

Appendix

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- I. Drinking Water Protection in Oregon

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

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Appendix A: References

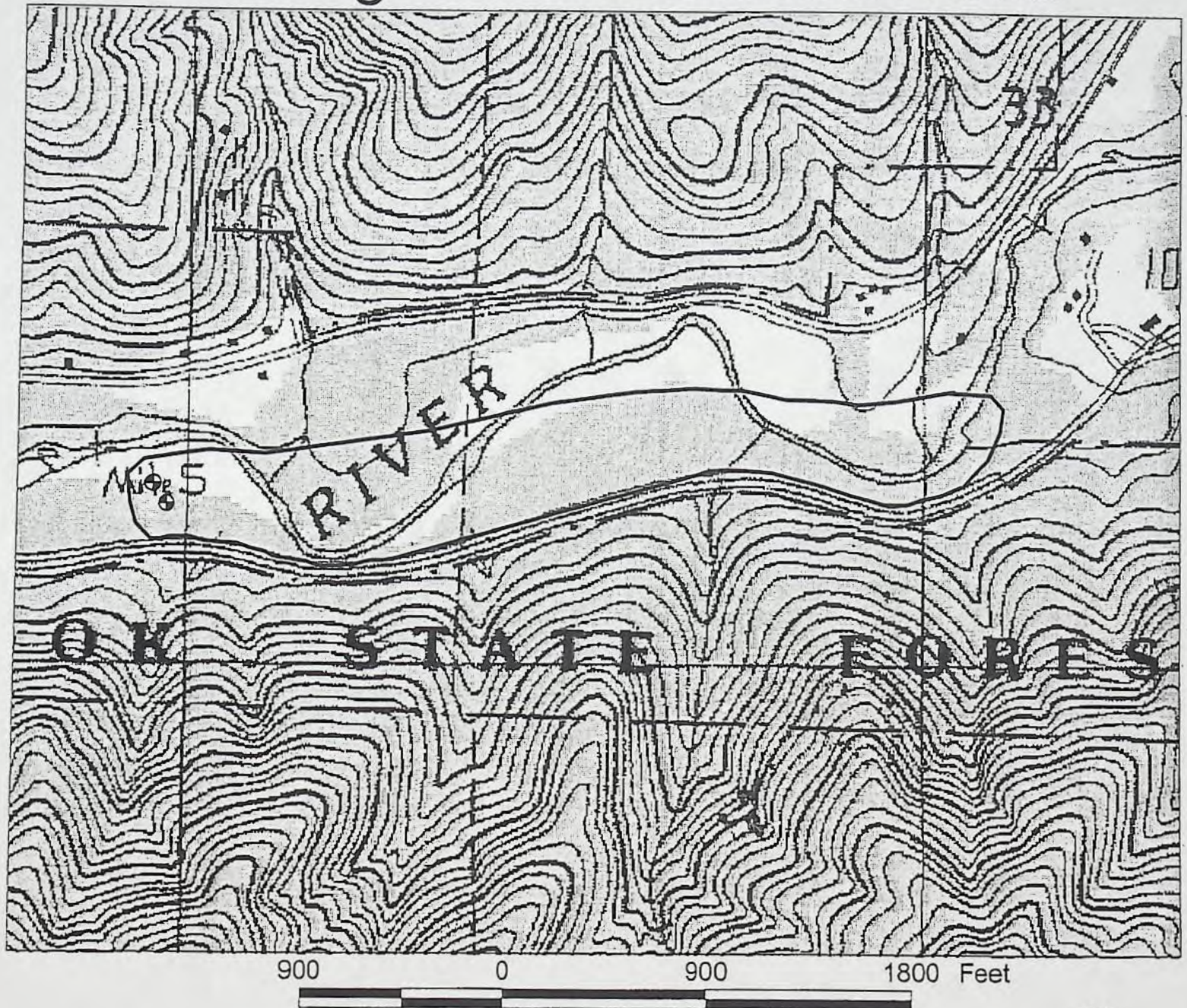
- Bowlsby, C. C. and Swanson, R. C., 1964. Soil Survey of the Tillamook Area, Oregon. U.S. Department of Agriculture, Series 1957, No. 18.
- Ray E. Wells, Parke D. Snively, Jr, N.S. MacLeod, Michael . Kelly, and Michael J. Praker, 1994, U.S. Geological Survey, Geologic Map of the Tillmook Highlands, Open file report 94-21.
- National Oceanic and Atmospheric Administration (NOAA), 1982. Monthly Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1951 - 80 Oregon, Climatology of the United States No. 81 (By State).
- Stewart, S. and Nelson, D., 1996. Oregon Wellhead Protection Program Guidance Manual. Oregon Department of Environmental Quality (available at www.deq.or.state.us).
- Stewart, S. and Nelson, D., 1999. Oregon Source Water Assessment Plan. Oregon Department of Environmental Quality.

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Kilchis Regional Water District Figure 1 Drinking Water Protection Area



Drinking Water Protection Area (DWPA)
Time-of-Travel (TOT) Entire Area
Outlined is within the 1-year TOT

Delineation Area: 0.061 mi²
Numerical Model: MODFLOW/Steady State
Model Parameters:
Hydraulic Conductivity
K_x=K_y=10200 ft/day; K_z=1020 ft/day
Aquifer Thickness: 75 ft
Water Use: 325 pgm

Scale 1:8,000

Well Location:

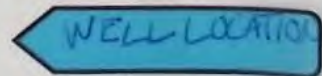
Well 1: 45° 31' 24.875" N 23° 48' 30.339" W

Well 2: 45° 31' 23.999" N 23° 48' 29.442" W

Datum: WGS 1984

T1NR9W Sec 32 USGS Kilchis River,
OR 7.5 minute topographic quadrangle

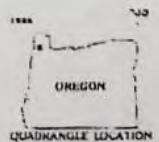
Tillmook County



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Prepared By Mike Hayes
Oregon Assoc. of Water Utilities
Review by: Dennis Nelson RG#1224
DWPA# 4100070

Appendix B: Figures

Figure 1: Drinking Water Protection Area - Groundwater Source

Figure 2: Potential Contaminant Survey

Figure 3: Sensitivity Map

Figure 4: Susceptibility Map

Figure 5: Drinking Water Protection Area - Watershed

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Potential Contaminant Inventory Kilchis Regional Water Dist.

Figure 2



1000 0 1000 2000 Feet

Scale 1:12000

Potential Contaminant Inventory
Relative Risk Level

- ⊕ Higher
- Mderate
- △ Lower

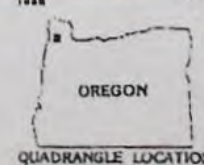
Note: Sites and areas noted in this figure are potential sources of contamination to the drinking water identified by oregon drinking water protection staff. Environmental contamination is not likely to occur when chemicals are used and managed properly.

Numbers indicate potential contaminante sources which are explained in Table 2

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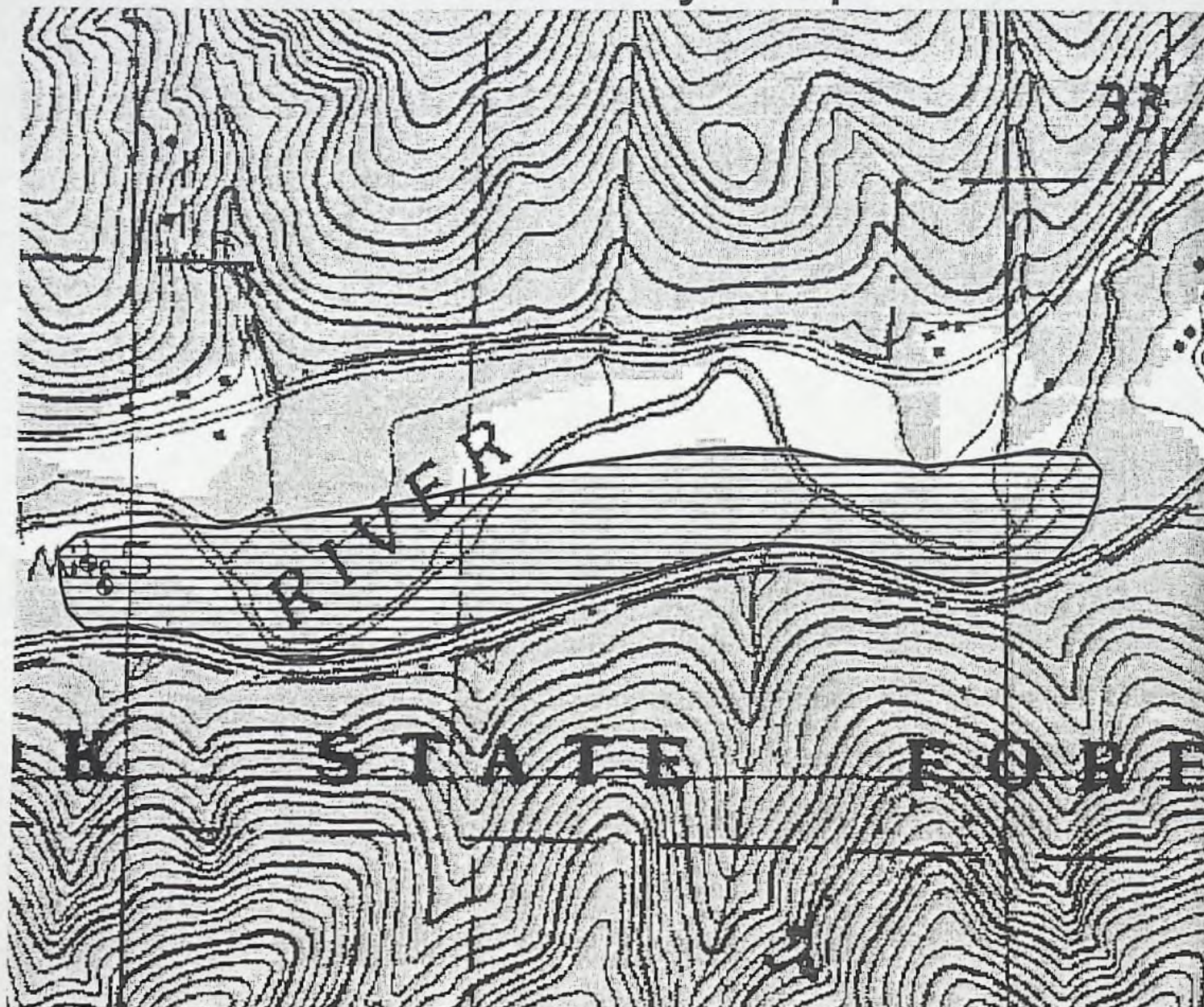
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Kilchis Regional Water Dist. Soil Sensitivity Map

Figure 3



700 0 700 1400 Feet

Scale 1:12000



Drinking Water protection area (DWPA)
Time of Travel (TOT) entire area
outlined is with in the 1-year TOT.

Aquifer sensitivity based on depth to
aquifer and permeability of subsurface
materials.

Map patterns are based on soil sensitivity
and indicate how rapidly water moves
across the soil zone under saturated
conditions

Soil Sensitivity Patterns
(within DWPA only)

Horizontal Lines: Medium

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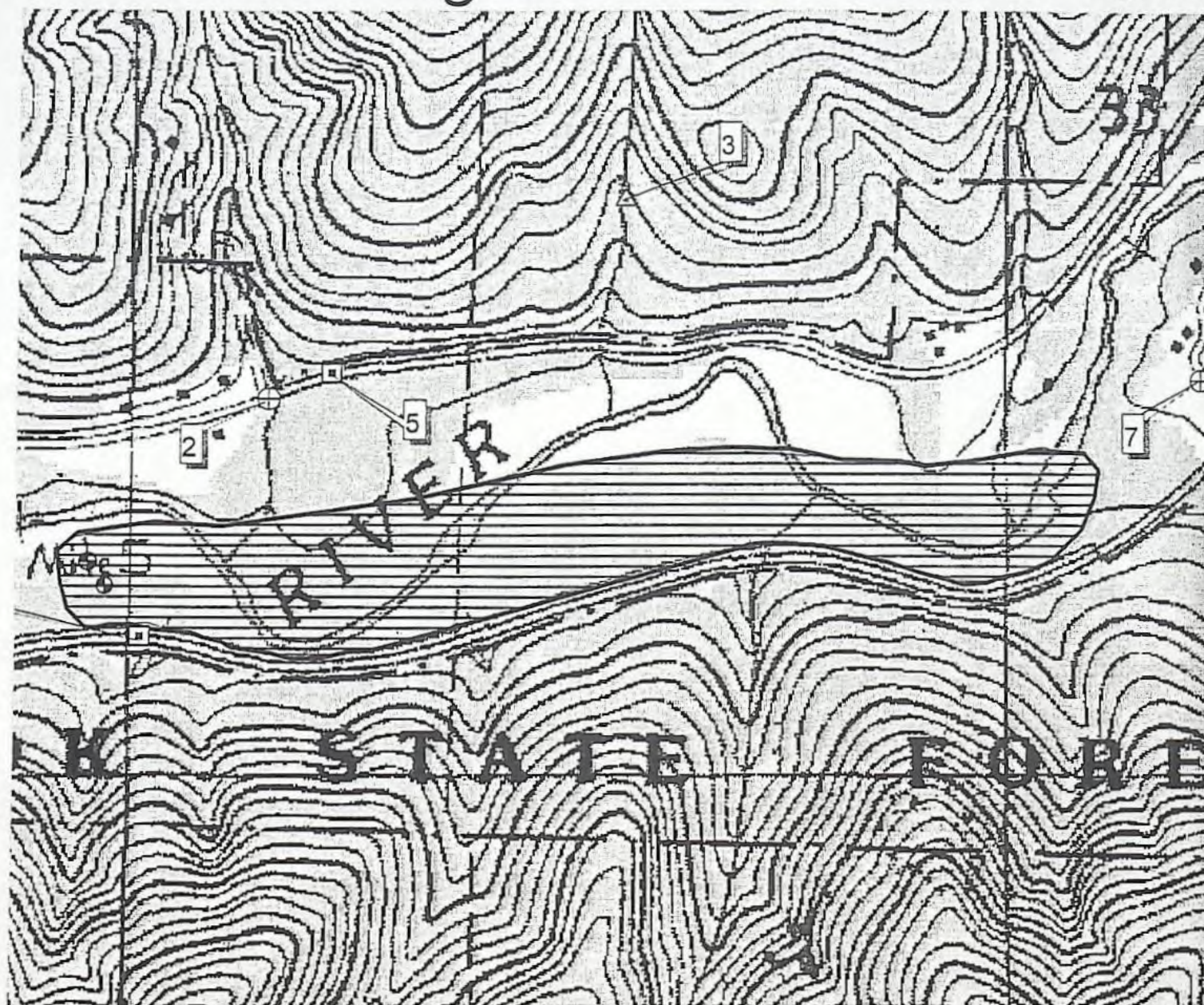
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Aquifer Susceptibility Map Kilchis Regional Water Dist.

Figure 4



Aquifer sensitivity based on depth to aquifer, permeability of subsurface materials

Map patterns are based on soil sensitivity and how rapidly water moves across the soil zone under saturated conditions

Potential Contaminant Inventory
Relative Risk Level

- ⊕ Higher
- ▣ Moderate
- △ Lower

Soil sensitivity pattern
Horizontal lines: Medium

Note: Sites and areas noted in this figure are potential sources of contamination to the drinking water 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 which are explained in Table 2

Features or activities that are identified as high or moderate risk that occur within an area designated as high or moderate sensitivity pose a greater risk to drinking water quality than those in areas of low sensitivity

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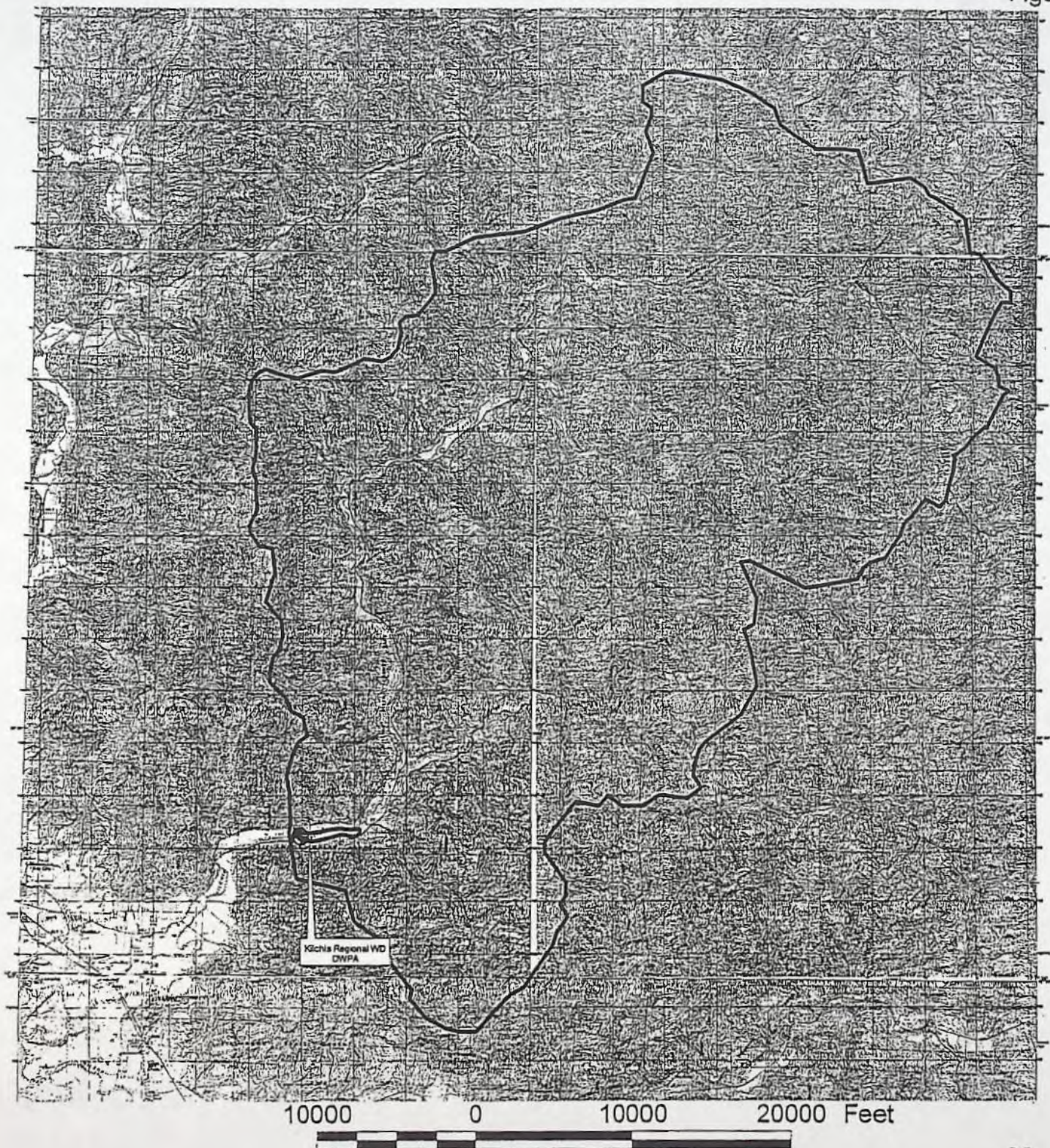
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Kilchis Regional Water District Northern Kilchis River Watershed

Figure 5



Kilchis River watershed upstream of Kilchis Regional Water District Drinking Water Supply Wells. Land use activities within the watershed may impact the supply wells.

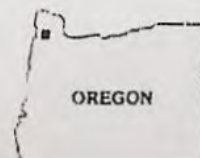
Watershed delineated based on areal

Scale: 1:110,000

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Appendix C: Inventory of Potential Contaminant Sources

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**APPENDIX C - INVENTORY OF POTENTIAL CONTAMINANT SOURCES
KILCHIS REGIONAL WATER DIST., - PWS # 4100079
OREGON SOURCE WATER ASSESSMENT**

Inventory Results

Table 1. Summary of Potential Contaminant Sources by Land Use

Table 2. Inventory Results - List of Potential Contaminant Sources

Notes for Tables:

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 Mike Hayes, Oregon Association of Water Utilities on 11/14/01.

Acronyms:

AST - Aboveground Storage Tank
DC - DEQ's Dry Cleaner database
DEQ - Oregon Department of Environmental Quality
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 (includes WPCF & NPDES permits)
SWMS - DEQ's Solid Waste Management System database
UST - DEQ's Underground Storage Tank database or Underground Storage Tank
WPCF - Water Pollution Control Facility
WRD - Oregon Water Resources Division database for water rights information

TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE

PWS # 4100079 KILCHIS REGIONAL WATER DIST.,
Residential/Municipal Land Uses

Potential Contamination Source	Note	Relative Risk Level	Total in DWPA
Airport - Maintenance/Fueling Area		Higher	0
Apartments and Condominiums		Lower	0
Campgrounds/RV Parks	(1)	Lower	1
Cemeteries - Pre-1945		Moderate	0
Drinking Water Treatment Plants		Moderate	0
Fire Station		Lower	0
Fire Training Facilities		Moderate	0
Golf Courses		Moderate	0
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 system/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
Other			0

NOTES:

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) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

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TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE

PWS # 4100079 KILCHIS REGIONAL WATER DIST.,
Commercial/Industrial Land Uses

Potential Contamination Source	Note	Relative Risk Level	Total in DWPA
Automobiles - Body Shops		Higher	0
Automobiles - Car Washes		Moderate	0
Automobiles - Gas Stations		Higher	0
Automobiles - 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
Plastics/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
Other			0

NOTES:

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.

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(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

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TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE

PWS # 4100079 KILCHIS REGIONAL WATER DIST.,
Agricultural/Forest Land Uses

Potential Contamination Source	Note	Relative Risk Level	Total in DWPA
Auction Lots	(1)	Higher	0
Boarding Stables	(1)	Moderate	0
Confined Animal Feeding Operations (CAFOs)	(1)	Higher	0
Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	(2)	Moderate	0
Crops - Nonirrigated (inc. Christmas trees, grains, grass seed, 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 Land - Broadcast Fertilized Areas		Lower	0
Managed Forest Land - Clearcut Harvest (< 35 yrs.)		Moderate	0
Managed Forest Land - Partial Harvest (< 10 yrs.)		Moderate	0
Managed Forest Land - Road Density (> 2 mi./sq. mi.)		Moderate	0
Pesticide/Fertilizer/Petroleum Storage, Handling, Mixing, & Cleaning Ar		Higher	0
Recent Burn Areas (< 10 yrs.)		Lower	0
Managed Forest Lands - Status Unknown		Moderate	0
Other: managed forest >35 years old		Lower	1

NOTES:

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

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(3) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

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TABLE 1. SUMMARY OF POTENTIAL CONTAMINANT SOURCES BY LAND USE

PWS # 4100079 KILCHIS REGIONAL WATER DIST.,
Miscellaneous Land Uses

Potential Contamination Source	Note	Relative Risk Level	Total in DWPA
Above Ground Storage Tanks - Excluding Water		Moderate	0
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/Equipment Maintenance		Higher	1
Homesteads - Rural - Septic Systems (< 1/acre)	(1)(3)	Lower	2
Injection/Dry Wells, Sumps - Class V UICs	(1)	Higher	0
Kennels (> 20 Pens)	(1)	Lower	0
Military Installations		Higher	0
Random Dump Sites		Moderate	0
River Recreation - Heavy Use (inc. campgrounds)	(1)	Lower	1
Sludge Disposal Areas	(1)	Moderate	0
Stormwater Retention Basins	(1)	Moderate	0
Transmission Lines - Right-of-Ways		Lower	0
Transportation - Freeways/State Highways/Other Heavy Use Roads		Moderate	2
Transportation - Railroads		Moderate	0
Transportation - Right-Of-Ways - Herbicide Use Areas		Moderate	0
Transportation - River Traffic - Heavy		Lower	0
Transportation - Stream Crossing - Perennial		Lower	2
UST - Confirmed Leaking Tanks - DEQ List		Higher	0
UST - Decommissioned/Inactive		Lower	0
UST - Nonregulated Tanks (< 1,100 gals or Large Heating Oil Tanks)		Higher	0
UST - Not Upgraded and/or Registered Tanks		Higher	0
UST - Upgraded/Registered - Active		Lower	0
UST - Status Unknown		Higher	0
Upstream Reservoirs/Dams		Lower	0
Wells/Abandoned Wells		Higher	2
Large Capacity Septic Systems (serves > 20 people) - Class V UICs	(1)	Higher	0
Construction/Demolition Areas		Moderate	0
Other			0

NOTES:

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) - For groundwater public water systems, septic systems located within the 2-year time-of-travel (TOT) are considered moderate risks.

