually in the shape of a flake, detached from a larger mass by a blow, by the action of weather, by pressure, or by expansion within the large mass.

Small Spall: A roughly circular depression not greater than 20 mm in depth or 50 mm in any dimension.

Large Spall: May be roughly circular or oval or in some cases elongated, more than 20 mm in depth and 150 mm in greatest dimension.

Warping: A deviation of a slab or wall surface from its original shape usually caused by either temperature or moisture differentials or both within the slab or wall.

APPENDIX J
Water Rate Resolution

RESOLUTION 484-2021

A RESOLUTION ADOPTING FEES FOR UTILITIES, OTHER FEES AND AMENDING RESOLUTION 435-16.

WHEREAS, due to increasing costs for operations and maintaining the City's aging water system; and

WHEREAS, the office cost for supplies and staff time have risen and these increases are reflected in the fee structure; and

NOW THEREFORE, the Common Council of the City of Echo resolves to adopt the attached fee schedule which shall become effective with the July 1 billing.

Adopted by the Common Council of the City of Echo this _____ day of _____, 2021.

_____
Mayor Chad Ray

Attest:

_____
David Slaght, City Admin.-Recorder

Blocking Meter Access: after 2nd written notice fee is **$25**.

Upon 3rd written notice: The City shall tag and tow the vehicle or move any debris onto the property of the occupant at no cost to the City and any damages shall be the responsibility of the owner. Customer will be billed for City staff or paid contractor time, equipment and any costs associated with removing debris blocking the access to the meter.

WATER RATES EFFECTIVE JULY 1, 2021 BILLING

Water Residential/small commercial:
Water Minimum Charge for up to 1st 5,000 gallons----**$33.00**
All over 5,001gallons shall be **$1.00** per 1,000 gallons.

Water Trucks: **$100** first tank up to 5,000 gallons, plus **$2.00** per 1,000 gallons thereafter. Customer shall fill out an application for service.

Water Non-resident rate: Double residential rate **$66** per meter

Golf Courses: $30 for up to 1st 5,000 gallons & **$.50** per 1000 gallons thereafter

School: Minimum charge for up to 50,000 gallons **$690** per month.
Over 50,001 gallons **$2.50** per 1,000 gallons

Water Industrial or large commercial: rate to be negotiated by contractor with the City Administrator and City Council.

Late Fee: Failure to pay utility bill by the 25th of each month is: **$12** per occurrence.

Reconnect Fee: **$40** Public Works Department hours 7 AM – 3:30 PM M-F
$80 After Hours

Fees charged in the Clerk's Office:

Fax Charges:

1st Page	**$2.00**
All Additional Pages	**$.50 each**

Making Copies:

Standard Size Paper

One Sided	**$.10 each**
Two sided	**$.15 each**

Legal Size Paper

One Sided	**$.20 each**
Two Sided	**$.30 each**

Standard Size Colored Paper & Colored Printing

One Sided	**$.25**
Two Sided	**$.50**

Scanning Per Page

1st Page	**$2.00**
All Additional Pagers	**$.50**

Fee for Returned Checks

Each Occurrence	**$12.00**