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TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100079 KILCHIS REGIONAL WATER DIST.,

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
1	Homesteads - Rural - Machine Shops/Equipment Maintenance	Rural homestead with machine shops/equipment maintenance	South Kilchis River Road	Bay City	Field-Observation	Outside sensitive areas.	Higher	Spills, leaks, or improper handling of solvents, fuels, and other materials or chemicals during transportation, use, storage and disposal may impact the drinking water supply.	Possibly a commercial fisherman
2	Wells/Abandoned Wells	Rural Homesteads with septic systems and wells	Kilchis River Road	Bay City	Field-Observation	Outside sensitive areas.	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source.	All homes have private wells and septic systems and are on lots greater than 2 acres in size.
	Homesteads - Rural - Septic Systems (< 1/acre)						Lower	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Use of drain cleaners and dumping household hazardous wastes can result in groundwater contamination.	All homes have private wells and septic systems and are on lots greater than 2 acres in size.
3	Other managed forest >35 years old	Kilchis River Watershed	North of well	Bay City	Field-Observation	Outside sensitive areas.	Lower	The impacts of this potential contaminant source will be addressed during the enhanced inventory.	Watershed logged more than 35 years ago
4	Campgrounds/RV Parks	Kilchis Park/Boat Ramp	Kilchis Park	Bay City	Field-Observation	Outside sensitive areas.	Lower	Leaks or spills of automotive fluids or improperly managed septic systems and wastewater disposal may impact drinking water supply. Heavy usage along edge of waterbody may contribute to erosion, causing turbidity.	
	River Recreation - Heavy Use (inc. campgrounds)						Lower	Inadequate disposal of human wastes may contribute bacteria and nutrients to the drinking water supply. Heavy use may contribute to streambank erosion causing turbidity. Fuel spills and emissions may also contribute to contamination.	

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.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

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TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100079 KILCHIS REGIONAL WATER DIST.,

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
5	Transportation - Stream Crossing - Perennial	Kilchis River Road	Kilchis River Road	Bay City	Field-Observation	Outside sensitive areas.	Lower	Road building, maintenance & use may increase erosion & slope failure causing turbidity. Vehicle use increases the risk of leaks or spills of fuel & other chemicals. Over-application/improper handling of pesticides in right-of-way may also impact water.	Road crosses several small to moderate sized streams.
	Transportation - Freeways/State Highways/Other Heavy Use Roads						Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.	Road crosses several small to moderate sized streams.
6	Transportation - Stream Crossing - Perennial	South Kilchis River Road	South Kilchis River Road	Bay City	Field-Observation	Outside sensitive areas.	Lower	Road building, maintenance & use may increase erosion & slope failure causing turbidity. Vehicle use increases the risk of leaks or spills of fuel & other chemicals. Over-application/improper handling of pesticides in right-of-way may also impact water.	Road crosses several small to moderate sized streams.
	Transportation - Freeways/State Highways/Other Heavy Use Roads						Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.	Road crosses several small to moderate sized streams.
7	Wells/Abandoned Wells	Rural homesteads with septic and wells	South Kilchis River Road	Bay City	Field-Observation	Outside sensitive areas.	Higher	Improperly installed or maintained wells and abandoned wells may provide a direct conduit for contamination to groundwater and drinking water source.	All homes have private wells and septic systems and are on lots greater than 2 acres in size.
	Homesteads - Rural - Septic Systems (< 1/acre)						Lower	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Use of drain cleaners and dumping household hazardous wastes can result in groundwater contamination.	All homes have private wells and septic systems and are on lots greater than 2 acres in size.

e: 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.

Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

See Table 3 for database listings (if necessary).

Appendix D: Well Reports

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As report are to be
filled with the
ENGINEER, SALEM, OREGON 97310
within 30 days from the date
of well completion.

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

DATE COPY
State Well No. _____
State Permit No. _____

(1) OWNER:

Name City of Bay City

Address Bay City, Oregon

(2) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable ☐ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED:

12" Diam. from plus 2 ft. to 0 ft. Gage 375
12" Diam. from 0 ft. to 26 ft. Gage
10" Diam. from 40 ft. to 46 ft. Gage 250

(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 Johnson

Type low carbon steel

Model No.

Diam. 10 Slot size 100 Set from 20 ft. to 40 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: 1200 gal./min. with 3 ft. drawdown after 24 hrs.

Ball 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 grout

Well sealed from land surface to 25 ft.

Diameter of well bore to bottom of seal 16 in.

Diameter of well bore below seal 12 in. 6 sack mix

Number of sacks of cement used in well seal sacks

Number of sacks of bentonite used in well seal 0 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 Driller's well number

SW 1/4 SW 1/4 Section 33 T. 1N R. 9W W.M.

Bearing and distance from section or subdivision corner

(11) WATER LEVEL: Completed well

Depth at which water was first found 17 ft.

Static level 17 ft. below land surface. Date 9/23/75

Artesian pressure lbs. per square inch. Date

(12) WELL LOG:

Diameter of well below casing

Depth drilled 60 ft. Depth of completed well 46 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
clay grave soil brown	0	3	12
sandy gravel gray brown	3	19	12
sand gravel water gray	19	35	17
clay brown	35	38	17
rocky clay brown	38	42	38
brown weathered rock	42	60	42
hard rock	60	60	

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Work started 9/15/75 19 Completed 9/27/75 19

Date well drilling machine moved off of well 9/27/75 19

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] Date 9/30/75 19

(Drilling Machine Operator)

Drilling Machine Operator's License No. 213

Water Well Contractor's Certification:

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

Name -Zent Drilling, Inc.

(Person, firm or corporation) (Type or print)
Address 7310 St. Johns Vancouver, Wash. 9866

[Signed] Date 8/30/75 19

(Water Well Contractor)

Contractor's License No. 228 Date 8/30/75 19

Appendix E: Parameters Used in Delineation Model

Delineation Method: ☐ Calculated Fixed Radius ☐ Enhanced CFR ☐ Analytical
☒ Numerical ☐ Hydrogeologic Mapping

Pump Rate (Q in gpm): 323

Source: ☒ System ☐ Water Resources Dept ☐ Comparable Community
☐ Pump Capacity ☐ Population Estimate ☐ 90% of Safe Yield

Nature of the Aquifer: ☐ Unknown ☒ Unconfined
☐ Semi-confined ☐ Confined

Aquifer name: Kilchis River Alluvium

Confining unit lithology: NA
Depth to 1st confining unit: NA
Thickness of confining unit: NA
Depth to 2nd confining unit: NA
Thickness of confining unit: NA
Depth to Aquifer: 15 feet

Aquifer Characteristics:

Lithology:

☐ Unknown ☐ Sandy Silt ☐ Layered Volcanic Rocks
☐ Sand ☒ Sand & Gravel ☐ Fractured Volcanic Rocks
☐ Gravel ☐ Cobbles/Gravel ☐ Fractured Sedimentary Rocks
☐ Other: _____

Thickness (b): Water-Bearing Zone: 20 feet

Effective Porosity (n): 0.25

Hydraulic Conductivity (Permeability): 0.1181 ft/day ☐ N/A
☒ Estimated from lithology ☐ Specific Capacity (Well Report)
☐ Published Report ☐ Aquifer Test

Hydraulic Gradient: 0.0000347 Flow Direction: Down Stream ☐ N/A
☐ Published Report ☐ Graphical Solution
☐ Field Measurements ☒ Model Results

Irrigation Wells Accounted for: 0 wells

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Appendix F: Sensitivity Summary: Kilchis Regional Water District Well #1

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)
☐	☒	Source-related Coliform: total fecal Date
☐	☒	Nitrate-N $\geq$ 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
☒	☐	Commingle of Aquifers Suspected
☐	☒	Nitrate-N 1-4.9 mg/L: ConcentrationDate
☒	☐	Inorganic Chemical Detection (<50% of MCL): Barium
☐	☒	Well Construction Deficiencies from Site Visit.
☒	☐	Well constructed prior to 1979
☐	☒	Other Wells Score $\geq$ 400
☐	☒	Soil with TOT <65 hours or lack of soil information in DWPA
☐	☒	Infiltration Potential 4 to $\leq$ 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: Well reports indicates bore hole drilled into bed rock with lower head level

Sensitivity Analysis Completed by: Mike Hayes Date: 04/09/2003

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Appendix F: Sensitivity Summary: Kilchis Regional Water District Well #2

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)
☐	☒	Source-related Coliform: total fecal Date
☐	☒	Nitrate-N $\geq$ 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
☐	☒	Commingleing of Aquifers Suspected
☐	☒	Nitrate-N 1-4.9 mg/L: Concentration Date
☒	☐	Inorganic Chemical Detection (<50% of MCL): Barium
☐	☒	Well Construction Deficiencies from Site Visit.
☐	☒	Well constructed prior to 1979
☐	☒	Other Wells Score $\geq$ 400
☐	☒	Soil with TOT <65 hours or lack of soil information in DWPA
☐	☒	Infiltration Potential 4 to $\leq$ 7 (Not performed on TNCWS)
☒	☐	Surface water within 500 feet: Kilchis River within 500 ft

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: Mike Hayes Date: 0409/2003

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Appendix G: Groundwater Fact Sheet

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DRINKING WATER PROTECTION FACT SHEET

GROUNDWATER BASICS



What Is Groundwater?

Groundwater can be found at various depths at any location on the Earth's surface. It is the water that fills the natural open spaces (e.g., fractures or pore spaces between grains) in soil and rocks underground in much the same way as water fills a sponge. Groundwater begins as precipitation and soaks into the ground where it is stored in underground geological water systems called aquifers. An aquifer is any geologic material (like sand and gravel or fractured bedrock) that is filled with water and will yield that water to a well. Groundwater can move sideways as well as up or down in response to gravity, differences in elevation, and differences in pressure. The movement is usually quite slow — frequently as little as a few feet per year — although it can move as much as several feet per day in more permeable zones. Groundwater does not occur as underground lakes or streams.

Who Uses Groundwater?

Of all groundwater used in Oregon, the majority is used for irrigation. Future population growth and land development is increasingly depending on groundwater resources. Prior allocation and rising treatment costs limit future use. Over 70 percent of all Oregonians (that's more than two million people) are at least partially dependent on groundwater for their drinking water supplies. Approximately 95 percent of Oregonians in rural areas are dependent on groundwater. In many areas, groundwater is the only source of drinking water. Protecting our water supply from contamination now will help maintain a clean and safe water supply for generations to come.

Oregon Groundwater Usage



■ Agriculture (72%)
□ Public Supply (12.6%)
■ Domestic/Commercial (10.9%)
□ Industry/Mining (4.5%)

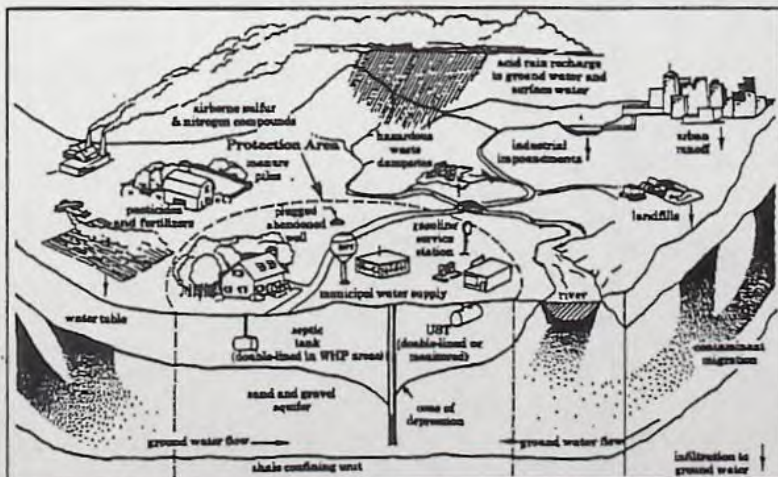
Potential Sources of Contamination

- * Household chemicals and cleaning products.
- * Excess nitrogen fertilizers including manure and lawn fertilizers.
- * Industrial solvents.
- * Chemical spills from highway, railroad accidents, or spills from business or manufacturing sites.
- * Improperly applied pesticides or pesticide spills.
- * Leaking underground storage tanks.
- * Improperly installed or old domestic wells.
- * Poorly maintained septic systems.
- * Urban runoff.
- * Waste disposal sites or dumps.

How Does Groundwater Become Contaminated?

With the increased use of chemicals in the 20th century, the contamination of groundwater has become a growing concern. When rainwater comes in contact with any source of contamination at the surface or in the soil, it dissolves some of that contaminant and carries it to the aquifer. Groundwater moves from areas where the water table is high to where the water table is low. Consequently, a contaminant may enter the aquifer some distance upgradient of a public or private drinking water well and move towards the well. When a well is pumping, it lowers the water table in the immediate vicinity of the well increasing the tendency for water to move towards the well.

Although it is common practice to associate contamination with highly visible features such as landfills, gas stations, industry or agriculture, potential contaminants are widespread and often come from common everyday activities as well, such as septic systems, lawn and garden chemicals, pesticides applied to highway right-of-ways, stormwater runoff, auto repair shops, beauty shops, dry cleaners, medical institutions, photo processing labs, etc. Importantly, it takes only a very small amount of some chemicals in drinking water to raise health concerns. For example: 1 gallon of pure trichloroethylene, a common solvent, will contaminate approximately 292 million gallons of water to the health-based limit for drinking water.



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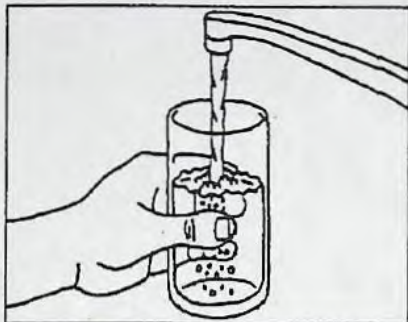
DEPARTMENT OF ENVIRONMENTAL QUALITY
811 S.W. Sixth Avenue * Portland, Oregon 97204

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How Can We Protect Drinking Water?

In Oregon, the state Department of Environmental Quality (DEQ) and the Oregon Health Division (OHD) are conducting "source water assessments" for most public water systems. These assessments include the identification of the source area supplying the well (commonly called the Drinking Water Protection Area), an inventory of potential contaminant sources within that area, and an identification of the areas most susceptible to contamination. Using the results of the assessment, members of the local community can form a "Drinking Water Protection Team" and develop a plan to reduce the risks of contamination from those sources. Technical assistance in Drinking Water Protection Plan development, and implementation is available from DEQ. The management options implemented as part

of the Drinking Water Protection Plan are highly individualized, and should be developed by the community to meet their specific needs. Cooperative decision making by public officials, water systems, public interest groups, business, agriculture, and individual citizens can create a powerful long-lasting partnership that will facilitate implementation and public acceptance of the drinking water protection plan.

Communities with groundwater systems interested in initiating a drinking water protection plan can get assistance from **Julie Harvey**, DEQ's Drinking Water Protection Specialist, at 503-229-5664 or toll free in Oregon at 1-800-452-4011.

Prevention Is The Key To Protection

Once groundwater is contaminated, it is difficult, costly, and sometimes impossible to clean up; communities are faced with the task of installing treatment facilities or locating an alternate source. Some examples of this occurring in Oregon are:

- * Milwaukie spent \$2,000,000 to study and treat solvents in their groundwater. Annual operations and maintenance costs for the treatment system are \$100,000/year.
- * Over \$500,000 was spent on study and treatment at Lakewood Estates. Residents used bottled water for two years.
- * Lake Oswego, Woodburn, Lebanon, and Madras have all lost the use of wells due to contamination.

That is why prevention is the key to groundwater quality protection. Because of their interrelationship, maintaining groundwater quality also helps protect surface water quality.

Oregon Drinking Water Protection Success Stories

Several water purveyors in Oregon already have Drinking Water Protection Plans certified by DEQ and many others have initiated drinking water protection activities in their communities. For example, between 1995 and 1998, members of the local governments, commercial/industrial sector, agricultural growers, and residents in the cities of **Coburg** and **Junction City** worked together to develop a plan that fit the local conditions and priorities. Nitrate (a common product of septic systems and agricultural practices) was identified in the local groundwater which served as a flag to the communities that the water is also vulnerable to other potential sources of contamination. These cities are now in the process of implementing management efforts which include a highly successful citizen, agriculture, and business involvement/outreach plan and a recognition program for growers and businesses that voluntarily apply practices that are in the best interest of drinking water protection and the community.

The **Powell Valley Road Water District** in Portland also had their drinking water protection plan approved in 1998. To get the word out on drinking water protection, Powell Valley Road Water District has contacted many of the business owners within the drinking water protection area, stenciled all stormdrains, developed a video on drinking water, and hosts a community *Clean Water Festival* in September of each year.

In 1991, trace amounts of a solvent were discovered in one of **Springfield's** water supply wells indicating the wellfield was susceptible to contamination. Although the source for the solvent was identified and removed, Springfield initiated a drinking water protection program for their 12 wellfields (containing 30 individual wells) that will help ensure future risks to the public water supply are minimized. The primary protection measures in Springfield's recently completed Drinking Water Protection Plan are preventative and include a public education program and adoption of a Drinking Water Protection Zoning Overlay District.

Other water purveyors are using the information obtained during the planning process to make informed choices for the land use, decide the best location to site new wells, and to focus pollution prevention efforts on the areas that matter most to the community's drinking water supply. Your community can become involved as well by contacting your public water system to find out about where your water comes from, its quality, and what is being done to protect it.



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How Can I Help?

One person can make a difference. By making small changes in our lifestyles, we can make our environment better. We can also encourage our friends, relatives, co-workers, and neighbors to help prevent pollution. Some of the things you can do to protect groundwater in your community are listed below. **Oregon's future depends on us!**

Things You Can Do To Protect Groundwater

<i>In Your Community</i> 	1. Learn more about where your water supply comes from, potential sources of contamination, and local and state waste protection efforts. 2. Organize a groundwater forum, community water festival, water testing or other educational event. 3. Support groundwater education in local schools. 4. Volunteer to help develop and implement your community's Drinking Water Protection Program. 5. Encourage your community to become active in the "Groundwater Guardian" program, a national non-regulatory program that recognizes local groundwater protection efforts. Contact the Groundwater Foundation for information 1-800-858-4844.
<i>In The Home</i> 	1. Properly dispose of household hazardous wastes. Take toxic chemicals like weed killers, pesticides, paint, thinners, strippers, wood preservatives, furniture polish, cleaning chemicals, and bleach to a hazardous waste collection center. Don't dump toxic chemicals down the drain or on the ground. Call your local garbage hauler for more information. 2. Find out if you have underground storage tanks (USTs) on your property. Residential USTs typically are used to store heating oil. Rural properties and farms may have USTs for gasoline, diesel, chemical, and waste oil storage. Active USTs should be checked for leakage, which can increase with UST age. DEQ strongly recommends inactive USTs be properly removed or closed in place to prevent expensive leaks that endanger public health or damage the environment. Homeowners that replace or decommission a heating oil tank may be eligible for free technical assistance and grants from DEQ. Contact DEQ's Tank Helpline at 1-800-742-7878. 3. Conserve Water — Turn off the faucet when you are brushing your teeth, shaving, or washing your face and you will save 2-3 gallons of water each minute. Install low flow faucets and fix leaky faucets right away. Clean vegetables and fruits in a pan of water — not under a running faucet. Keep a container of drinking water in the refrigerator instead of letting the faucet run until the water is cold enough to drink. Run the dishwasher and washing machine only when fully loaded. Make every drop count!
<i>In Your Garage/Workshop</i> 	1. Recycle or properly dispose of used motor oil, grease and parts cleaners, and antifreeze. Solid and hazardous waste laws prohibit land spreading of waste oil for dust or weed suppression. Call your local garbage hauler for more information. 2. Check for leaking fluids from vehicles. Clean up drips with an absorbent like kitty litter or sawdust and properly dispose of contaminated absorbent. Do not use water to wash spills since water percolates into the ground or discharges to storm drains in the street (which typically lead to streams and rivers). 3. Inventory your hazardous household products like thinners, solvents, oil based paints, stains and finishes, paint and finish preparation products, photographic chemicals, and art supplies. Store only what you'll use; properly dispose of waste materials; and give extras to a neighbor for their use. Use less toxic alternatives whenever possible.

Things You Can Do To Protect Groundwater (Continued)

In The Yard



- ♣ Carefully follow label directions for use and disposal of fertilizers and pesticides and use less toxic alternatives whenever possible.
- ♣ Select disease and pest resistant plants and learn about biological controls. Call your local County Extension Service Office for free information.
- ♣ Go easy on fertilizers and pesticides. Test your soil to help determine fertilizer and compost needs for your lawn and garden to avoid over fertilization.
- ♣ Water Wisely — Water during the cooler parts of the day (late evening and early morning). Water slowly and evenly with 1 to 1½ inches of water per week so that moisture soaks down to the roots. **If it doesn't grow, don't water it!** Use a broom (not a hose) to clean driveways, sidewalks, and other hard surfaces. Check for leaks in pipes, hoses, faucets, and couplings.
- ♣ Organize a local workshop with your neighbors to learn more about your wells and septic system. Call OSU's Extension Service (Gail Glick) for assistance.

Well & Septic System Owners



- ♣ Never store pesticides, fertilizers, and other chemicals in your well house to avoid direct well contamination.
- ♣ Properly abandon old wells and never use them as disposal pits. For information on abandoning wells or to order well records (logs), contact Oregon Water Resources Department at 1-800-624-3199.
- ♣ Ensure your well construction and surface seal is adequate to minimize the chance of chemicals wicking through the soil down the outside of the casing or entering the well directly. Call your local watermaster (Oregon Water Resources Department) for a free inspection.
- ♣ Regularly test your well water for nitrates, bacteria, and other contaminants, as necessary.
- ♣ Properly maintain your septic system by having the septic tank pumped out every 2 - 3 years.
- ♣ Use less water. The more groundwater you use, the higher the risk is for pulling nearby groundwater pollution toward the well. Also, your septic system functions better if less water goes down the drain.
- ♣ Do not put improper materials down the household drains like garbage disposal food wastes, drain cleaners, household chemicals, and other toxic-cleaning agents.

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Who To Call For Help

For local assistance, check the government section of your phone directory for telephone numbers.

- | | |
|---|--|
| <ul style="list-style-type: none"> ▲ Water Utility or Public Works Department. ▲ County Environmental Health Department. ▲ County Extension Service. | <ul style="list-style-type: none"> ▲ County Development or Planning Office. ▲ Waste Disposal and Recycling Facility (check your monthly garbage bill for name and number). |
|---|--|

Contact	What
Oregon Department of Environmental Quality (DEQ) 1-800-452-4011 or (503) 229-5630 Internet Page: http://deq.state.or.us	Drinking water protection planning, groundwater contamination, septic tanks, underground storage tanks, toxic wastes, pollution prevention, and hazardous waste reduction, collection, and disposal.
Oregon Health Division (503) 731-4010 or (541) 726-2587 Internet Page: http://www.ohd.hr.state.or.us	Groundwater issues, health effects, water quality concerns, drinking water testing laboratories, groundwater susceptibility, and drinking water protection.
Oregon Water Resources Department 1-800-624-3199 or (503) 378-8455 Internet Page: http://www.wrd.state.or.us	Abandoned wells, well construction, well logs, well maintenance, water rights, and water master.
Oregon State University Extension Service / Home®A®Syst (541) 737-6294 Internet Page: http://www.agcomm.ads.orst.edu	Groundwater quality assessment for rural homeowners, farmers, and private well owners, groundwater friendly gardening, and lawn care.
Oregon Department of Agriculture (503) 986-4550 Internet Page: http://www.oda.state.or.us/Natural_Resources/wqual.htm	Technical assistance regarding agricultural practices, effect of soil type on groundwater vulnerability, pesticides, fertilizers, best management practices, and permits.

Accessibility Information

This publication is available in alternate format (e.g., large type, braille) by calling DEQ Public Affairs at (503) 229-5317 or toll free within Oregon at 1-800-452-4011. People with hearing impairments can call DEQ's TTY number at (503) 229-6993.

**Appendix H: BMPs For Some Activities Commonly Found Within
Drinking Water Protection Areas.**

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Household Hazardous Waste

CHEMICAL HAZARDS IN THE HOME

PRODUCT	DISPOSAL SUGGESTIONS	SUBSTITUTES AND PRECAUTIONS
Aerosols	Best: Put only empty cans in trash. 2nd Best: Full or partially full cans to HHW collection site.	Instead: Use non-aerosol products. Safe Use: Store in cool place. Do not burn or put in trash compactor.
Batteries: household (mercury, cadmium, lithium, silver, lead)	Best: HHW collection site.	Instead: Use rechargeable batteries. Avoid battery-operated products.
Bleach: chlorine	Best: Use up/give away. 2nd Best: Flush small amounts down drain with plenty of water. Large amounts to HHW collection site.	Instead: Use 1/2 cup borax per washer load, or use hydrogen peroxide in a 3 percent solution. Safe Use: NEVER mix chlorine with ammonia or strong acids like toilet bowl cleaner. The combination produces hazardous fumes.
Detergent cleaners	Best: Use up/give away. 2nd Best: Dilute and wash down sink or take to HHW collection site.	Instead: Use nontoxic alternatives. (See below) Safe Use: Liquid dishwashing detergent is mildest, laundry detergent is moderate, automatic dishwasher detergent is harshest. Use mildest product for your needs.
Drain cleaners	Best: Use up/give away. Put empty container in trash. 2nd Best: Dilute small amounts and wash down sink or take to HHW collection site.	Instead: Use nontoxic alternatives. Do not pour grease down the drain. Pour boiling water down drain weekly. Use plunger or plumber's snake. Pour 1/2 cup baking soda and 1/2 cup vinegar down drain. Let stand 15 minutes. Pour boiling water down drain.
Medicines: unneeded or expired	Best: HHW collection site. 2nd Best: Flush down drain.	Safe Use: Check contents of medicine chest regularly. Old medications may lose their effectiveness, but not their toxicity.
Metal polishes	Best: Use up/give away. 2nd Best: HHW collection site. 3rd Best: Expose to air to evaporate solvents, then put in garbage.	Instead: Use nontoxic alternatives. Safe Use: Use only in well-ventilated area. (See below)
Mothballs	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: Before storing clean articles, double wrap in tightly sealed plastic bags or in tight container (such as a cedar chest). Safe Use: Don't use in living areas. Air out clothing before use.
Oven cleaner	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: Use a soap/borax combination, followed by a mixture of baking soda and salt for abrasion. Apply with a copper scrubber. Use cleaner without lye. Safe Use: Do not use aerosols; they can explode.
Toilet bowl cleaner	Best: Use up/give away. 2nd Best: Flush with lots of water.	Instead: Use a paste of borax and lemon juice. Scrub with a stiff brush.
Window cleaner	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: Spray on solution of 1/2 water and 1/2 vinegar; wipe dry with newspaper or squeegee. Safe Use: Ventilate room.
Wood cleaners, polishes, and waxes	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: Damp mop wood floors with mild vegetable oil soap. Rub black heel marks with paste of baking soda and water. For furniture, apply olive or almond oil. Let stand for several hours. Polish with a soft dry cloth.
Mildew remover	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: Scrub with a vinegar and salt mixture. Use borax to remove mildew from plastic shower curtains.

PESTICIDES AND YARD PRODUCTS

Insecticides	Best: If not banned, use according to label instructions. Empty cardboard containers: Dispose of empty box in garbage. Empty glass and plastic containers: Triple rinse with water and apply according to label directions. Wrap in newspaper and put in garbage. If banned: Take to HHW collection site. Do not pour on ground, in a ditch, or down a drain.	Instead: Use nontoxic alternatives. (See below) Safe Use: Do not buy more than you need.
Fertilizers	Best: Use up/give away. Put empty bag in garbage. 2nd Best: If it does not contain pesticides, put in heavy bag, tie and dispose of in garbage. If it contains pesticides, take to HHW collection site.	Instead: Use compost as fertilizer. Use organic fertilizers: bone meal, fish emulsion, manure.
Herbicides	Best: If not banned, use up/give away. Triple rinse empty containers and apply rinse water as directed. Put empty containers in trash. 2nd Best: HHW collection site. Do not dispose of in garbage, sewer, septic tank or storm drain.	Instead: Cover garden with plastic or mulch (such as alfalfa hay) to prevent weed germination. Grow a healthy lawn to out-compete weeds. Pull weeds when they first appear.

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Best: If not banned, use up/give away. Triple rinse empty containers and apply as directed. Put empty containers in trash.
2nd Best: HHW collection site. Do not dispose of in garbage, sewer, septic tank or storm drain.

Instead: For mice and rats: Use traps baited with a peanut butter, oatmeal and honey mixture. Use glue boards or sticky traps. Bait with warfarin are lethal to rodents, yet relatively safe for household use. For moles: Do you really want to kill them? They are voracious insect eaters. Scissor traps are effective. For gophers: Use spring traps or box traps. Set in burrow runways.

CHEMICAL HAZARDS IN THE GARAGE AND HOME WORKSHOP

Asphalt roofing compounds	Best: Use up/give away. 2nd Best: HHW collection site. 3rd Best: Expose open container to air to evaporate solvents/put in garbage.	Instead: No substitutes. Safe Use: Do not use indoors.
Auto: antifreeze	Best: HHW collection site. 2nd Best: Contact sewage treatment plant for permission to flush small amounts down the sewer. Do not flush into septic tank or pour in storm drain.	Instead: Propylene Glycol-based antifreeze is less toxic than Ethylene Glycol-based. Check the antifreeze each year to see if it really needs to be replaced. Safe Use: Clean up leaks or spills carefully.
Auto: batteries	Best: Take old batteries to battery retailer or wholesaler for recycling. (It is illegal to dispose of auto batteries.) 2nd Best: HHW collection site.	Instead: No substitutes.
Auto: degreasers	Best: Use up/give away. 2nd Best: HHW collection site. Do not mix with used oil.	Instead: Choose strong detergent type over solvent type.
Auto: used motor oil and transmission fluid	Best: Recycle at HHW collection site, recycling center or at curbside (if available). Do not pour on ground, in a ditch or down drain. Absorbent containing "easy-change" boxes cannot be recycled.	Instead: Have your oil changed at a service station that has its oil recycled.
Auto: waxes and polishes	Best: Use up/give away. 2nd Best: HHW collection site.	Instead: No substitutes. Safe Use: Use outside.
Paints: water-based and latex	Best: If paint does not contain lead (generally if manufactured since 1973), use up or give away. If paint contains mercury, use outdoors. 2nd Best: Allow to harden in can, then dispose of in garbage. 3rd Best: HHW collection site.	Instead: Use whitewash (a combination of hydrated lime, water, and salt) for fences, barns, basements and outbuildings. Safe Use: Ventilate area well.
Paints: oil-based and varnishes	Best: If paint does not contain lead, use up or give away. Let empty can dry and dispose of in garbage. 2nd Best: HHW collection site.	Instead: Use water-based or latex paints. Safe Use: Ventilate area well. Do not use near open flame. May take weeks for fumes to go away.
Paint strippers	Best: Use up or give away. Let the empty container air outside, wrap scrapings in several layers of newspaper and put in garbage. 2nd Best: HHW collection site.	Instead: Use a scraper, heat gun or sandpaper to remove paint. Use strippers with less toxic ingredients (bearing a caution advisory). Safe Use: Use in well-ventilated area. Use precautions against lead-bearing dust in some old paints.
Paint thinners	Best: Let settle, pour off thinner for reuse. Take sludge to HHW collection site. If thinner is not reusable, let small amounts (less than 1 cup) evaporate outside. Take large amounts of thinner to HHW collection site. Do not pour down a storm drain, down an inside drain, or on the ground.	Instead: Avoid paint thinners by choosing water-based paints.

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CONSIDER USING NON-TOXIC ALTERNATIVES

Cleaners

- Use baking soda, whiting (powdered chalk sold at hardware and paint stores) or a nonchlorinated scouring powder such as Bon Ami™ for general cleaning.
- Use full strength vinegar plus salt to remove grease.
- Use borax to remove spots on counters.
- Use a pumice stick to clean ovens and grills and remove rust from tools.
- Use half the recommended amount of automatic dish washer detergent.

Recipes for all-purpose cleaners:

1. 1/2 cup household ammonia, 1/2 cup white vinegar, 1/2 gallon water, 1/4 cup baking soda.
2. 1 tsp. liquid soap (castile), 1 tsp. borax, 1 qt. water, 1/4 cup vinegar

Polish

- Copper polish Use lemon juice and salt.
- Aluminum polish Inside pan - Use 2 Tbsp. of cream of tartar to one quart of water. Bring to boil and simmer 10 minutes. Outside pan - Use baking soda and scouring pad.
- Chrome polish Use baking soda or vinegar. To remove scum, try baby oil.
- Brass polish Apply thick coating of 1/2 tsp. salt, 1/2 cup vinegar and enough flour to make a paste. Let set for 15-60 minutes. Rinse with water. (Do not use on metal with a lacquer coating.)
- Stainless steel Use baking soda and a plastic scouring pad.
- Silver Use baking soda and soft sponge or boil silver for 3 minutes with a sheet of aluminum foil, 2 inches water, 1 tsp. soda and 1 tsp. salt.

Insects on plants:

- Spray with soapy water and rinse after a few minutes.
- Place tobacco on potted plant soil.

For slugs and snails:

- Sprinkle sawdust, diatomaceous earth, ashes or lime around affected areas.
- Place bowls of beer around the garden.

For ants:

- Use commercial sticky barriers to block ants.
- Sprinkle boric acid on trails and where ants are found in nooks and crannies.

For fleas:

- Vacuum house regularly and thoroughly.
- Bathe pet regularly.
- Launder pet bedding frequently.
- Feed cats and dogs brewer's yeast.



What Is Household Hazardous Waste?

Why Is It A Problem?

Many products found in your home can pose a health or environmental hazard if you don't dispose of them properly. Anything labeled as toxic, flammable, corrosive, reactive, infectious or radioactive can threaten family health and safety.

According to national estimates, each home contains 3 - 8 gallons of hazardous materials in kitchens, bathrooms, garages and basements. Throwing these materials into the garbage can result in sanitation workers who may be injured by fires or explosions or poisoned by acids.

Hazardous wastes that reach our landfills can leach into the soil, polluting water and threatening all living things.

Substances poured into Oregon's household drains and toilets enter into the sewage treatment process, eventually impacting fish and wildlife. Substances poured on soil or streets or into storm drains are carried to our streams. As little as one pint of solvent can cause measurable fish kills.

How To Minimize Hazardous Waste In Your Home

- Use safer alternatives.
- Read labels before purchasing. Watch for the words "caution," "warning," and "danger." Follow label directions.
- Buy only what you need and will use up.
- If you do have products left over, give them to friends, neighbors, or charitable institutions to use up.

Handle Hazardous Waste The Recommended Way

Watch For Household Hazardous Waste Collection Days.

Your community may be among those holding household hazardous waste collection events, where residents can bring unused and unwanted hazardous substances to a central location for proper sorting and disposal by local officials and hazardous waste collectors.

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Until you safely dispose of these materials, you can

- Keep containers upright, tightly closed, with labels intact.
- Keep unused portions and empty containers (check labels to see if an empty container can be triple-rinsed and safely discarded in your household garbage.)
- Never mix substances or pour into other containers.
- Avoid burning or reusing empty containers.
- Keep out of reach of children, pets, and wildlife.

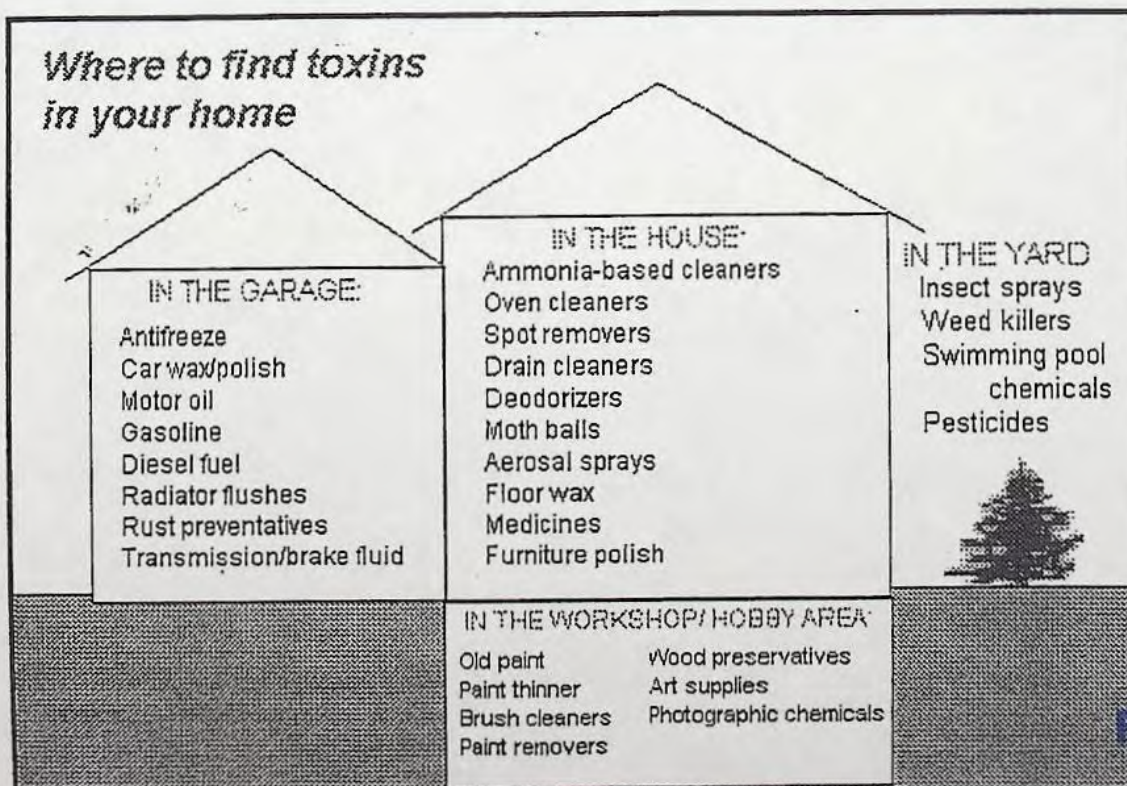
What Should You Know About Hazardous Waste?

Many home and garden products contain potentially dangerous chemicals. They may cause injury to living things or damage the environment if not used and disposed of safely.

If Something Spills ...

Your first concern must be for your own safety. If you have been exposed to toxic materials, call the Oregon Poison Control Center at 1-800-452-7165. In the Portland area, call 494-8968. For medical emergencies or large spills, call 911 or your fire department.

- Read the product label for exposure and spill information.
- Keep the area well-ventilated.
- Keep children and pets away.
- Wear gloves and protective clothing.
- Contain and cover the spill with absorbent material such as cat litter, clay, or sand.
- Sweep and scoop the material into a container with a lid or doubled plastic bags. Secure well.
- Finally, wash the surface well with soap and water.



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For information on collection events, call 1-800-732-9253. For more information, call your garbage hauler, local government solid waste department, or the Oregon Department of Environmental Quality at (503)229-5913, or toll free 1-800-452-4011. If you live in the Portland area, call Metro at (503)234-3000. Ask for household hazardous waste information.



The organizations listed in this brochure assume no responsibility and disclaim any liability for any injury or damage resulting from the use or effect of any product or information specified in this publication.

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Household Hazardous Waste

CHEMICAL HAZARDS IN THE HOME		
PRODUCT	DISPOSAL SUGGESTIONS	SUBSTITUTES & PRECAUTIONS
Aerosols	Best: Put only empty cans in trash. 2nd Best: Take full or partially full cans to HHW collection site.	Instead: Use non-aerosol products. Safe Use: Store in cool place. Do not burn or put in trash compactor.
Batteries: <i>Household (mercury, cadmium, lithium, silver, lead)</i>	Best: Take to HHW collection site.	Instead: Use rechargeable batteries. Avoid battery-operated products.
Bleach: Chlorine	Best: Use up/give away. 2nd Best: Flush small amounts down drain with plenty of water. Take large amounts to HHW collection site.	Instead: Use ½ cup borax per washer load, or use hydrogen peroxide in a 3% solution. Safe Use: Never mix chlorine with ammonia or strong acids such as toilet bowl cleaner. The combination produces hazardous fumes.
Detergent Cleaners	Best: Use up/give away. 2nd Best: Dilute and wash down sink or take to HHW collection site.	Instead: Use non-toxic alternatives (see below). Safe Use: Liquid dishwashing detergent is mildest, laundry detergent is moderate, automatic dishwasher detergent is harshest. Use mildest product for your needs.
Drain Cleaners	Best: Use up/give away. Put empty container in trash. 2nd Best: Dilute small amounts and wash down sink or take to HHW	Instead: Use non-toxic alternatives. Do not pour grease down the drain. Pour boiling water down drain weekly. Use

	collection site.	plunger or plumber's snake. Pour ½ cup baking soda and ½ cup vinegar down drain. Let stand 15 minutes. Pour boiling water down drain.
Medicines: <i>Unneeded or expired</i>	Best: Take to HHW collection site. 2nd Best: Flush down drain.	Safe Use: Check contents of medicine chest regularly. Old medications may lose their effectiveness, but not their toxicity.
Metal Polishes	Best: Use up/give away. 2nd Best: Take to HHW collection site. 3rd Best: Expose to air to evaporate solvents, then put in garbage.	Instead: Use non-toxic alternatives. Safe Use: Use only in well-ventilated area (see below).
Mildew Remover	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: Scrub with a vinegar and salt mixture.
Mothballs	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: Before storing clean articles, double wrap in tightly sealed plastic bags or in tight container (such as a cedar chest). Safe Use: Don't use in living areas. Air out clothing before use
Oven Cleaner	Best: Use up/give away. 2nd Best: Flush with lots of water.	Instead: Use a non-chlorinated scouring powder, a pumice stick or a copper or steel wool scrubbing pad. Use cleaner without lye. Safe Use: Do not use aerosols; they can explode.
Toilet Bowl Cleaner	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: Use a paste of borax and lemon juice. Scrub with a stiff brush.
Window Cleaner	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: Spray on solution of ½ water and ½ vinegar; wipe dry with newspaper or squeegee. Safe Use: Ventilate room.
Wood Cleaners, Polishes, and Waxes	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: Damp mop wood floors with mild vegetable oil soap. Rub black heel marks with a paste of baking soda and water. For wood furniture, apply olive or almond oil. Let stand for several hours. Polish with a soft dry cloth.

PESTICIDES AND YARD PRODUCTS

PRODUCT	DISPOSAL SUGGESTIONS	SUBSTITUTES &
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Fertilizers: <i>Plant food</i>	Best: Use up/give away. Put empty bag in garbage. 2nd Best: If it does not contain pesticides, put in heavy bag, tie and dispose of in garbage. If it contains pesticides, take to HHW collection site.	Instead: Use compost as fertilizer. Use organic fertilizers: bone meal, fish emulsion, and manure.
Herbicides: <i>Weed killers</i>	Best: If not banned, use up/give away. Triple-rinse empty containers and apply rinse water as directed. Put empty containers in trash. 2nd Best: Take to HHW collection site. Do not dispose of in garbage, sewer, septic tank, or storm drain.	Instead: Cover garden with plastic or mulch such as alfalfa hay to prevent weed germination. Grow a healthy lawn to out-compete weeds. Pull weeds when they first appear.
Insecticides: <i>Insect killers</i>	Best: If not banned, use according to label instructions. Empty cardboard containers, dispose of empty box in garbage. Empty glass and plastic containers. Triple-rinse with water and apply according to label directions. Wrap in newspaper and put in garbage. If banned: Take to HHW collection site. Do not pour on ground, in a ditch, or down a drain.	Instead: Use non-toxic alternatives (see below). Safe Use: Do not buy more than you need.
Rodenticides: <i>Rat poison</i>	Best: If not banned, use up/give away. Triple-rinse empty containers and apply as directed. Put empty containers in trash. 2nd Best: Take to HHW collection site. Do not dispose of in garbage, sewer, septic tank, or storm drain.	Instead: For mice and rats: Use traps baited with a peanut butter, oatmeal, and honey mixture. Use glue boards or sticky traps. Baits with <i>warfarin</i> are lethal to rodents, yet relatively safe for household use. For moles: Do you really want to kill them? They are voracious insect eaters. Scissor traps are effective. For gophers, use spring traps or box traps. Set in burrow runways.

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CHEMICAL HAZARDS IN THE GARAGE AND HOME WORKSHOP

PRODUCT	DISPOSAL SUGGESTIONS	SUBSTITUTES & PRECAUTIONS
Asphalt Roofing Compounds	Best: Use up/give away. 2nd Best: Take to HHW collection site. 3rd Best: Expose open container to air to evaporate solvents, then put in garbage.	Instead: No substitutes. Safe Use: Do not use indoors.
Auto: Antifreeze	Best: Take to HHW collection site. 2nd Best: Contact sewage treatment plant for permission to flush small amounts down the sewer. Do not	Instead: Propylene glycol-based antifreeze is less toxic than ethylene glycol-based. Check the antifreeze each year to see if it really needs to

	storm drain.	leaks or spills carefully.
Auto: Batteries	Best: Take old batteries to battery retailer or wholesaler for recycling. (It is illegal to dispose of auto batteries.) 2nd Best: Take to HHW collection site.	Instead: No substitutes.
Auto: Degreasers	Best: Use up/give away. 2nd Best: Take to HHW collection site. Do not mix with used oil.	Instead: Choose strong detergent-type over solvent-type.
Auto: Used motor oil and transmission fluid	Best: Recycle at HHW collection site, recycling center or at curbside (if available). Do not pour on ground, in a ditch, or down drain. Absorbent containing "easy-change" boxes cannot be recycled.	Instead: Have your oil changed at a service station that has its oil recycled.
Auto: Waxes and polishes	Best: Use up/give away. 2nd Best: Take to HHW collection site.	Instead: No substitutes. Safe Use: Use outside.
Paints: Water-based and latex	Best: If paint does not contain lead (generally, if manufactured since 1973), use up or give away. If paint contains mercury, use outdoors. 2nd Best: Allow to harden in can, then dispose of in garbage. 3rd Best: Take to HHW collection site. Do not mix with used oil.	Instead: Use whitewashes (a combination of hydrated lime, water, and salt) for fences, barns, basement and outbuildings. Safe Use: Ventilate area well.
Paints: Oil-based and varnishes	Best: If paint does not contain lead, use up/give away. Let the empty can dry and dispose of in garbage. 2nd Best: Take to HHW collection site. Do not mix with used oil.	Instead: Use water-based or latex paints. Safe Use: Ventilate area well. Do not use near open flame. May take weeks for fumes to go away.
Paint Strippers	Best: Use up/give away. Let the empty container air outside, wrap scrapings in several layers of newspaper and put in garbage. 2nd Best: Take to HHW collection site. Do not mix with used oil.	Instead: Use a scraper, heat gun or sandpaper to remove paint. Use strippers with less toxic ingredients (bearing a caution advisory). Safe Use: Use in well-ventilated area. Use precautions against lead-bearing dust in some old paints.
Paint Thinners	Best: Let settle, pour off thinner for reuse. Take sludge to HHW collection site. If thinner is not reusable, let small amounts (less than 1 cup) evaporate outside. Take large amounts to HHW collection site. Do not pour down a storm drain, an inside drain, or on the ground.	Instead: Avoid paint thinners by choosing water-based paints.

Consider using nontoxic alternatives

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Cleaners

- Use baking soda, whiting (powdered chalk, sold at hardware and paint stores), or a non-chlorinated scouring powder such as Bon Ami™ for general cleaning.
- Use full-strength vinegar plus salt to remove grease.
- Use borax to remove spots on counters.
- Use a pumice stick to clean ovens and grills and remove rust from tools.
- Use half the recommended amount of automatic dishwasher detergent.

Recipes For All-Purpose Cleaners:

1. ½ cup household ammonia, ½ cup white vinegar, ½ gallon water, ¼ cup baking soda.
 2. 1 tsp. Liquid soap (castile), 1 tsp. Borax, 1 qt. Water, ¼ cup vinegar.
-

Polish

Copper Polish - Use lemon juice and salt.

Aluminum Polish - Inside pan, use 2 tbsp. of cream of tartar to one quart of water. Bring to boil and simmer 10 minutes. Outside pan, use baking soda and scouring pad.

Chrome Polish - Use baking soda or vinegar. To remove scum, try baby oil.

Brass Polish - Apply thick coating of ½ tsp. salt, ½ cup vinegar and enough flour to make a paste. Let set for 15 - 60 minutes. Rinse with water. (Do not use on metal with a lacquer coating.)

Stainless Steel - Use baking soda and a plastic scouring pad.

Silver - Use baking soda and soft sponge or boil silver for 3 minutes with sheet of aluminum foil, 2 inches of water 1 tsp. baking soda, and 1 tsp. salt.

Insects On Plants:

- Spray with soapy water and rinse after a few minutes.
- Place tobacco on potted plant soil.

For Slugs and Snails:

- Sprinkle sawdust, diatomaceous earth, ashes or lime around affected areas.
- Place bowls of beer around the garden.

For Ants:

- Use commercial sticky barriers to block ants.
- Sprinkle boric acid on trails and where ants are found in nooks and crannies.

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For Fleas:

- Vacuum house regularly and thoroughly.
- Bathe pet regularly.
- Launder pet bedding frequently.
- Feed cats and dogs brewer's yeast.



Solid Waste Program Site
Oregon DEQ Home Page



Return to Household Hazardous Waste
Updated: December 4, 1998

Other Publications Available from the DEQ Solid Waste Program:

- Natural Gardening - A Guide to Alternatives to Pesticides
- The Hazardless Home Handbook - A Guide to Hazardous Household Products and Effective Alternatives
- Aphids - Safe and Successful Control - A Washington Toxics Coalition Fact Sheet
- Garden Insect Pests - A Washington Toxics Coalition Fact Sheet
- Weed Management for the Lawn and Garden - A Washington Toxics Coalition Fact Sheet
- Reducing Exposure to Lead in Older Homes - A Washington Toxics Coalition Fact Sheet
- Lawn Care - A Washington Toxics Coalition Fact Sheet
- Appropriate Plants for Northwest Landscapes - A Washington Toxics Coalition Fact Sheet
- Clothing Moths - Prevention and Control - A Washington Toxics Coalition Fact Sheet
- Spiders, Ants, Flies, and Cockroaches: Four Common Household Invaders - A Washington Toxics Coalition Fact Sheet
- Paints, Solvents, and Wood Preservatives: Protecting Your Wood and Your Health - A Washington Toxics Coalition Fact Sheet
- Managing Fleas in Your Home - A Washington Toxics Coalition Fact Sheet
- Safer Cleaning Products - A Washington Toxics Coalition Fact Sheet
- A Safer Home: Reducing Your Use of Hazardous Household Products - A Washington Toxics Coalition Fact Sheet
- Art and Hobby Supplies - A Washington Toxics Coalition Fact Sheet
- Protecting Your Home from Carpenter Ants - A Washington Toxics Coalition Fact Sheet
- Managing Tent Caterpillars without Chemicals - A Washington Toxics Coalition Fact Sheet

To obtain copies of these publications, contact the Oregon DEQ at (503) 229-5913 or toll free 1-800-452-4011.



Fact Sheet #6

Reducing the Risk of Groundwater Contamination by Improving Household Wastewater Treatment

A properly installed and maintained system for treating and disposing of household wastewater will minimize the impact of that system on groundwater and surface water. State and local codes specify how wastewater systems must be designed, installed, and maintained. For example, see Oregon Administrative Rules (OAR) Chapter 340, Division 71.

At a minimum, follow the codes. But also consider whether the minimum requirement is sufficient for your site.

Septic tank/soil absorption system: The most common system

The most common form of onsite wastewater treatment is a septic tank/soil absorption system. In this system, wastewater flows from the household pipes into an underground septic tank.

- There the waste components separate—the heavier solids (sludge) settling to the bottom, and the grease and fatty solids (scum) floating to the top.
- Bacteria partially decompose and liquefy the solids.
- Baffles are placed in the tank to provide maximum retention of solids, prevent inlet and outlet plugging, and prevent rapid flow of wastewater through the tank.
- The more liquid portion (effluent) flows through an outlet to the soil absorption field.
- The absorption field is usually a series of parallel trenches (fingers), each containing a distribution pipe or tile embedded in drainfield gravel or rock.
- The effluent leaks out through holes in the pipe or seams between tile sections, then down through the drainfield gravel or rock and into the soil.
- The soil filters out remaining minute solids and pathogens (disease-producing microorganisms), and dissolved substances slowly percolate down to the watertable.



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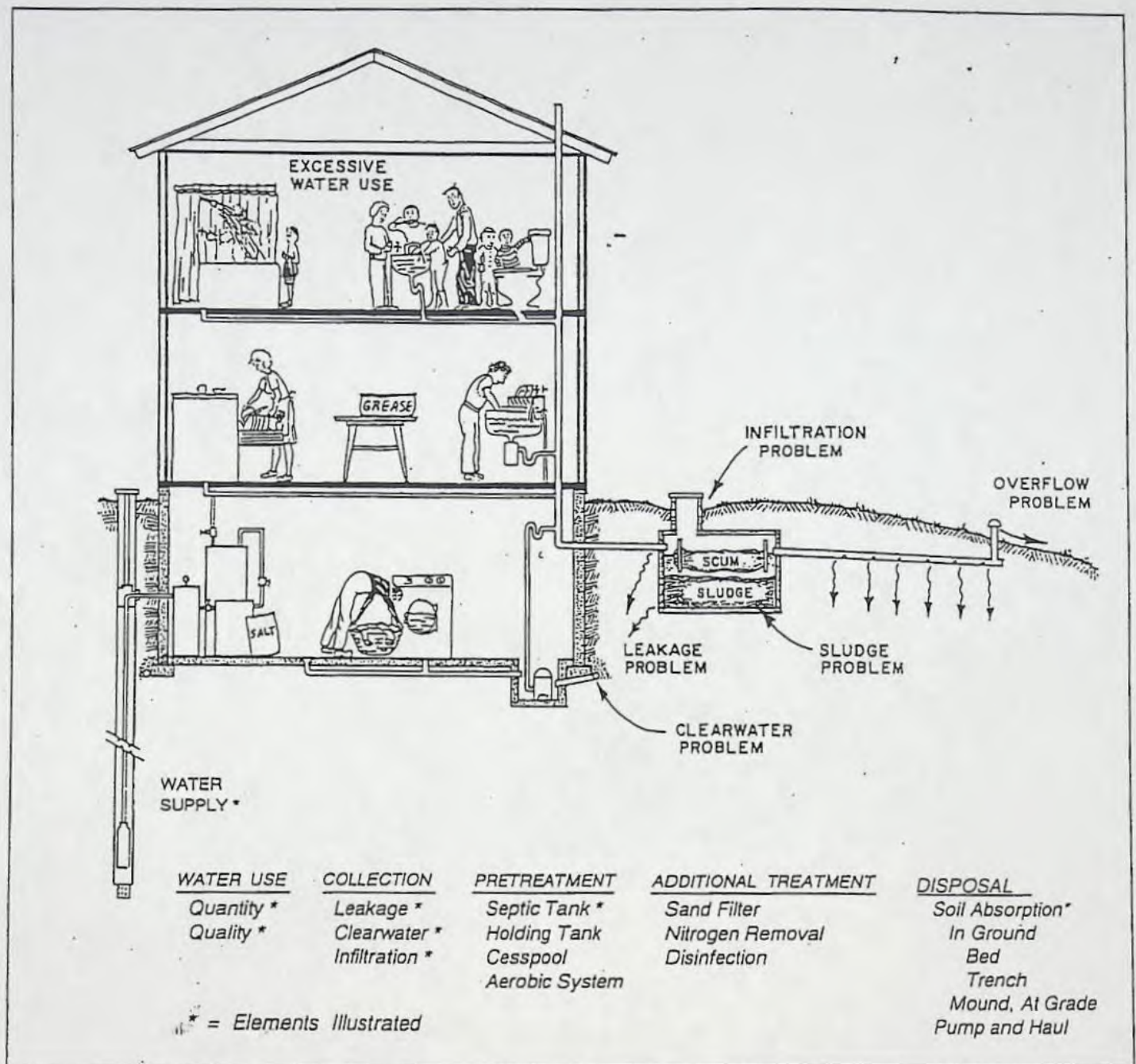


Figure 1: Typical household wastewater treatment system with problems. Illustration by Andy Hopfensperger, University of Wisconsin-Madison Department of Agricultural Engineering.

Figure 1 shows a typical household system for wastewater generation, collection, treatment, and disposal. While systems for many homes may be very similar (groundwater supply, septic tank, subsurface treatment, and disposal), note the lists of options below each part of the diagram. You may wish to circle the parts found in your system. The "leakage," "overflow," "infiltration," and "clearwater" components represent possible problems with the system. Unfortunately, these problems are often difficult to recognize. Overflow from systems may be noticed as wet spots, odors, and some changes in vegetation cover. Water entry (infiltration and clear water) will be more difficult to detect, involving tracing where floor drains, roof drains, foundation drains and sumps are directing waters that do not need treatment into and overfilling the treatment system. Leakage from the collection and treatment system as well as infiltration of water into the system through unsealed joints, access ports, and cracks can be very difficult to assess. The flow chart at the bottom of the box follows the flow of wastewaters and sludge through the treatment system.

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1. Quantity of wastewater

Strategy: Minimize the volume of household wastewater

Reducing the volume of wastewater entering the treatment system is important because less flow (volume) means better treatment, longer system life, and less chance of overflow. For holding tanks, less volume reduces costs but increases the number of times the tank has to be emptied.

Reducing the volume of water entering the system will improve the treatment by increasing the time the waste spends in the system, thus providing more time for settling, aeration, and soil contact.

The quantity of water used depends upon the number of people using the dwelling, how water is used, and maintenance of the water supply system. Average water use in rural households is 50-75 gallons per person per day. With low-use fixtures and individual awareness and concern, a reduction to fewer than 25 gallons per person per day is possible. However, even conservative use by several people may exceed the capacity of the wastewater treatment system.

Consider the following ways to minimize water use:

- Eliminate non-functional uses, such as flushing toilets to dispose of tissues or other wastes that should be handled as solid waste. Turn off water between uses, fix plumbing fixture leaks, and try to eliminate sources of clear water and infiltration into the system (e.g., divert roof drains away from the soil absorption field.)
- Consider which actions use the most water. Toilet flushing usually ranks highest. Low-flow models could decrease water use by more than half. In the United States, 35-40 percent of the population has plumbing codes that require 1.5-gallon-or-less toilets on all new construction. Composting toilets allow even greater reductions, but they can present other waste disposal challenges. If interested in installing a composting toilet, contact the Oregon Department of Environmental Quality (DEQ) for pertinent regulations.
- Bathing and laundry are next in order of water use. For bathing, consider such reduction options as installing low-flow or controlled-flow showerheads, which give good cleansing with less water; taking shorter showers; and taking "wet-down-soap-up-without-water-then-rinse" showers.
- For laundry, run only full loads. Front-loading washers use much less water. If you must run small loads, be sure to use the reduced water level setting. Avoid using the permanent press cycle as it uses more water than regular or delicate cycles. If you have adequate room and are willing to change how you do laundry, explore a suds saver attachment for your washer.
- Modern efficient plumbing fixtures, including 0.5 to 1.5-gallon toilets, 0.5-2.0 gallons per minute (gpm) showerheads, faucets of 1.5 gpm or less, and front-loading washing machines of 20 to 27 gallons per 10-to-12-pound dry load offer the potential of substantial reduction in residential water use and wastewater generation. These reductions have commonly amounted to between 30 and 70 percent of total in-house water use. (See Figure 2.)
- In hard water areas, the water softener may use a significant amount of water. Proper adjustment and timing of the softener's flushing mechanism can reduce excessive water use. Spent salts should not be discharged into the septic system.
- Being aware of how your family can reduce its water use is as important as the use of water conservation devices.

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Conventional fixture	Gal. used	Water-saving fixture/device	Gal. used
Toilet	4-6/flush	Air-assisted toilet	0.5/flush
Shower Head	4-6/min.	Low-flow shower head	2.0/min
Faucets: Bathroom and kitchen	4-6/min.	Faucet-flow-control aerators: Bathroom Kitchen	0.5/min 1.5/min
Top-loading clothes washer	40-55/load	Front-loading clothes washer	22-33/load
*Installation of all these water-saving devices could reduce water use by about 35%.			
Source: Penn State Cooperative Extension Circular 302			

Figure 2. Water use by conventional fixtures and water-saving fixtures and devices.

2. Quality of wastewater

Strategy: Minimize the amount and complexity of contaminants in the wastewater

The quality of water refers to what is in the water, not to the water itself. Even wastewater is more than "99.44% pure" water. Wastewater usually contains relatively small amounts of contaminants—but they make a big difference in the usefulness of the water.

Contaminants found in wastewater include:

- **Bacteria and viruses**, some of which can cause disease in humans. These microorganisms are large enough to be removed by settling or through filtration in beds or soil. Many will die from the adverse conditions or aging in the system.
- **Suspended solids**, particles which are more dense (sludge) or less dense (scum) than water. Most can be separated from liquid waste by allowing enough time in a relatively calm tank. Grease and fats are a part of the suspended solids. Filtration beds and absorption systems can be clogged by wastewater high in suspended solids.
- **Oxygen demand**. The microorganisms that decompose organic wastes use oxygen. The amount of oxygen required to "stabilize" wastewater measured as biochemical and chemical "oxygen demand." Wastes such as blood, milk residues and garbage disposal grindings have high oxygen demand. Aeration and digestion processes, in the presence of oxygen and organisms, produce stable, low-odor wastewater when given enough time. Wastewater with excess oxygen demand can cause problems for soil absorption fields, groundwater, streams, and lakes by reducing levels of oxygen.
- **Organic solvents from cleaning agents and fuels** are not degraded or removed through treatment and can pass along with the wastewater back into the water supply.

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- **Nutrients.** Nitrogen from human wastes and phosphorus from detergents and some chemical water conditioners are the most notable. Nitrate-nitrogen is a common groundwater contaminant, and phosphorus over-fertilizes surface water.

Consider the following ways to improve wastewater quality:

Note: Following these steps carefully is the key to a "healthy" septic system. Septic tank additives do not significantly help, and some can even be harmful.

- Minimize use of the garbage disposal unit. Garbage disposal use contributes a large load of suspended solids and organic matter to wastewater, as well as using additional water. They should not be used in homes with septic systems unless the septic tank is increased in size.
- Do not put items down drains that may clog septic tanks (fats, grease, coffee grounds, paper towels, sanitary napkins, tampons, disposable diapers, cigarettes, condoms).
- Do not put toxic substances in drains that might end up in the groundwater, such as ash, solvents, degreasers, acids, oils, paints, disinfectants, and pesticides. (This does not include using bleach to disinfect laundry or to wash clothing worn for pesticide applications.) Normal use of household cleaning products will not adversely affect the septic system.
- Do not use chemicals to clean or "sweeten" your system. They may interfere with the biological action in the tank, clog the drain field by flushing sludge and scum into the field, or add toxic chemicals to groundwater.

3. Collection of wastewater

Strategy: Collect all wastes that need treatment. Minimize loss of untreated waste. Exclude from the treatment system water that doesn't need treatment or disposal.

Leaking pipes or treatment tanks ("leakage losses") can allow wastewater to return to the local water supply without adequate treatment. Infiltration of clear water overloads the system and dilutes the wastes. Don't allow water that doesn't need treatment (basement floor drain sumps, foundation drains, infiltration of rain water, roof drainage) to add to your waste volume. Divert clear water, which doesn't require treatment, away from house, well and wastewater treatment system. Plumb the water softener so that backwashing water does not enter the septic system. (This water is very salty.)

4. System design

Septic tanks retain most of the suspended solids (sludge and scum) from wastewater. In the tank, bacteria digest and compact the sludge. The partially treated water moves on to additional treatment or disposal (for example, in a soil absorption field.)

Design and construction of septic tanks influence their water tightness and effectiveness of retaining sludge and scum. Multiple tanks or chambers in series can improve sludge and scum removal. Gas deflectors and filter screens or inclined-plate settling units help to minimize solids carryover. Tanks should be sized to accommodate at least 24 hours of wastewater flow, while still allowing for sludge and scum retention. Pumping the tank before it is more than one-third filled with scum and sludge improves functioning of the system. When the tank is pumped, you should also have the baffles checked and check for tank leaks.

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Aerobic (oxygen-using) biological systems (packaged systems) provide more extensive treatment of wastewater than the typical anaerobic (no oxygen) septic units, improving solids separation, releasing volatile chemicals, and reducing sludge volume. These systems (Figure 3) are, however, more expensive to operate and maintain and are more subject to problems caused by changes in wastewater quality or environmental conditions. Contact DEQ for regulations pertaining to aerobic units.

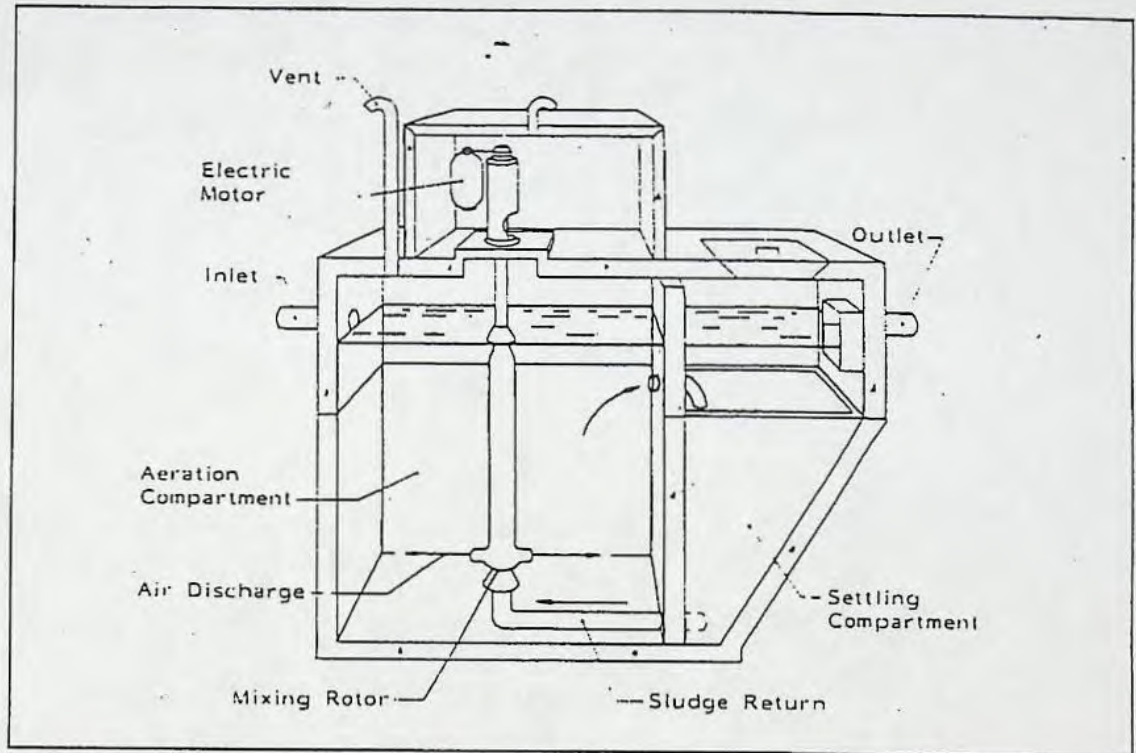


Figure 3: Aeration tank of a household aerobic treatment system. Source: *Onsite Domestic Sewage Disposal Handbook, MWPS-24, Midwest Plan Service, 1982.*

5. Additional treatment

Strategy: Reduce concentration and amount of contaminants in the wastewater to expand options for appropriate disposal.

Aerobic systems, described in the previous section, may be used for additional treatment of septic tank effluent, yielding a better quality effluent suitable for more disposal options. Contact DEQ for pertinent regulations.

Sand filters improve the quality of wastewater after septic tank pretreatment. Effective treatment involves aerobic biochemical activity as well as physical filtration. Filters consist of at least 2 feet of graded sand (or other media) in a bed equipped with a distribution and collection system (Figure 4). Wastewater is applied by dosing.

Wastewater treated in such systems is generally lower in bacteria, nitrogen, phosphorus, oxygen demand, suspended solids and organic matter. The amount of reduction depends on design of the system.

Pretreatment and quality of wastewater, hydraulic loading rate, depth and type of filter media, dosing frequency, temperature and distribution, and collection systems are all important considerations in designing filters. Maintenance includes resting and attention to dosing equipment.

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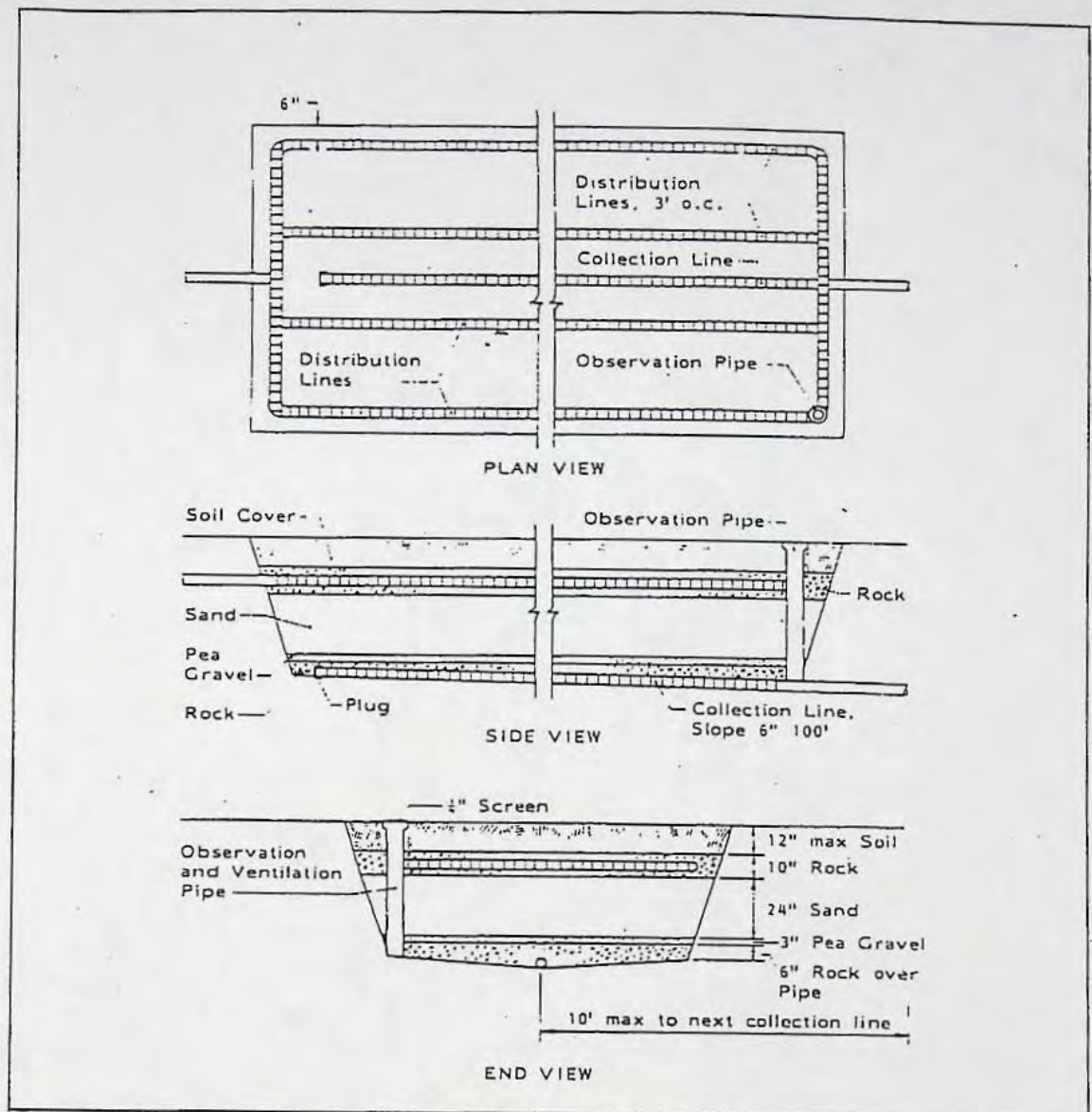


Figure 4: Buried sand filter. Source: *Onsite Domestic Sewage Handbook, MWPS-24, Midwest Plan Service, 1982.*

Nitrogen removal can be achieved through denitrification (conversion of nitrate to nitrogen gas) or ion exchange. Denitrification requires anaerobic conditions in the presence of more decomposable organic matter for bacteria to reduce nitrate to nitrogen gas for removal from wastewater. Denitrification and ion exchange processes are not used extensively at this time, as they are quite expensive to install, operate, and maintain.

Disinfection systems kill disease-causing microorganisms in wastewater and are used where discharge to surface water is permitted. Chlorine, iodine ozone, and ultraviolet light systems are available for treatment of good quality effluent, such as those from properly functioning aerobic units and sand filters.

Disinfection of holding tank waste prior to land spreading has been studied, but it is not in common use. Disinfection with lime is feasible.

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6. Disposal of wastewater and pumpage

Strategy: Disperse wastes, take advantage of additional treatment afforded by contact with soils, and minimize opportunity for waste to contaminate water supplies.

Off-site disposal of wastewater, by connection to a municipal sewage system, hauling to a municipal treatment facility, or land spreading, can help protect the local homestead water supply. Discharging treated wastes to surface water from private systems is not permitted in Oregon. Improper waste management of the home site can endanger the health of others in your community. Also, it may eventually contribute to poor water quality at your well.

Application of wastewater to the soil surface provides an opportunity to recycle nutrients and to further reduce the contaminant content of wastewater in a safe manner. The application time should be chosen so that there will be 1) little runoff, 2) maximum use of nutrients by plants, and 3) additional reduction in microorganisms. Site characteristics (soil, land use, depth to groundwater, weather, climate, and hydrogeology) should be considered when selecting a site.

Subsurface treatment and disposal using soil absorption (trenches, beds, mounds, at-grade and gravel-less) is the common practice for household wastewater after pretreatment in a septic tank or aerobic system. There are, however, sites where soil absorption systems are not acceptable because of high or low soil permeability, depth to bedrock or the saturated zone, or other factors. Deep, well-drained, well-developed, medium-textured soils (such as silt loam and loam) are desirable soil absorption sites.

Incorporation of wastewater into surface soils is most desirable because the chance of runoff is reduced. While wastewater applications are often controlled by the amount that will infiltrate, the rate of application should be estimated to match the nutrient uptake by vegetation harvested from the site, thus minimizing loss of nutrients to the groundwater.

Soils and separation from the water supply are important factors. Unsaturated soils allow movement of air, helping keep the wastewater aerobic. A minimum of three feet of unsaturated soils is recommended for removal of bacteria. Finer-textured soils (clay loams and clay) retain water better, allowing plant roots to take up wastewater and nutrients and allowing increased die-off of microorganisms. Coarse, sandy soils allow effluent to flow too quickly downward to groundwater, not providing adequate time for filtering solids and pathogens from the liquid. Disposal sites that are more distant and downslope from the well increase the isolation of your water supply from the contaminated wastewater.

Disposal of pumpage from septic tanks and other treatment systems on site should follow similar rules as for wastewater. Sludges are more concentrated than treated wastewater, so lower application rates are recommended.

Land application of wastewater and sludge must only be done on sites permitted by the DEQ. Approved sites for land application must meet requirements found in OAR Chapter 340, Division 71, including requirements for soil, depth to groundwater or bedrock, slope, and distance from well and residences.

Matching nutrient applications to crop nutrient needs is critical. Contact your OSU county Extension agent or private crop consultant for assistance in developing a waste utilization plan.

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7. Assistance with failing systems or new designs

If you suspect your household wastewater treatment system is backing up or your distribution system is clogged, first contact your plumber or septic system installer, who may have suggestions for extending the life of your system. Contact the Department of Environmental Quality (DEQ) or its authorized agent in your area for permits to repair or replace your wastewater treatment system.

- Do not use septic tank cleaners that contain degreasing solvents like TCE. They can contaminate groundwater.
- Do not place more soil over a surfacing soil absorption field; this does not fix the system, and it will soon surface again.
- Do not just pipe the sewage to the road ditch, storm sewer, stream or farm drain tile; this pollutes the water and creates a health hazard.
- Do not run the sewage into a sink hole or drainage well; this pollutes the groundwater.
- Do not wait for the system to fail before pumping the septic tank. Once a system fails, it is too late to pump the tank. Develop a regular tank maintenance and pumping schedule.

A properly designed, constructed and maintained septic system can effectively treat wastewater for many years. For more information on septic systems, contact your County Extension Agent, the DEQ or its authorized agents.

Contacts and References

Who to call about...

Household wastewater treatment and local regulations

Contact the Oregon Department of Environmental Quality (toll free number) 1-800-452-4011, or their authorized agent for your county. Refer to the phone number following your county:

Baker (276-4063)
Benton (757-6841)
Clackamas (655-8521)
Clatsop (325-8660)
Columbia (397-1501)
Coos (269-2721)
Crook (447-8155)
Curry (247-7011 x229)
Deschutes (388-6575)
Douglas (440-3338)
Gilliam (276-4063)
Grant (276-4063)
Harney (388-6146)
Hood River (386-1115)
Jackson (776-7556)
Jefferson (475-4456)
Josephine (471-2850)
Klamath (883-1122)
Lake (388-6146)

Lane (687-3951)
Lincoln (265-4192)
Linn (967-3821)
Malheur (473-5186)
Marion (588-5147)
Morrow (276-4063)
Multnomah (823-7247
or 823-7303)
Polk (623-9237)
Sherman (296-4636)
Tillamook (842-3409)
Umatilla (276-4063)
Union (276-4063)
Wallowa (276-4063)
Wasco (296-4636)
Washington (648-8722)
Wheeler (276-4063)
Yamhill (434-7516)

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Statewide regulation of private sewage systems

Oregon Department of Environmental Quality (toll free number) 1 (800) 452-4011.

What to read about...

Publications are available from sources listed at the end of the reference section. (Refer to number in parentheses after each publication.)

Design, installation, use and maintenance of onsite sewage systems

Design Manual: Onsite Wastewater Treatment and Disposal Systems. 1980. EPA Technology Transfer 625/1-80-012. (1) 391 pages. Contains information on site evaluation procedures, wastewater characteristics, onsite treatment and disposal methods, and management of onsite systems.

Onsite Domestic Sewage Disposal Handbook. First Edition. 1982. \$5.00. Midwest Plan Service. MWPS-24. (2)
40 pages. Includes information on septic tanks, soil absorption systems, site selection, small and alternative wastewater treatment technologies

National Small Flows Clearinghouse (3)

Small Scale Waste Management Project (4)

Household water conservation

Why Do Septic Systems Fail? Oregon State University Extension Service. EC 1340 (5)

Septic Tank—Soil Absorption Systems. Oregon State University Extension Service. EC 1341. (5)

Holding Tanks. Oregon State University Extension Service. EC 1342. (5)

Septic Tank Maintenance. Oregon State University Extension Service. EC 1343. (5)

Water-saving toilets and showerheads

"How To Save Water," *Consumer Reports*, July 1990, pages 465-473.

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Publications available from...

1. U.S. Environment Protection Agency, 401 M Street SW, Washington, DC 20460.
2. Midwest Plan Service Publications may be ordered from Bioresource Engineering Department, Oregon State University, Gilmore Hall 116, Corvallis, OR 97331-3906.
3. West Virginia University, P.O. Box 6064, Morgantown, WV 26506-6064, or call 1 (800) 624-8301.
4. University of Wisconsin-Madison, 1450 Linden Drive, Madison, WI 53706, (608) 262-0853 or (608) 262-6968.
5. Your county Extension office or directly from Publications Orders, Agricultural Communications, Oregon State University, Administrative Services A422, Corvallis, OR 97331-2119, (503) 737-2513. There may be charges for publications.

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Information derived from Home•A•Syst worksheets is intended only to provide general information and recommendations to homeowners regarding their own home practices. It is not the intent of this educational program to keep records of individual results.

Adapted for use in Oregon from the cooperative project (Farm•A•Syst/Farmstead Assessment System) of the University of Wisconsin-Cooperative Extension, Minnesota Extension Service, and U.S. Environmental Protection Agency Region V. Reviewed and adapted for use in Oregon by members of the Extension Service, Oregon State University; the Oregon Department of Agriculture, the Oregon Department of Environmental Quality, the Oregon Department of Water Resources, and the Oregon Division of Health.

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Appendix I: Drinking Water Protection In Oregon

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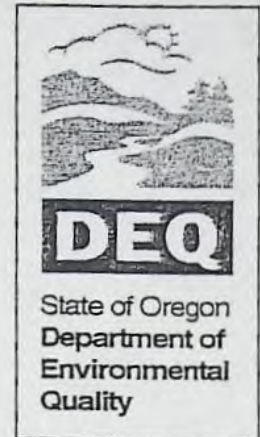
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Drinking Water Protection In Oregon

Information and Resources



◆ Agency Programs

Oregon Department of Human Service's Drinking Water Website

<http://www.ohd.hr.state.or.us/dwp/welcome.htm>

Includes a directory of all public water systems in Oregon, drinking water standards, fact sheets on contaminants, Annual Compliance Reports for water systems, information on the Safe Drinking Water Revolving Loan Fund, Consumer Confidence Reports, and more.

Oregon Department of Environmental Quality's Drinking Water Protection Website

<http://deq.state.or.us/wq/dwp/dwphome.htm>

Includes an introduction to drinking water protection in Oregon, information on the Source Water Assessments required by the Safe Drinking Water Act, technical assistance resources for protection, example Source Water Assessment Reports, example Drinking Water Protection Plans, and *links to many other useful sites*.

U.S. Environmental Protection Agency Websites

EPA's Office of Ground Water and Drinking Water <http://www.epa.gov/ogwdw/>

EPA's Drinking Water Information site <http://www.epa.gov/safewater/dwinfo>

Safe Drinking Water Hotline 1-800-426-4791

Oregon Plan for Salmon and Watersheds

Information and Education Tools Available: <http://www.oregon-plan.org>

In an effort to initiate a campaign to raise awareness and the understanding of the ecological, social and economic challenges facing Oregon, the Oregon Plan for Salmon and Watersheds Outreach Team has created a toll free telephone line and mailing service.

Oregon Watershed Information Line: 1-888-854-8377

Information is available in 21 separate user packets. The packets provide help for the individual boater, business owner, educator, farmer, forest landowner, gardener, home builder/developer, rancher, recreationalist, small acreage landowner, wish to volunteer, looking for incentive programs, or are interested in other issues such as the Willamette Restoration Initiative or local Watershed Councils.

Water Resources Department

The map and list of all watermasters (by county) for the state of Oregon:

<http://www.wrd.state.or.us/staff/watermasters.html>

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◆ Water Quality Standards

Federal/State Safe Drinking Water Act Standards

A reference list of all drinking water standards is available through DHS's website or on EPA's Office of Water website at:

<http://www.epa.gov/safewater/standards.html>

Federal Clean Water Act Standards

A reference of water quality standards for Oregon waters is available on DEQ's website at:

<http://www.deq.state.or.us/wq/standards/wqstdhome.htm>

This website will enable any user to obtain information on the water quality standards in Oregon that are in effect under the Clean Water Act. The site includes a full text of Oregon Administrative Rules Section 340, Division 41. Designated uses are also a component of water quality standards. The designated use information is available at this site as well.

◆ Water Quality Monitoring Data and Information

Oregon's Year 2000 Water Quality Status Assessment Report

(Section 305(b) Report) is an excellent source of information on Oregon's water quality improvement efforts. The report is issued every two years, and covers water quality trends, overviews of all Oregon programs, assessment procedures and data collection procedures. It is available for viewing on the DEQ water quality web site, listed under "Information by Subject Area."

<http://deq.state.or.us/wq/>

DEQ's Database of Water Quality Data

Records of Oregon's existing water quality monitoring data can be accessed through the LASAR website at:

<http://deq.state.or.us/wq/lasar/LasarHome.htm>

On this page you will find four options for finding and retrieving water quality data.

1. Selecting monitoring stations from an interactive Geographic Information Systems (GIS) map
2. Locating monitoring stations by entering search criteria like station location description, station type or latitude and longitude - once you enter your search criteria and click enter you will get a summary page of all the monitoring stations that meet your search criteria. From there you choose the monitoring station of interest and you will get a list of water quality data available for that station and you can choose which data to retrieve.
3. Locating monitoring stations by basin, sub-basin and watershed - this page lists in summary form the basins, sub-basins and watersheds in Oregon along with the number of monitoring stations in each sub-basin and watershed. You select the sub-basin or watershed of interest and you will get a list of all the monitoring stations in that sub-basin or watershed. From there you select a station and retrieve the water quality data of interest to you.
4. Selecting parameters for data retrieval - this option gives you a summary of all parameters that have data in LASAR and the number of data points. You select the parameter of interest and you will get a listing of all the monitoring stations that have data for that parameter. From there you can select from 1 to 10 stations (or all stations) to retrieve the water quality data for the parameter you selected. *Please note that these queries can take a while to run where there are lots of data points.*

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◆ Additional Resources for Drinking Water Protection

Source Protection: A National Guidance Manual for Surface Water Supplies

This manual includes descriptions of new SDWA programs, source protection case studies from across the country, information on pollutants and their sources, funding and implementation assistance information, and a chapter on source protection planning and implementation. The document was published in 2000 by the New England Interstate Water Pollution Control Commission (NEIWPCC). Available on NEIWPCC's website at <http://www.neiwpcc.org/>. Click on "Publications", then click "Technical Guidance" and scroll down to "Source Protection".

EPA's Nonpoint Source Control Technical Assistance

Draft Guidance "CONTROLLING NONPOINT SOURCE POLLUTION FROM FORESTRY"

EPA has developed and is requesting comment on draft technical guidance for managing nonpoint source pollution from forestry. It discusses the broad concepts of assessing and addressing water quality problems on a watershed level, and it presents up-to-date technical information about how to reduce nonpoint source pollution from forestry.

The draft guidance is available on EPA's Nonpoint Source Control website at:

<http://www.epa.gov/owow/nps/forestrymgmt/>

Oregon Stream*A*Syst

EM 8761, Stream*A*Syst: A Tool To Help You Examine Stream Conditions on Your Property, June 2000, 16 pages. See OSU Extension Service Publications web page at: <http://eesc.orst.edu/agcomwebfile/edmat/EM8761.pdf>

Resources for Educators

"Keeping it Clean: Student Involvement in Drinking Water Protection" 300-page resource document for teachers. Call Sheree Stewart at DEQ 503-229-5413 to obtain a free copy.

See also DEQ Online's "Especially for Educators" page at:

<http://www.deq.state.or.us>

Topographic Maps

Geographic Data (topographic maps): <http://www.terraserwer.microsoft.com>

<http://www.topozone.com/>

Educational Materials

The Terrene Institute is a nonprofit organization working to provide information and resources on how to conserve resources and protect the environment. The website provides excellent descriptions of water quality issues, as well as good links to other water quality sites.

<http://www.terrene.org/index.htm>

The Center for Watershed Protection works with local governments to provide scientifically based information on tools to protect watersheds.

<http://www.cwp.org>

US Geological Survey Monitoring Data

The following link will also provide available USGS data for Oregon rivers.

<http://water.usgs.gov/or/nwis/nwis>

EPA's Watershed Assessment, Tracking and Environmental Results (WATERS)

This is an information system that enables users to connect and display important water quality information on maps in their geographic context. (Not all states are 100% available.) WATERS is at: <http://www.epa.gov/waters>

WATERS can:

- * display key water quality information about the quality of surface water bodies, the designated use of a waterbody (e.g., drinking water supply, recreation, fish protection) from state water quality standards, and an identification of which waters are identified as being impaired;
- * allow users to quickly identify the status of individual waters of interest within a specified geographic area;
- * allow users to easily generate reports summarizing key information on waters of a state;
- * use EPA's standard mapping application, Enviromapper, to display the information;
- * use the National Hydrography Dataset (NHD) maintained by the U.S. Geological Survey, as the common language to connect the information hydrologically.

EPA's Index of Federal Data Sources

<http://www.epa.gov/safewater/protect/feddata.html>

The list of federal data sources includes a breakout by assessment function and by agency and also provides links to regional contacts.

US Geological Survey Streamflow Data

USGS's streamflow data is available at: http://water.usgs.gov/dwc/national_map.html

Wastewater Permit Information

Oregon DEQ's Water Quality Division has a new website called Water Quality Permit Assistance Corner, to assist the public with their questions about wastewater permits. Highlights include:

1. All information that a permit holder might need is centralized.
2. Potential permittees can find out what kind of permit, if any, is needed, get the application forms, find out how much it will cost, and the address of the DEQ office that will process the application.
3. Links to sites of interest, for example ODA site for agricultural management plans and WRD for water rights information.

It is accessible through the DEQ Water Quality Program home page, click on Permits and then click on Water Quality Permit Assistance Corner. The direct website address is:

<http://deq.state.or.us/wq/permitcorner/>

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WATER DISTRIBUTION STUDY FOR KILCHIS RIVER WATER TRANSMISSION SYSTEM

CITY OF BAY CITY

MAY 1991
REVISED MAY 1992

PREPARED BY
HANDFORTH LARSON & BARRETT, INC.
CIVIL ENGINEERING & SURVEYING
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KILCHIS RIVER WATER
TRANSMISSION
SYSTEM
WATER SYSTEM MASTER PLAN

FOR THE
CITY OF BAY CITY

MAY 2, 1991
REVISED MAY, 1992

Prepared by :
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PURPOSE

The purpose of this study is to analyze the existing water system of the Kilchis River Water Transmission System and to make recommendations for water delivery in adequate quantity and quality for fire, domestic and other uses. This includes the supply, treatment, transmission and storage of water, both now and in the future. Future demand will be projected up to the year 2001.

STUDY AREA

The Kilchis River Water Transmission System is a cooperative agreement between the City of Bay City and six separate water districts, associations and corporate users for the supply and transmission of water. The size of the individual districts ranges from a small rural district made up of eight residential users, to a small municipality serving 612 residential and commercial services. The largest water purchaser is a commercial cooperative involved in the production of dairy products. Water use among the districts includes farm, residential, commercial and some light industrial.

The Kilchis River Water Transmission System is located in Tillamook County along the Oregon coast, just north of the city of Tillamook. The system is bounded on the west by Tillamook Bay and extends easterly approximately two miles up the Kilchis River drainage basin and approximately two miles up the north side of the Wilson River. The system is bounded on the north by the northerly border of the urban growth boundary of Bay City, and is bordered on the south by the Wilson River. The terrain of the system varies from wooded hillsides to rolling hills and fertile bottom land. Approximate elevations range from a low of 8 feet to a high of over 400 feet. Several of the small districts require booster pumps to adequately serve portions of their districts at higher elevations.

The individual water districts served by the Kilchis River Water Transmission System are generally rural or semi-rural in nature. Although the city of Bay City is the most consolidated service district, large areas of wooded or undeveloped tracts are encompassed within the city limits. The potential for growth in the individual districts exists in varying degrees due to the varying availability of building sites, temporary building restrictions, and other factors.

Because this particular region is not directly on the coast, it does not experience the large seasonal fluctuations of population which affect coastal cities within immediate proximity to the beach experience. The predominance of single family dwellings, stable commercial establishments and a permanent population base provide a steady demand for a continuous supply of water.

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TRANSMISSION SYSTEM OVERVIEW

On November 1, 1980, the City of Bay City entered into a joint water supply agreement with four other water user groups. These groups were: Latimer Road Water Association, Juno Water Company, Cole Creek Water District, and Tillamook County Creamery Association. A copy of this agreement is in Appendix G.

On July 1, 1981, and February 1982, the Northwood Water District and the Wilson River Water District respectively, also entered into water agreements with the City of Bay City. In all the agreements except that with the Wilson River Water District, the City of Bay City agreed to supply water on a continuing basis for consumers within the purchaser's service area. The agreement with Wilson River Water District is for supply of surplus water not to exceed 0.100 million gallons per day and subject to the restrictions on surplus water as determined by the City of Bay City.

At this time, all of the user groups, except Wilson River Water District, rely solely on the water supplied by the City of Bay City. The Wilson River Water District has developed and maintains its own water source and only uses the Kilchis Regional Water supply as an emergency source. Wilson River Water District has only purchased water from Kilchis Regional one time. This was for a period of nine days in August 1990, when a problem with the water quality of Wilson River Water District's water source arose and the source was shutoff until the problem was corrected.

The general water use among the various small districts and associations is residential in nature. Several districts supply dairy farms and/or small commercial accounts such as a restaurant or nursery. The City of Bay City is primarily residential but also maintains several large commercial accounts. The largest water user of the Kilchis Regional System is the Tillamook County Creamery Association (TCCA). TCCA is a cooperative commercial endeavor involved in the production of cheese and other dairy products. Master meters were installed in each district by September of 1988 and have been read monthly since then. Water consumption varies considerably from District to District. The average percent of total monthly use is shown in Table 1 below. The total monthly average use shown is the average over the entire time span of September 1988 to October 1990. The monthly use for '88-'89 and '89-'90 is calculated from the total monthly use from September to August of the respective year.

TABLE 1: PERCENTAGE OF TOTAL WATER USEAGE PER PURCHASING WATER DISTRICT

District	Percent Usage		
	Monthly Average 8/88-9/89	Monthly Average 9/89-8/90	Monthly Average 8/88-10/90
Bay City	37.5%	36.8%	37.5%
Cole Creek	0.9%	0.9%	0.9%
Latimer Road	4.8%	5.7%	4.8%
Juno	4.2%	4.3%	4.2%
Northwood	3.5%	3.5%	3.5%
TCCA	49.1%	48.8%	49.1%

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As stated, the individual water districts vary in type of water use and number of services. Table 2 shows the general breakdown of type of water users per district.

TABLE 2: DISTRICT WATER SERVICE DISTRIBUTION

District	Number of Services:			Total
	Residential	Commercial	Farm	
Bay City	594	18	—	612
Cole Creek	8	—	—	8
Latimer	41	1	2	44
Juno	49	3	3	54
Northwood	18	—	—	18
TCCA	—	1	—	1

EXISTING WATER SYSTEM

WATER SUPPLY

The existing source of supply for the Kilchis Regional Water System consists of two wells at Dill Bar on the Kilchis River. Well #1 was drilled in September of 1975. It is a 12 inch diameter well drilled to a depth of 60 feet. Well #2 was drilled in May of 1980 to a depth of 50 feet and is also 12 inches in diameter. Well flow tests were conducted on each well at time of drilling with the well drawdown measured. Well #1 yielded 1200 gallons per minute (GPM) with a three foot drawdown after 24 hours. Well #2 yielded 1000 GPM with a 3.5 foot drawdown after 24 hours. Well recovery was within 30 seconds for both wells. Well reports can be seen in Appendix F.

Since creation of the Kilchis Regional Water System, the reliability of the wells for supply of the purchasing district has been consistently good even during low flow years on the Kilchis River.

PUMPS

Both wells are equipped with 40 Hp motors to drive turbine pumps capable of pumping at a rate of 600 GPM. The pumps are controlled by a telemetry control system activated at the 200,000 gallon reservoir near Bay City. A 40 Hp propane fueled backup motor is maintained at the well house to provide backup pumping in the event of power failure. This motor must be manually started and is in relatively good condition. It is checked and tested weekly. Although the propane auxiliary motor is the same horsepower as the main motors, it is not operated at full power when utilized. This is due mainly to the infrequent operation of the auxiliary motor. When the motor is used, it is operated to pump approximately 400 GPM.

DISINFECTION

The existing disinfection system is a gas-fed vacuum operation system which injects chlorine directly into the well upon the start-up of a well pump. In the event of loss of electrical power and the auxiliary motor must be engaged, the chlorinator is deactivated and must be activated by a hand operated valve.

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EXISTING TRANSMISSION SYSTEM

The water is pumped from the well house through approximately 13000 feet of 18 inch ductile iron water main. This main runs along the Southerly edge of the Kilchis River Forest Road to the Old Riverdale School at the intersection of Kilchis River Forest Road with Alderbrook Road. The Cole Creek Water District taps the 18 inch main at Curl Road with a four inch diameter PVC main and a master meter. At the Riverdale school the 18 inch main ends and wyes to two 10 inch PVC mains. One 10 inch main runs Westerly along Alderbrook Road to Vaughn Road, Northwesterly on Vaughn Road to the Bay City Master Meter at the intersection of Vaughn Road and Bewley Road. This main continues within the Bay City water service area to feed Bay City's 200,000 gallon Willowbrook Reservoir off of Doughty Road. A pump station at Doughty Road feeds a 100,000 gallon reservoir for Bay City's high level system.

The remaining 10 inch main at the intersection of Kilchis River Forest Road and Alderbrook Road continues Southerly along Alderbrook Road to Highway 101. Continuing South on the East side of Highway 101 the 10 inch main supplies water to Kilchis River Water Transmission Systems 500,000 gallon reservoir on Juno Hill. It then continues on to supply Juno Water Company, and the Tillamook Creamery Association, ending at the intersection of Highway 101 and Latimer Road. From this point, the waterline changes to eight inch diameter PVC. The eight inch main extends East on Latimer Road, serving the Latimer Road Water Association and ending at the master meter and booster pump for the Northwood Water District.

All districts are metered with the meters read monthly. The Latimer Road Water Association is between master meters on the eight inch main on Latimer Road. The City of Bay City picks up those customers between the Easterly master meter of Latimer Road Water Association, and the master meter of the Northwood Water District. A master meter for the Wilson River Water District is located at the intersection of Latimer Road and the bridge at Wilson River Loop Road.

EXISTING STORAGE

Kilchis Regional Water District maintains two reservoirs on their water system. Both reservoirs are situated at an elevation of 212 feet and are fed by 10 inch mains from the transmission system. One reservoir has a 500,000 capacity and is situated off of Oregon State Highway 101, just north of the Tillamook County Creamery, on Juno Hill. The other reservoir has a 200,000 gallon capacity and is east of the city of Bay City in the Willowbrook area. The Willowbrook reservoir has an alarm and float switches which activate the Kilchis River will pumps by telemetry.

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POPULATION

Average population density per household varies from district to district. The Juno Hill district is populated predominantly by retired people with approximately two people per residence. In contrast, the Northwood district is predominantly younger family dwellings with an average occupancy rate of 3.5 people per residence. The districts are shown below in Table 3 with their estimated average population per service.

According to the Research and Census Center of Portland State University, the expected growth of Tillamook County over the period from 1980 to 1990, was expected to be approximately ten percent. This growth was never realized, with the actual numbers approaching six percent. Growth within the respective districts varies. Due to the limited available land in some districts, the number of expected service hookups will be small if any.

Population and growth rates were estimated from conversations with the residents of varying districts and information supplied by the Research and Census Center. The existing number of services for each district and the projected increase in services over the next 10 years are shown in Table below:

TABLE 3 : PROJECTED TEN YEAR GROWTH FOR INDIVIDUAL WATER DISTRICTS

	Existing Services	Projected Service Hookups	% Growth	Exist. Pop.	Est. People Per Serv.
Bay City	612	62	10.0%	1025	2
Cole Creek	8	1	12.5%	20	3
Latimer	44	7	15.9%	120	2.7
Juno	54	9	16.7%	110	2
Northwood	18	2	11.1%	62	3.5

As stated, the projected growth rates vary among the districts. T.C.C.A. is not shown on this table and will be treated separately when determining water demand.

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WATER DEMAND

Water demand varies considerably from district to district. Most districts are predominantly residential in nature with a small amount of commercial or farm use. The exception is TCCA which is completely commercial, and requires large quantities of water in its cheese manufacturing process. The variation in demand is a result of the number and type of services within a district, district population and system leakage within each district. The monthly water consumption by district can be seen in Table 13, in Appendix C. The average monthly water consumption is shown in Table 4 below.

TABLE 4 : AVERAGE DISTRICT MONTHLY WATER CONSUMPTION
(in thousands of gallons)

District	Year 9/88-8/89	Year 9/89-8/90	Average 9/88-10/90
Bay City	8086	6876	7439
Cole Creek	176	176	176
Latimer	782	1057	943
Juno	808	810	827
Northwood	764	650	703
T.C.C.A.	10365	9135	9732

The average monthly consumption per district is shown by different water years to give an indication of change in consumption. The average monthly consumption per service is shown in Table 5 below. The adjusted consumption shown for Juno Hill and Latimer Road is derived by subtracting the average monthly commercial and farm use from the total district use. This gives a more accurate portrayal of residential demand for those districts and allows comparisons with those districts that are completely residential.

TABLE 5 : AVERAGE DISTRICT MONTHLY WATER CONSUMPTION PER SERVICE
(in gallons)

District	No. of Services	Avg. Monthly Demand Per Service	Adjusted Demand Per Service
Bay City	612	12155	
Cole Creek	8	21744	
Latimer	44	21435	17694
Juno	54	15321	10123
Northwood	18	39069	
T.C.C.A	1	9135250^	

^ 1989-1990 demand for T.C.C.A. is more representative of future use and therefore will be used. This will be discussed further on page 10.

From similar water studies, completed by this firm, for coastal communities, it has been determined that 85 gallons per capita per day (GPCD) is a conservative figure for residential consumption. The calculated demand determined for residential services is therefore determined by the equation shown on the next page:

$$(\text{\#People/Service}) * (85 \text{ GPCD}) = \text{Gallons per Service per Day}$$

Because the demand varies in some districts due to commercial or farm use, the demand for each district is calculated separately. The initial demand is initially calculated on a gallons per day basis to facilitate the determination of peak demand for pipe system analysis purposes.

BAY CITY DEMAND

The 12,155 average monthly use per service for Bay City shown in Table 5, page 6, includes the average demand from 18 commercial users. This inflates the average monthly residential use figures to some degree, but the distortion is small since the commercial use is spread over 594 residential users.

Bay City is completing a program to meter all services. Early evidence has shown that metering has reduced the City's overall water consumption. A recent water distribution study for Bay City, done by this firm, analyzed the City's distribution system and storage. Evidence indicates a large amount of leakage within the system. Leakage is predominantly from old, deficient water mains. The City is making an effort to repair or replace these lines. Water consumption should therefore continue to decline. See Table 4, on Page 6, for Bay City's water use.

Of the 612 services maintained by Bay City, 525 residential accounts and 18 commercial accounts are within the Urban Growth Boundary limits of Bay City, the remaining 19 accounts are outside the Urban Growth Boundary. With the population of Bay City at 1025 people, this amounts to approximately two people per service. It will be assumed that those services outside the Urban Growth Boundary also average two people per service. Of the 18 commercial accounts in Bay City, nine have shown a water demand and useage history similar to a residence and will be treated as such. The remaining commercial users require larger quantities of water and will be considered on a per account basis. The average daily demand was determined from the monthly water records for 1989 and shown below in Table 6.

TABLE 6 : LARGE COMMERCIAL ACCOUNT DEMAND IN BAY CITY

Account	Average Daily Demand (gals)
Mink Farm	3,240
Tillamook County Smoker	14,410
Downies Restaurant	730
Bay Ocean Apartments	1,400
Hayes Oyster	3,100
Landing Restaurant	1,460
C & W Meat Co.	2,130
McRae & Sons	1,200

TOTAL 27,670 gal.

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Table 7 below shows the average daily demand for Bay City. The expected residential growth for Bay City in the next 10 years is ten percent (10%). Commercial growth may exceed that rate in some cases such as for the Tillamook Country Smoker. However, external factors, whether economic or social, may reduce the expansion of other commercial enterprises as in the milk farm. It will be assumed the total commercial growth will average out to ten percent (10%) for a ten year period. Demand estimates are shown on Table 7 below.

TABLE 7 : CALCULATED DAILY WATER DEMAND FOR BAY CITY
(in gallons)

	No. of Services	Present Demand (GPD)	Future Demand (GPD)
Res./Comm.	594	100,980	111,078
Small Comm.	10	1,700	1,870
Large Comm.	8	27,670	30,437
TOTALS =	612	130,350	143,385

COLE CREEK WATER DISTRICT consists of eight services. According to Water District Representative, Ray Downs, all services are residential. Although all services are metered the water meters are rarely checked. Average occupancy per service is estimated at three people per service. At 85 GPCD the calculated average daily use is:

$$(85 \text{ GPCD}) * (3 \text{ People/Service}) = 255 \text{ Gallons/Day/Service}$$

The calculated average daily and monthly use for the entire district is:

$$\begin{aligned} (255 \text{ Gals/Day/Service}) * (8 \text{ Services}) &= 2040 \text{ GPD} \\ (2040 \text{ GPD}) * (30 \text{ Days per month}) &= 61200 \text{ GPM} \end{aligned}$$

As can be seen from Table 4, page 6, the actual monthly water useage of Cole Creek District has remained relatively constant at an average of 176,000 gallons per month. The discrepancy between calculated and actual demand for all districts will be discussed further on page 10.

NORTHWOOD WATER DISTRICT is made up of 18 residential services with an average occupancy rate of 3.5 people per service. At the average 85 GPCD rate of water demand, this calculated daily demand is:

$$(85 \text{ GPCD}) * (3.5 \text{ People/Service}) = 298 \text{ Gallons/Day/Service}$$

The calculated average daily use for the entire district is:

$$(298 \text{ Gals/Day/Service}) * (18 \text{ Services}) = 5364 \text{ GPD}$$

The actual monthly water use of 703,000 gallons for Northwood is shown in Table 4, Page 6.

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LATIMER ROAD WATER ASSOCIATION consists of 44 services of which 41 are residential, one is a farm implement company, and two of the services are dairy farms. The water use from the implement company is similar to that of a residence and will be treated as such. Average residential occupancy per service is three people. This yields a calculated average daily demand per residential service of 255 gallons/day.

$$(85 \text{ GPCD}) * (3 \text{ People/Service}) = 255 \text{ Gallons/Day/Service}$$

Farm demand was determined by the meter readings as supplied by Jace Meyers of the Latimer Road Water Association. Combined Average farm use for a two month period is 380,000 gallons or 190,000 gallons per month.

All services are metered with meters read monthly. Average monthly use by the Latimer Road Water District is shown in Table 4, page 6, and is 943,000 gallons per month.

Total calculated daily demand for Latimer Road Water Association is shown below:

TABLE 8 : CALCULATED DAILY DEMAND FOR LATIMER ROAD WATER ASSOCIATION
(in gallons)

	No. of Services	Daily Demand per Service	Total Daily Demand
Residential	42	255	10,710
Farm	2	3167	6,333
TOTAL =			17,043 Gallons/Day

$$\text{Calculated monthly demand} = (17043 \text{ GPD}) * (30 \text{ days/month}) = 511,000 \text{ GPM}$$

JUNO HILL WATER COMPANY serves two farms, a recreational vehicle park, a restaurant, a nursery and 49 residential services. The average residential occupancy rate is two people per service. At the 85 GPCD average residential demand this yields 170 gallons per day per service. Due to the large water useage by farms and commercial enterprises the average daily use by these entities will be considered individually. Average daily water use figures are shown in Table 9 below.

TABLE 9 : AVERAGE CALCULATED WATER USE FOR JUNO WATER COMPANY
(in gallons)

Service	Avg. Monthly Gallons	Avg. Daily Use
Restaurant	55,000	1,833
Nursery	34,615	1,154
Farms (2)	170,000	5,667
Trailer Park	78,385	2,613
*Residential Use	249,900	8,330
Total =	587,900	19,597

$$*49 * 5270 \text{ Gallons/Service/Month}$$

Average monthly use for Juno Hill Water Company is shown in Table 4, page 6, at 827,000 gallons per month.

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TILLAMOOK COUNTY CREAMERY ASSOCIATION (TCCA) is the largest water user of all the districts served by the Kilchis Regional Water District, using an average of 49.1 percent of the monthly water demand with an average demand of 9,135,250 gallons per month. T.C.C.A. also has implemented one of the strictest water conservation efforts of all the districts. Although T.C.C.A. has expanded their operations and updated its plant, water consumption per month has decreased an average of over a million gallons a month from the previous year (Table 4, Page 6). This is due to the installation of a new piping system throughout the plant, the appointment of a water officer who oversees all water use within the plant, and efforts in recycling water used for cooling pumps and cleanup operations. Mr. Harold Schilds of T.C.C.A. states that water consumption would most likely continue at the existing levels over the next ten years and could even be reduced by as much as ten to twenty percent by future recycling efforts.

For the purpose of this study it will be assumed that T.C.C.A. will continue to use water at their current monthly rate of 9.1 million gallons per month or 305,000 gallons per day.

DEMAND COMPARISON Table 10 below shows the calculated demand as determined on the previous pages and the actual water consumption by the various districts. As can be seen by comparing the figures, a large disparity exists. This may result from several factors, the largest being leakage within the individual district system. Other factors being little effort to conserve, unauthorized water use and in some cases, not reading individual meters. It can be seen that those districts that do practice some form of meter reading and/or periodic water line inspection programs have a lower disparity between the calculated and actual daily demand.

Leakage from the transmission mains, controlled by Kilchis Regional Water District, is minimal, averaging around seven percent (7%). This number was determined from the difference between the readings at the master meter at the pumps and the master meters for each district. This is well within acceptable tolerances and indicates a stable transmission system

TABLE 10 : MEASURED VERSUS CALCULATED DAILY DISTRICT WATER DEMAND
(in gallons)

District	Calculated Daily Demand	Actual Daily Demand	Increase Factor
Bay City	130,350	247,964	1.9
Cole Creek	2,040	5,798	2.8
Iatimer	17,043	31,439	1.8
Juno	19,597	27,578	1.4
Northwood	5,364	23,442	4.4
T.C.C.A.	304,500	304,500	- -

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PEAK DEMAND RATE

For water system design purposes it is necessary to determine the peak demand rate of each district to determine the capacity of the water distribution system. The peak demand rate is measured in gallons per minute (gpm) and is determined by applying a peak demand factor of five (5) to the actual average demand rate. The peak demand rate per district was determined by the equation shown on the next page.

$$\text{PEAK DEMAND} = \frac{(\text{Actual Daily Demand}) * (\text{Peak Demand Factor})}{(24 \text{ Hours per Day}) * (60 \text{ Minutes per Hour})}$$

The peak demand per district is shown in Table 11 below.

TABLE 11: PRESENT AND PROJECTED PEAK WATER DEMAND PER DISTRICT

District	Actual Daily Demand (gpd)	Peak Demand Rate (gpm)	Projected Growth	Projected Peak Demand (gpm)
Bay City	247,964	861	10.0%	947
Cole Creek	5,798	20	12.5%	22
Latimer	31,439	109	15.9%	126
Juno	27,578	96	16.7%	112
Northwood	23,442	82	11.1%	91
T.C.C.A.	324,391	1126		1126

FIRE DEMAND

The water demand for adequate fire flow can be determined by the following formula as recommended by the American Insurance Association:

$$Q = 1020 P^{1/2} (1 - 0.01 P^{1/2})$$

Where Q = Fire Flow in gallons per minute
P = Population in thousands

All of the water districts except for Bay City and T.C.C.A have populations too small to produce a fire flow of greater than 500 gpm using the equation shown above. A minimum fire flow of 500 gpm will therefore be used for these districts.

The city of Bay City's total population is 1025. However it is divided between two separate water systems within the city limits, a "high-level" and "low-level" system. Only the "low-level" water system is directly connected to the Kilchis regional Water District and serves a population of 657 people. The projected population for this system is 723 in ten years. The required fire flow is calculated as follows:

Fire Flow for Present Bay City Population

$$Q = 1020 (0.657)^{1/2} (1 - 0.01 (0.657)^{1/2}) = 820 \text{ gpm}$$

Fire Flow for Future Bay City Population

$$Q = 1020 (0.723)^{1/2} (1 - 0.01 (0.723)^{1/2}) = 860 \text{ gpm}$$

Because T.C.C.A. is a commercial enterprise the fire demand flow determination is far more complex. Other than the supply room where the corrugated packing boxes are stored the structure is mainly concrete and steel. This would reduce the needed fire flow as calculated by the Insurance Services Office. It will be assumed for the purpose of this study that the required fire flow for T.C.C.A will be 2500 gpm.

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STORAGE AND DISTRIBUTION

STORAGE

A brief overview of the existing transmission and storage system for Kilchis River Water Transmission System was given in the beginning of this report. Some additional storage is provided within the individual districts for their own use. This additional storage is important in buffering the impact on the transmission system at peak demand times and provides a ready water source for fire demands. For the purposes of this report it will be assumed that the pumps will not be operating at the time storage is required and cannot be counted on to replenish the system.

EXISTING STORAGE

The main transmission system for Kilchis River Water System supplies a 200,000 gallon reservoir at Willowbrook and a 500,000 gallon reservoir on Juno Hill. Both reservoirs are at an elevation of 212 feet. The water in these reservoirs is available to all the individual districts in the system. The result being that 700,000 gallons of water is available on demand for the entire system.

Three additional district reservoirs are supplied from the Kilchis Regional Water System and are located within three of the individual districts served. These districts are:

<u>Northwood Water District</u>	which maintains a 15,000 gallon reservoir for domestic use
<u>Bay City</u>	which maintains a separate 100,000 gallon reservoir for domestic use
<u>T.C.C.A.</u>	which maintains a 220,000 gallon reservoir for fire flows

The reservoirs in Northwood and Bay City are supplied by booster pumps from the main transmission lines of the Kilchis River Water Transmission System. The 100,000 gallon Bay City reservoir is at an elevation of 337 feet and supplies the "high-level" distribution system for Bay City. A check valve prevents this reservoir from feeding back into the Kilchis Regional system. The 15,000 gallon reservoir in Northwood is at an elevation of 400 feet and serves only the Northwood Water District. This reservoir is also isolated from the main distribution system by a check valve.

The 220,000 reservoir maintained by T.C.C.A. is for fire flow storage only and can not be considered for use in meeting other demands as it feeds a separate distribution system.

A recent decision by the Kilchis Regional Water System board of directors has allocated a portion of the existing storage capacity to meet the required fire flow for the individual service districts. The excess storage capacity would be divided among the service districts on a proportional use basis. Because all individual service districts have direct access to these storage reservoirs, the decision is basically a bookkeeping matter. However, it guarantees the needed fire flow to all the districts.

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REQUIRED STORAGE

It is customary to base the system storage on a three days average flow requirement plus storage for a fire of a specified duration at the required flow value. The minimum duration as suggested by the American Insurance Association for areas with populations less than 1250 is four hours. In regards to T.C.C.A, the fire flow duration required by the Insurance Services Office for a fire flow of 2500 gpm is two hours. As determined previously for the fire flow demand, the greatest fire flows are required for the City of Bay City and for T.C.C.A. which are 820 gpm and 2500 gpm respectively. The total fire storage required is determined by multiplying the required fire flow rate by 60 minutes and by the fire duration. The resulting required fire storage is:

Bay City Required Present Fire Storage

$$(820 \text{ gpm}) * (60 \text{ min/hr}) * (4 \text{ hr}) = 196,800 \text{ gal.}$$

Bay City Required Projected Fire Storage

$$(860 \text{ gpm}) * (60 \text{ min/hr}) * (4 \text{ hr}) = 206,400 \text{ gal.}$$

T.C.C.A. Fire Storage

$$(2500 \text{ gpm}) * (60 \text{ min/hr}) * (2 \text{ hr}) = 300,000 \text{ gal.}$$

Because T.C.C.A. maintains a 220,000 gallon reservoir exclusively for fire storage, Kilchis Regional Water District needs only to allocate storage capacity for the remaining 80,000 gallons (300,000 gal. - 220,000 gal.). The required storage for Bay City far exceeds this amount so will be the controlling storage capacity. It is being assumed that only one large fire will take place in the district at a time.

To determine the three day average flow requirements for each district the calculated average daily demand from Table 10, page 10, will be multiplied by three days to determine the existing storage required. The projected storage requirements are determined by multiplying the existing storage by the projected growth given in Table 11, page 11. The resulting required storage is shown in Table 12 below:

TABLE 12: Storage Requirements Per Individual Service District
(in gallons)

District	Calculated Daily Demand	Present Storage Required	Projected Storage Requirements
Bay City	130,350	391,050	430,155
Cole Creek	2,040	6,120	6,885
Latimer	17,043	51,129	59,259
Juno	19,597	58,791	68,609
Northwood	5,364	16,092	17,878
T.C.C.A.	304,500	913,500	913,500
Total		1,436,682	1,496,286

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Adding the required fire storage to the storage required for the individual districts yields the total required storage as shown below.

Required Present Storage	
3 days average flow	= 1,436,682 gal.
required fire flow	= 196,800 gal.
	1,633,482 gal.

Projected Design Storage	
3 days average flow	= 1,496,286 gal.
required fire flow	= 206,400 gal.
	1,702,686 gal.

The total existing storage available is:

Existing Available Storage	
Bay City	
High-Level system	100,000 gal.
Low-Level system	200,000 gal.
Juno Hill	500,000 gal.
Northwood	15,000 gal.
	815,000 gal.

From review of the figures it can be seen that the existing storage capacity of the Kilchis Regional Water District is not sufficient to meet existing storage demands, much less those demands projected to the year 2001. The largest water storage requirement of the district is the three day average flow of 913,500 gallons for T.C.C.A. T.C.C.A. maintains no storage at this time for direct commercial use. They are however, constructing several 30,000 gallon reservoirs for recycling purposes. These reservoirs will store the morning sanitizer water and pump cooling water for reuse in the evening pre-rinse. It is estimated that a savings of 60,000 gallons of water a day will be achieved on completion of this project. Further efforts of conservation and leak detection are predicted by TCCA officials to either cut their consumption further or at least stabilize it. It may be that with the continued efforts of T.C.C.A. to conserve and recycle water that their three day flow requirements will be reduced. Kilchis Regional Water Board may also attempt to reach an agreement with T.C.C.A. to provide water storage for a two day average flow resulting in a saving of 305,000 gallons of storage.

Comparing the available and the required storage yields a storage deficit, as shown below.

Required Present Storage	1,633,482 gals
Existing Available Storage	815,000 gals
Additional Storage Required	818,482 gals
Projected Required Storage	1,702,686 gals
Existing Available Storage	815,000 gals
Additional Storage Required	887,686 gals

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Paragraph 8.2 of the "Water Supply Agreement" between Bay City and the associated water purchasers state that "the City reserves the right to require the purchaser to provide and maintain reservoirs of sufficient capacity to store twice the purchaser's daily average consumption on water...." provided one of several conditions are met. See Appendix . It is possible that several of the purchasing districts fall under the terms of those conditions and may be responsible for the provision of their own two day storage. It would however, more likely be less costly for all districts if they shared in the costs of one or two large reservoirs rather than construct a series of smaller ones.

NEW STORAGE FACILITIES

A water study was recently completed by this firm for the City of Bay City that proposed that the city construct two reservoirs to provide adequate storage within their system. One reservoir of 100,000 gallons would be isolated in their high level system and would provide fire flow storage to that area. That reservoir would offer no immediate benefits to the Kilchis River Water System as it would be inaccessible. However, proposed valving and connections between Bay City's High and Low level systems would make that water accessible in an emergency situation. The other proposed reservoir would be situated next to the existing 200,000 gallon reservoir in Willowbrook and would contain 75,000 gallons. It would be financially prudent for Kilchis Regional Water District to approach Bay City and propose building a reservoir larger than 75,000 gallon and sharing the cost.

The current storage requirements require an increase of almost one million gallons of storage capacity. The optimal location for a new million gallon reservoir would be adjacent to the existing 500,000 gallon reservoir on Juno Hill. At this time land is still available, the elevation conformity between existing reservoirs can be maintained, and cost savings may be incurred if existing transmission main can be utilized. Juno Hill is also somewhat centrally located for serving the majority of the existing user groups. A reservoir in this area in conjunction with reservoirs within the Bay City system would provide a fairly even pressure distribution throughout the transmission system.

Cost estimates for 250,000 gallon and one million gallon reservoirs are shown in Appendix B.

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DISTRIBUTION SYSTEM ANALYSISDesign Constraints and Assumptions

The analysis of the transmission system for Kilchis River Water Transmission System required the collection of a large amount of data. This data included pipe location, sizes and materials, water supply and demand, storage capacity, and the general topography of the area. Much of this data was supplied by Leonard Zinda, superintendent of Kilchis River Water Transmission System. This information included "asbuilt" plans of the existing transmission system, daily pump flow information, monthly master meter readings, and the Bay City Regional Water System Operation & Maintenance Manual prepared by Boatwright Engineering Inc.. Conversations were also held with the managers and operators of the purchasing districts. Some districts were able to supply detailed records of customer water use, whereas other districts had only the monthly master meter readings. Accurate plans noting water location, size, and material were in most cases nonexistent. Upon compilation of the data, some assumptions were required to develop an accurate model of the system.

These assumptions and constraints include:

- Fire flow demand shall be a minimum of 500 gpm with a minimum pressure of 20 psi. Initial fire flow analysis will assume that only one fire will occur in the district at a time.
- Maximum fire demand coincides with maximum district demand. This situation is extreme and would most likely not occur but is a conservative approach to the demand situation.
- Flow analysis will be for the transmission system of the Kilchis River Water System and in most cases will not extend into the individual purchasing districts. In some districts, where pipe sizes and lengths were supplied, these were also analyzed. Flow characteristics will be analyzed on the transmission system at assumed points of diversion to the purchasing districts.
- No leaks are present in the system. Although this assumption is not accurate for the system it is not far off. Data shows that the average leakage within the transmission system is only seven percent. There is some evidence that there is a large leakage problem within some of the purchasing districts, however this water consumption will be treated as district demand.
- Valve and fitting losses in the pipe network are negligible.
- Peak demand rates for each district are determined by applying a factor of five to the districts actual average daily flows. Standard engineering convention suggests a factor of four to five.
- Analysis will be performed on the transmission system assuming that the well pumps are not operating. The water supply is only from the two existing reservoirs. This is the extreme case but would simulate the system at the time of a power outage.

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Analysis Method

After compilation of the available data, schematics of the transmission system were drafted. These schematics showed pipe lengths, pipe diameters, and materials. District water demand was noted at those points on the system that coincided with the points of water access for each individual district. The flow distribution was then calculated for the pipe system after the application of fire and peak district demand. The calculation method used was the "Hardy-Cross" method, an iterative process of simultaneous equations. This method is used to balance the pressure and flow relationship within the piping network. Each change in pipe length or size, or water demand, requires a complete recalculation of the system. Prior to the advent of computers, these extensive calculations were done by hand. New computer programs have made the calculations of these systems quicker and easier. The program used by this firm is called "MICRO-HARDY CROSS" which was developed by CECOMP of Granada Hills, California.

The water transmission system of Kilchis River Water Transmission System was analyzed using the "MICRO HARDY CROSS" program. Different flow demands and pipe schemes were analyzed and compared with the requirements of the Oregon State Health Department (O.S.H.D.). Fire flow demand was applied at a demand point in each district and adjusted to determine the maximum fire flow allowable. Through adjustment of the transmission system, the required flow and pressure values could be achieved. A sample of the data input and output is shown in Appendix D.

TRANSMISSION SYSTEM

The existing transmission system was analyzed and found to be in good condition. Comparing the total of master meter readings from the service districts with the pump discharge readings it was found that the transmission mains were experiencing an average of seven percent leakage rate. This leakage rate is far below what is normally found in a transmission system of this length and is an indication of a sound transmission system. Fire demand was applied at each district at the predetermined fire flows. In several areas the mains are undersized for fire flows but the system responded well in delivering water at the peak demand rate, both present and projected.

The existing system was analyzed at peak demand and was found to be able to supply all the water necessary to meet both the current peak demand and the projected peak demand. Fire demand was then applied to the system at the same time, assuming that the maximum draw on the system would occur when a fire would occur at the time everyone was using water. It was found that the system was able to deliver the necessary fire flows to all districts except for Northwood where a maximum flow of 472 gpm at a pressure of 20 psi was attained. A further problem for the Northwood district is that a booster pump is installed at the point of connection with the Kilchis Regional Water District main. This booster pump has a maximum flow rate of approximately 100 gpm making the need for higher flow rates academic.

If the Northwood Water District should desire to achieve a minimum fire flow of 500 gpm at the base of their district it would be necessary to increase the size of the main feeding from the Juno reservoir to T.C.C.A.. This main is currently ten inches in diameter and would have to be increased to a diameter of twelve inches. Another option the Northwood District has is to construct a reservoir for fire flow storage within their own system.

May 2, 1991

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Another low flow area was at the end of the four inch diameter Cole Creek main. Due to the high pressure loss in the smaller line, the available flow for fire demand was 250 gpm. By increasing the size of the Cole Creek main to six inch diameter, a much higher flow of 640 gpm could be achieved.

The fire flow to the Latimer Road Water Association is at least 600 gpm at Latimer Road but falls off considerably through any main size less than six inches. For adequate fire flow away from the main road larger mains should be installed.

Pumping Capacity The pumping capacity of the existing pumps can meet the required average daily demand of 669,000 gallons per day. This daily rate breaks down to an average rate of 464 gpm. The pumps are capable of pumping 550 gpm each. Pump discharge data was derived from the daily pump records supplied by Leonard Zinda of Bay City. During the summer months, typically a high demand period, maximum daily water demand reached 856,000 gallons per day or close to 600 gpm. This rate is still within the pumping capacity of the two pumps, and allows for outage of one pump for several days.

Water Quality at the well was tested two different times. Water samples were taken by Leonard Zinda, superintendent of Kilchis Regional Water District with the samples analyzed by CH Diagnostic and Consulting Service, Inc. in Fort Collins, Colorado. The first sample was taken on February 2, 1990. This sample showed slight surface water influence in well number two in the form of the algae, *Draparnaldia* and the diatoms *Synedra*, *Asterionella*, *Fragilaria* and *Diatoma*. Well number one showed no surface water influence. The samples on the two wells had been taken after the large flood of January, 1990, which may have had some bearing on the test. A second test was then performed in December of 1990. In this case both wells showed no influence from surface water. The results from both tests can be seen in Appendix E. The lack of surface water influence in the samples indicates that filtration of the water is not required at this time. This should not be construed as meaning that filtration may never be required. If surface water infiltration begins to repeat itself in future samples, O.S.H.D. may then require filtration.

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POTENTIAL NEW USER GROUPS

As the many state and federal agencies place more and more stringent requirements on water supply and water quality, and increased growth places a greater demand on existing water sources, many water districts, small and large, will be looking for alternative water supplies. Because of the quality of the Kilchis water and the apparent certainty of the supply the City of Bay City and the Kilchis Regional Water Board should expect inquiries regarding the sale of water and/or incorporation of other water districts into the system. Several local independent water districts that are bordering or are within the service area of the Kilchis River Water Transmission System are likely prospects. These districts are the Kilchis River Water District and the Wilson River Water District. The effect of incorporation of these districts into the Kilchis River Transmission System was analyzed and a brief summary shown below.

The KILCHIS RIVER WATER DISTRICT is located along Alderbrook Road, encompassing the town of Idaville and several nearby farms. The district serves 125 services and 1000 to 1500 cows. Water is pumped from two wells along the Kilchis River at 90 gpm and 100 gpm respectively. The only storage for the system is an old reservoir of approximately 38,000 gallons that is slated to be abandoned. The existing distribution system is made up of old waterlines of various materials and predominantly 2 to 4 inch diameter. All services pay the same flat rate for water regardless of amount of use and no meters have been installed. The approximate average daily flow is 147,000 gallons. There are no fire hydrants in the district.

The Kilchis Water District is bisected by the Kilchis River Water Transmission Systems 10" diameter transmission main that runs along Alderbrook Road. The district also lies between the Willowbrook reservoir and the Juno Hill Reservoir, all of which makes delivery of water to the district from the Kilchis Regional System quite feasible. Storage and supply may present another problem however. At Kilchis Water District's current daily demand an additional 440,000 gallons of storage would be required to maintain three days of average flow for the district. It would also require an average of an additional pumping of 100 gpm from the wells to supply the water throughout the day. Obviously with the existing condition of Kilchis Water Districts distribution system, the lack of metering, and the flat rate charge for water regardless of useage, there is little incentive to locate and repair leaks and to conserve water. It would be in the best interest of Bay City and the Kilchis River Water Transmission System to encourage the Kilchis Water District to attempt to alleviate these problems prior to their incorporation in to the Kilchis Regional System.

The WILSON RIVER WATER DISTRICT currently has a surplus water agreement with Bay City and the Kilchis Regional Water Transmission System to provide water in an emergency situation if that water is available. The Wilson River Water District is located on the south side of the Wilson River and is connected to the Kilchis River Water Transmission System on the 8" diameter line on Latimer Road between the Latimer Road Water Association and the Northwood Water District. The Wilson River Water District maintains 110 services consisting of 98 residential and 12 farms. As with the Kilchis Water District, the Wilson River Water District charges a flat rate for water regardless of useage and there are no meters installed in the district. The water source is one well along the Wilson River that is pumped at a continuous rate of 150 gpm. Storage consists of a 30,000 gallon reservoir. According to Chuck Curl of the Wilson River Water District, the distribution system is mainly four and six inch diameter cast iron lines and leakage is prevalent.

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The only measurement of system demand at this time is the continuous pumping of 150 gpm at the well.

The Wilson River Water District is near the end of a long stretch of eight inch diameter main just upstream from the Northwood Water District. Analysis of the transmission system, utilizing a peak demand of 500 gpm for Wilson River, indicated that to maintain minimum pressure of 20 psi at the Northwood Water District during peak flows some main sizes would have to be increased. To maintain minimum pressure without providing fire flows the transmission main from the Juno Hill Reservoir to the Tillamook County Creamery would have to be upsized to a minimum of 12" diameter. If a minimum fire flow of an additional 500 gpm were to be required at the Wilson River Water District the entire 8" diameter main on Latimer Road and Sollie Smith Road would need to be upgraded to a minimum of a 10" diameter pipe.

As is the case with the Kilchis River Water District, the city of Bay City and the Kilchis River Water Transmission System would want to encourage the Wilson River Water District to implement a leak detection and metering program and develop a sufficient storage system prior to incorporation into the Kilchis Regional System.

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GENERAL RECOMMENDATIONS

The general condition and capacity of the existing transmission system is in good shape and is capable of handling the existing and future needs of the district. Water consumption among some of the smaller districts is far above normal and would seem to indicate problems with leakage. Unfortunately, the current billing structure from Kilchis Regional Water District to the purchasing districts does not stimulate conservation among the purchasing districts. The same applies within the purchasing districts with their own customers. Some recommendations for the Kilchis River Water Transmission System are as follows:

- A reservoir inspection program should be created and followed. This would indicate areas of potential problems and allow for routine maintenance. Unfortunately this is difficult to do at the time, due to the need to keep both reservoirs operating. However, once a new reservoir is constructed the inspection program should begin.
- A valve turning program should be implemented to check all the valves within the transmission system and keep them in operating condition.
- A cross-connection control program should be kept active and up to date. Currently there is a need for a backflow prevention device at the connection with the Wilson River Water District. Potential other locations are at Northwood Water District and the connection with Juno Water Company.
- Plans of all water lines, giving size, material, location of pipes and valves, should be provided to the City of Bay City by all purchasing districts. Maps showing the accurate boundaries of all purchasing districts should also be provided.
- Monthly meter readings of the customers in all purchasing districts should be taken by all districts with copies sent to the City of Bay City as per paragraph 2.2 of the "Water Supply Agreement".
- An active leak detection program should be implemented by each purchasing water district in conjunction with the reading of the meters.
- Rate Structures that reflect water consumption per customer should be implemented by those purchasing water districts that have not already done so. This may create a greater desire for water conservation in some areas and would keep the purchasing water districts in compliance with paragraph 10.2 of the "Water Supply Agreement".
- A Master meter should be installed on the 10" diameter connection to the 220,000 gallon reservoir used for fire storage at T.C.C.A..
- A second auxiliary pump motor should be installed should water demand increase through the addition of another district.
- A 6" dia. main will be required for the Cole Creek Water District if a fire flow of 500 gpm is desired.

APPENDIX A

KILCHIS REGIONAL WATER DISTRICT PIPE SCHEMATIC

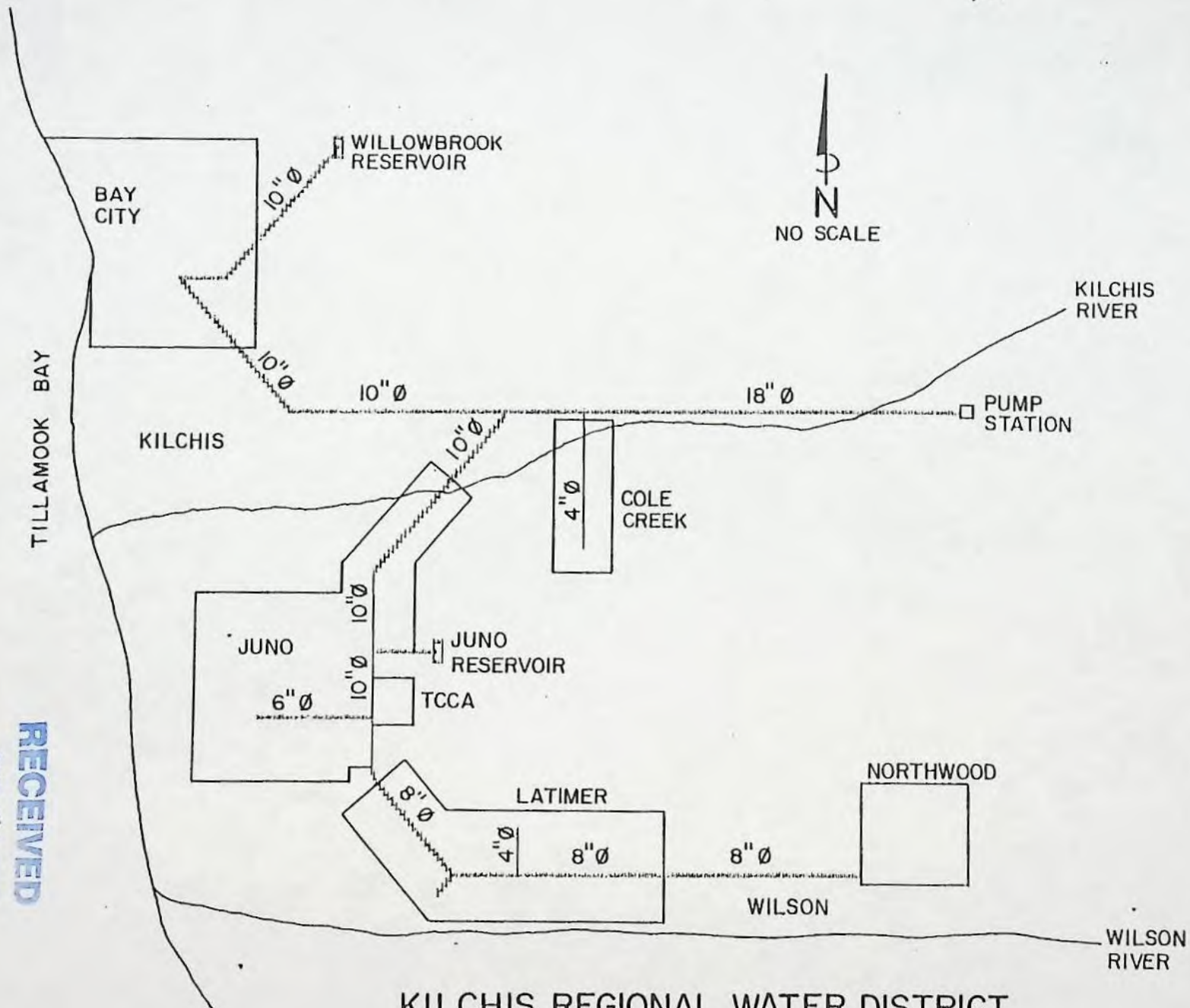
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SALEM, OREGON**

AUG 04 2003

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KILCHIS REGIONAL WATER DISTRICT
PIPE SCHEMATIC

APPENDIX B

WATER SYSTEM IMPROVEMENT PRELIMINARY COST ESTIMATE

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**WATER RESOURCES DEPT.
SALEM, OREGON**

KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM IMPROVEMENT PRELIMINARY COST ESTIMATE

02-May-91

IMPROVEMENT: 250,000 GALLON STORAGE TANK

DESCRIPTION: 250,000 GALLON GROUND LEVEL, PRESTRESSED CONCRETE STORAGE TANK.
42 FEET DIAM. X 24' HIGH

LOCATION: IN THE VICINITY OF THE EXISTING STORAGE RESERVOIRS.

THIS ESTIMATE ASSUMES THAT SOME EXISTING VALVES & EXISTING HOUSING
WILL BE USEABLE.

ITEM:	QTY	UNIT	UNIT COST	TOTAL
STORAGE TANK, PRESTRESS CONCR.	1	LS	\$190,000.00	\$190,000
STORAGE TANK, WITH FOUNDATION				
CLEARING & GRUBBING	0.3	ACRE	\$3,150.00	\$945
PIPES, FITTINGS, & VALVING	1	LS	\$19,500.00	\$19,500
SECURITY FENCE	350	LF	\$10.00	\$3,500
GATE, 14 FOOT WIDE	1	EA	\$1,200.00	\$1,200
				\$215,145
ENGINEERING DESIGN	10	%		\$21,515
ENGINEERING STAKING & INSPEC.	6	%		\$12,909
CONTINGENCIES & UNLISTED ITEMS	10	%		\$21,515
				\$271,080
			USE	\$271,000

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WATER RESOURCES DEPT.
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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM IMPROVEMENT PRELIMINARY COST ESTIMATE

02-May-91

IMPROVEMENT: 1 MILLION GALLON STORAGE TANK

DESCRIPTION: 1 MILLION GALLON GROUND LEVEL, PRESTRESSED CONCRETE STORAGE TANK,
87 FEET DIAM. X 24' HIGH

LOCATION: IN THE VICINITY OF THE EXISTING STORAGE RESERVOIRS.

THIS ESTIMATE ASSUMES THAT SOME EXISTING VALVES & EXISTING HOUSING
WILL BE USEABLE.

	QTY	UNIT	UNIT COST	TOTAL
ITEM:				
STORAGE TANK, PRESTRESS CONCR.	1	LS	\$403,000.00	\$403,000
STORAGE TANK, WITH FOUNDATION				
CLEARING & GRUBBING	0.3	ACRE	\$3,130.00	\$1,575
PIPES, FITTINGS, & VALVING	1	LS	\$19,500.00	\$19,500
SECURITY FENCE	400	LF	\$10.00	\$4,000
GATE, 14 FOOT WIDE	1	EA	\$1,200.00	\$1,200
				\$431,275
ENGINEERING DESIGN	10	1		\$43,128
ENGINEERING STAKING & INSPEC.	5	1		\$25,877
CONTINGENCIES & UNLISTED ITEMS	10	1		\$43,128
				\$543,407
			USE	\$543,000

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KILCHIS REGIONAL WATER DISTRICT
WATER SYSTEM IMPROVEMENT PRELIMINARY COST ESTIMATE

02-May-71

IMPROVEMENT: 1 MILLION GALLON STORAGE TANK

DESCRIPTION: 1 MILLION GALLON GROUND LEVEL, STEEL CONCRETE STORAGE TANK.

76 FEET DIAM. X 32' HIGH

LOCATION: IN THE VICINITY OF THE EXISTING STORAGE RESERVOIRS.

THIS ESTIMATE ASSUMES THAT SOME EXISTING VALVES & EXISTING HOUSING
WILL BE USEABLE.

ITEM:	QTY	UNIT	UNIT COST	TOTAL
STORAGE TANK, STEEL STORAGE TANK, INCLUDING FOUNDATION	1	LS	\$240,000.00	\$240,000
CLEARING & GRUBBING	0.3	ACRE	\$3,150.00	\$1,575
PIPES, FITTINGS, & VALVING	1	LS	\$19,500.00	\$19,500
SECURITY FENCE	400	LF	\$10.00	\$4,000
GATE, 14 FOOT WIDE	1	EA	\$1,200.00	\$1,200
				\$266,275
ENGINEERING DESIGN	10	%		\$26,628
ENGINEERING STAKING & INSPEC.	5	%		\$15,977
CONTINGENCIES & UNLISTED ITEMS	10	%		\$26,628
				\$335,507
			USE	\$336,000

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APPENDIX C

TABLE 13: WATER CONSUMPTION BY MONTH

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SALEM, OREGON

TABLE 13

KILCHIS REGIONAL WATER DISTRICT
WATER CONSUMPTION BY MONTH

	Bay City	Cole Cr.	Latimer	Juno Hill	Northwood	Creamery
NO. OF SERVICES	612	8	44	54	18	1
S 1988	8997290	230900	728000	1007460	819450	10518200
O	9265490	160200	433000	1104380	390790	11519000
N	7051220	87500	478000	587486	1084130	10075000
D	6503650	152200	619000	733526	679630	10244000
J 1989	9494030	156000	803000	847721	859900	11843000
F	8584180	156000	1101000	785850	843000	9865000
M	7307000	155900	780000	636020	727880	9651000
A	8900000	132400	984000	859200	943200	11409000
M	7127000	168700	665000	695830	625130	8210000
J	7669000	233300	684000	734140	782550	9744000
J	8724000	203900	1155700	867080	634560	11346000
A	7408000	271300	948000	832050	779890	9950000
S	8495000	271300	1317000	1041230	779890	11013000
O	6135000	140200	749000	789030	548980	8469000
N	6135000	140100	796000	613240	533090	8586000
D	5850000	137400	792000	581358	514050	7923000
J 1990	7960000	180900	1008000	688222	657600	10066000
F	6778000	147400	877000	581358	609590	9053000
M	5567000	114300	846000	539000	549180	7762000
A	7994000	156800	1044000	754180	691240	9282000
M	6589000	123100	826000	849430	596910	8731000
J	6427000	123100	907000	834180	649000	9950000
J	7974000	258700	1552000	1139120	874820	9733000
A	6608000	312700	1972000	1304650	802460	9055000
S	7667000	190800	1344000	1271390	726430	10659000
O	6202000	117600	1113333	833340	581040	8369000
TOTAL	1.9E+08	4522700	24522033	21510471	18284390	2.5E+08
MONTHLY						
AVG. USE	7438918	173950	943155	827326	703246	9731738
MONTHLY AVG USE						
SEPT. TO AUG.						
'89-'90	6876000	175500	1057167	809583	650568	9135250
MONTHLY AVG USE						
SEPT. TO AUG.						
'88-'89	8085905	175692	781558	807562	764176	10364517
TOTAL						
DAILY						
AVG. USE	247964	5798	31439	27578	23442	324391
AVG. GPM	172	4	22	19	16	225
PEAK GPM						
(AVG x 5)	861	20	109	96	81	1126

APPENDIX D

MICRO HARDY CROSS OUTPUT

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SALEM, OREGON

5/ 7/1991

Page 1

RUN NO. 162- 836

NETWORK NAME : KILCHIS REGIONAL WATER DISTRICT

PEAK DEMAND AT ALL NODES

EXISTING PIPING SYSTEM

PUMPS ARE OFF

MAX FIRE FLOW AT NORTHWOOD WITH 20 PSI MINIMUM PRESSURE

Analysis Statistics :

Analysis Method : Hazen Williams

Tolerance level was set to 0.0 gpm

The solution was found (or stopped) after 5 Iterations

Maximum head error was 0.0 ft

Maximum flow error was 0.0 gpm

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WATER RESOURCES DEPT
SALEM, OREGON

5/ 7/1991
Run # 162- 836

PIPE REPORT

Page 2

	Flow Rate gpm	Vel. fps	Head Loss ft	From Node	To Node	Dia. in	Length ft	Roughness C	K
	1	1033.6	4.2	21.5	1	2	10.00	4299	150 0.00
	2	686.6	2.8	3.1	2	3	10.00	1300	150 0.00
	3	86.6	0.4	0.2	3	4	10.00	4497	150 0.00
	4	84.6	0.3	0.3	4	5	10.00	5850	150 0.00
	5	25.0	0.0	0.0	5	6	18.00	2200	135 0.00
	6	23.0	0.6	1.2	6	7	4.00	3100	150 0.00
	7	0.0	0.0	0.0	6	8	18.00	10500	135 0.00
	8	57.6	0.2	0.1	5	9	10.00	5098	150 0.00
	9	7.6	0.0	0.0	9	10	10.00	1800	150 0.00
>>	10	-1801.3	-7.4	-25.2	10	11	10.00	1800	150 0.00
>>	11	1806.9	7.4	21.9	10	12	10.00	1550	150 0.00
	12	62.0	0.7	1.1	12	13	6.00	3200	150 0.00
	13	618.9	2.5	2.3	12	14	10.00	1200	150 0.00
	14	616.9	3.9	18.3	14	15	8.00	3196	150 0.00
	15	2.0	0.1	0.0	15	16	4.00	700	150 0.00
	16	612.9	3.9	9.9	15	17	8.00	1750	150 0.00
	17	2.0	0.1	0.0	17	18	4.00	1100	150 0.00
	18	552.9	3.5	14.5	17	19	8.00	3100	150 0.00
	19	491.9	3.1	11.3	19	20	8.00	3000	150 0.00
	20	489.9	3.1	13.0	20	21	8.00	3500	150 0.00

5/ 7/1991
Run # 162- 836

NODE REPORT

	Water Demand gpm	Ground Elev. ft	H.G.L. Elev. ft	Pressure psi	X Co-ord. ft	Y Co-ord. ft	
>>	1	-1033.6	190.0	212.5	9.7	6160	21220 FIXED HEAD
	2	347.0	90.0	191.0	43.7	3120	18180
	3	600.0	109.0	187.9	34.2	1820	18180
	4	2.0	39.0	187.7	64.4	5000	15000
	5	2.0	26.0	187.4	69.9	10850	15000
	6	2.0	35.0	187.4	66.0	13050	15000
	7	23.0	40.0	186.2	63.3	13050	11900
	8	0.0	82.0	187.4	45.6	23550	15000
	9	50.0	35.0	187.3	65.9	7245	11395
	10	2.0	60.0	187.3	55.1	7245	9595
>>	11	-1801.3	190.0	212.5	9.7	9045	9595 FIXED HEAD
	12	1126.0	20.0	165.4	63.0	7245	8045
	13	62.0	15.0	164.4	64.7	4045	8045
	14	2.0	15.0	163.1	64.1	7245	6845
	15	2.0	20.0	144.8	54.0	9505	4585
	16	2.0	15.0	144.8	56.2	9010	4090
	17	58.0	25.0	135.0	47.6	11255	4585
	18	2.0	85.0	135.0	21.6	11255	5685
	19	61.0	40.0	120.5	34.9	14355	4585
	20	2.0	35.0	109.2	32.1	17355	4585
	21	489.9	50.0	96.2	20.0	20855	4585 FIXED HEAD

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SALEM, OREGON

APPENDIX E
ANALYSIS FOR WATERBORNE PARTICULATES

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ANALYSIS FOR WATERBORNE PARTICULATES

CH Diagnostic and Consulting Service, Inc.

2012 Derby Court, Fort Collins, Colorado 80526

Charles P. Hibler PhD, President

Telephone (303) 223-9549

Invoice 90034

2/3/90

Customer 90199

City of Bay City

PO Box 307, 5525 B St

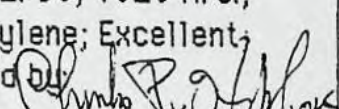
Bay City, OR 97107

Laboratory Information

Fed. Ex.; 2/2/90; 1020 Hrs.;

1/polypropylene; Excellent;

Sample read by



Sample Identification: Well No. II (10°C; pH 6.0; 0 NTU)*

Date/Start 1/31/90

Date/Stop 2/1/90; 0400

Sampler: Leonard W. Zinda

Gallons: 520

Filter Color: White

Sediment: None

Fine Amorphous Debris: Rare silica (1-5 μ diameter)

Large Amorphous Debris: 0

Algae: Rare Draparnaldia (fresh water species)**

Diatoms: Occasional Synedra, Asterionella, Fragilaria & Diatoma**

Plant Debris: 0

Giardia: 0

Cryptosporidium: Not checked

Free-Living Nematodes: 0

Pollen: 0

Free-Living Amoeba: 0

Ciliates: 0

Flagellates: 0

Crustaceans: 0

Arthropods: 0

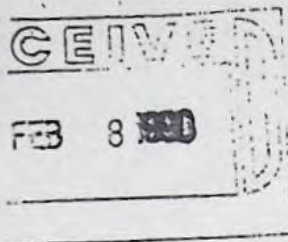
Other: 0

Comments: *Pre-chlorination into Well. **This system has a slight surface water influence. Is it a well or a recently developed spring? Was sample taken after a storage tank that is exposed to sunlight?

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**WATER RESOURCES DEPT.
SALEM, OREGON**



ANALYSIS FOR WATERBORNE PARTICULATES

CH Diagnostic and Consulting Service, Inc.

2012 Derby Court, Fort Collins, Colorado 80526

Charles P. Hibler PhD, President

Telephone (303) 223-9549

Invoice 90034

2/3/90

Customer 90199

City of Bay City

Box 307, 5525 B St

Bay City, OR 97107

Laboratory Information

Fed. Ex.; 2/2/90; 1020 Hrs.;

1/polypropylene; Excellent;

Sample ready by:

Sample Identification: Well No. 1 (10°C; pH 6.0; 0 NTU)*

Sample/Start 2/1/90; 0400 Date/Stop 2/1/90; 1200 Sampler: Leonard W. Zinda

Flow Rate: 300 Filter Color: White Sediment: None

Fine Amorphous Debris: Rare silica (1-5 μ diameter)

Large Amorphous Debris: 0

Algae: 0

Diatoms: 0

Plant Debris: 0

Giardia: 0

Cryptosporidium: Not checked

Free-Living Nematodes: 0

Pollen: 0

Free-Living Amoeba: 0

Ciliates: 0

Flagellates: 0

Crustaceans: 0

Arthropods: 0

Other: 0

Comments: *Pre-chlorination into Well. There is no evidence of surface water influence on this system.

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**WATER RESOURCES DEPT.
SALEM, OREGON**

ANALYSIS FOR WATERBORNE PARTICULATES

Invoice 90394

CH Diagnostic and Consulting Service, Inc.

12/13/90

2012 Derby Court, Fort Collins, Colorado 80526

Charles P. Hibler PhD, President

Telephone (303) 223-9549

Customer 90199

Laboratory Information

City of Bay City

Fed. Ex.; 12/12/90; 1020 Hrs.;

PO Box 307, 5525 B St

Polypropylene; Excellent;

Bay City, OR 97107

Sample read by:

Charles P. Hibler

Sample Identification: Well No. 1 (13°C; pH 5.9), Pre-chlorination

Date/Start 12/10/90; 1603 Date/Stop 12/10/90; 2000 Sampler: BB

Gallons: 860

Filter Color: White

Sediment: None

Fine Amorphous Debris: Occasional silica (1-2 μ diameter)

Large Amorphous Debris: 0

Algae: 0

Diatoms: 0

Plant Debris: 0

Giardia: 0

Cryptosporidium: Not checked

Free-Living Nematodes: 0

Pollen: 0

Free-Living Amoeba: 0

Free-Living Ciliates: 0

Free-Living Flagellates: 0

Crustaceans: 0

Arthropods: 0

Other: 0

Comments: No particulates indicating surface water influence were found in this sample.

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**WATER RESOURCES DEPT.
SALEM, OREGON**

ANALYSIS FOR WATERBORNE PARTICULATES

CH Diagnostic and Consulting Service, Inc.

2012 Derby Court, Fort Collins, Colorado 80526

Charles P. Hibler PhD, President

Telephone (303) 223-9549

Invoice 90394

12/13/90

Customer 90199

City of Bay City

PO Box 307, 5525 B St

Bay City, OR 97107

Laboratory Information

Fed. Ex.; 12/12/90; 1020 Hrs.;

Polypropylene; Excellent;

Sample read by:

Charles P. Hibler
Chet by Charles P. Hibler

Sample Identification: Well No. 2 (15°C; pH 5.6), Pre-chlorination

Date/Start 12/10/90; 1123 **Date/Stop** 12/10/90; 1600 **Sampler:** LWZ

Gallons: 800

Filter Color: White

Sediment: None

Fine Amorphous Debris: Occasional silica (1-2 μ diameter)

Large Amorphous Debris: 0

Algae: 0

Diatoms: 0

Plant Debris: 0

Giardia: 0

Cryptosporidium: Not checked

Free-Living Nematodes: 0

Pollen: 0

Free-Living Amoeba: 0

Free-Living Ciliates: 0

Free-Living Flagellates: 0

Crustaceans: 0

Arthropods: 0

Other: 0

Comments: No particulates indicating surface water influence were found in this sample.

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**WATER RESOURCES DEPT.
SALEM, OREGON**

APPENDIX F
WATER WELL REPORT

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**WATER RESOURCES DEPT.
SALEM, OREGON**

WATER WELL REPORT

STATE OF OREGON

(Please type or print)

(Do not write above this line)

State Well No. _____

State Permit No. _____

STATE ENGINEER, SALEM, OREGON 97310

within 30 days from the date
of well completion.

(1) OWNER:

Name City of Bay City
Address Bay City, Oregon

(2) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED:

12 " Diam. from PLUS 2 ft. to 21 ft. Gauge 250
" Diam. from _____ ft. to _____ ft. Gauge _____
" Diam. from _____ ft. to _____ ft. Gauge _____

(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 Johnson

Type stainless Model No. _____
Diam. 1 1/2 Slot size 100 Set from 20 ft. to 40 ft.
Diam. _____ Slot size _____ Set from _____ ft. to _____ ft.

(8) WELL TESTS:

Drawdown is amount water level is
lowered below static level

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

Yield: 1000 gal./min. with 3.5 ft. drawdown after 24 hrs.

" " " " " "

" " " " " "

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

Artesian flow _____ g.p.m.

Temperature of water _____ Depth artesian flow encountered _____ ft.

(9) CONSTRUCTION:

Well seal—Material used Cement

Well sealed from land surface to 20 ft.

Diameter of well bore to bottom of seal 16 in.

Diameter of well bore below seal 10 in.

Number of sacks of cement used in well seal 6 sack: mix _____ sacks

Number of sacks of bentonite used in well seal none 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 Tillamook Driller's well number _____
SW 1/4 SW 1/4 Section 33 T. 1 R. 9 W.M.
Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found 15 ft.

Static level 15 ft. below land surface. Date _____

Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing 10
Depth drilled 50 ft. Depth of completed well 50 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
clay sand brown	0	7	0
clay gravel cobbles gray	7	18	15
sand gravel water gray	18	29	15
clay gravel cobbles brown	29	36	15
sand gravel water brown	36	41	15
clay brown	41	43	15
clay gravel brown	43	50	15

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WATER RESOURCES DEPT.
SALEM, OREGON

Work started 4/28/80 19 Completed 5/9/80 19

Date well drilling machine moved off of well 5/12/80 19

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] _____ Date 5/12, 19 80

(Drilling Machine Operator)

Drilling Machine Operator's License No. 574

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 Zent Drilling, Inc.

(Person, firm or corporation)

(Type or print)

Address 7310 St. Johns Vancouver, Wash. 98665

[Signed] _____

(Water Well Contractor)

Contractor's License No. 229 Date 5/12/80 19

and first copy
report are to be
filed with the
ENGINEER, SALEM, OREGON 77310
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)

State Well No. _____

State Permit No. _____

(1) OWNER:

Name City of Bay City

Address _____

Bay City, Oregon

(2) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐

If abandonment, describe material and procedure in Item 12.

(3) TYPE OF WELL:

Rotary ☐ Driven ☐
Cable ☒ Jetted ☐
Dug ☐ Bored ☐

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) CASING INSTALLED:

	Threaded ☐	Weided ☒
12" Diam. from <u>plus 2</u> ft. to <u>0</u> ft. Gage <u>375</u>		
12" Diam. from <u>8</u> ft. to <u>28</u> ft. Gage _____		
10" Diam. from <u>40</u> ft. to <u>45+</u> ft. Gage <u>250</u>		

(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 JOHNSON

Type 1/2" CARBON STEEL Model No. _____

Diam. 10 Slot size 100 Set from 20 ft. to 40 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: 1200 gal./min. with 3 ft. drawdown after 21 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 grout

Well sealed from land surface to 25 ft.

Diameter of well bore to bottom of seal 10 in.

Diameter of well bore below seal 12 in.

Number of sacks of cement used in well seal 6 Jack air sacks

Number of sacks of bentonite used in well seal 0 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 _____ Driller's well number _____
S 1/4 SE 1/4 Section 33 T. 1N R. 9E W

Bearing and distance from section or subdivision corner _____

(11) WATER LEVEL: Completed well.

Depth at which water was first found 17

Static level 17 ft. below land surface. Date 9/23/75

Artesian pressure _____ lbs. per square inch. Date _____

(12) WELL LOG:

Diameter of well below casing _____

Depth drilled 60 ft. Depth of completed well 45+

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

MATERIAL	From	To	SWI
CLAY GRAVE SOIL MOUND	0	2	1
SANDY GRAVEL STRATUM	2	27	1
SAND GRAVEL WATER BEAR	27	30	1
CLAY MOUND	30	35	1
ROCKY CLAY MOUND	35	40	1
CLAY WEATHERED ROCK	40	45	1
SAND ROCK	45	60	1

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WATER RESOURCES DEPT.
SALEM, OREGON

Work started 9/15/75 19 Completed 9/27/75 19

Date well drilling machine moved off of well 9/27/75 19

Drilling Machine Operator's Certification:

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

[Signed] _____ Date 9/30/75 19

(Drilling Machine Operator)

Drilling Machine Operator's License No. 213

Water Well Contractor's Certification:

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

Name East Drilling, Inc. (Type of print)

Address 7310 St. Johns Vancouver, B.C. (Person, firm or corporation)

[Signed] _____ (Water Well Contractor)

Contractor's License No. 222 Date 8/30/75 19

APPENDIX G
WATER SUPPLY AGREEMENT

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**WATER RESOURCES DEPT.
SALEM, OREGON**

WATER SUPPLY AGREEMENT
KILCHIS RIVER WATER TRANSMISSION SYSTEM

CITY OF BAY CITY
TILLAMOOK COUNTY CREAMERY ASSOCIATION
JUNC WATER COMPANY
LATIMER ROAD WATER ASSOCIATION
COLE CREEK WATER DISTRICT
NORTHWOOD WATER DISTRICT

November 1, 1980

LATIMER ROAD WATER ASSOCIATION AGREEMENT

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WATER RESOURCES DEPT.
SALEM, OREGON

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WATER RESOURCES DEPT.
SALEM, OREGON

WATER SUPPLY AGREEMENT

This agreement, made and entered into this _____ day of _____, 1980, by and between The City of Bay City, referred to as "The City," a municipal corporation of the State of Oregon, and LATIMER ROAD WATER ASSOCIATION, referred to as "Purchaser," with the following understandings:

The City is willing to enter into an agreement on a supply of water for consumers within the Purchaser's service area; and

The City has received authority to issue bonds up to the amount of \$900,000 and is willing under the authority of Oregon law to construct a transmission facility outside the corporate limits of The City; and

The construction of the transmission facility is to the mutual benefit of The City and the Purchaser for the reason that water can be taken from the Kilchis River in an economical way through the cooperative agreement of The City, the Purchaser and other water districts and corporate users; and

The Purchaser fully realizes that sufficient security must be given The City so as to assure timely payment of the bond principal and interest by The City to the bond holders; and

The City has designed a water system for The City and the area to the south of The City for supply of water to districts and corporate users; and

The water from the Kilchis River appears to be in sufficient quantity and quality to supply the water to the Purchaser and The City; and

Now, in consideration of the below mutual covenants and agreements, the parties agree with each other according to the following provisions:

Legal

1.1 This agreement shall be in force and effect for a period ending 40 years from the date hereof, unless sooner terminated as provided in this agreement.

1.2 No officer, official or agent of The City has the power to amend, modify or alter this agreement or waive any of its conditions or to bind The City by making any promise or representations not contained herein.

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WATER RESOURCES DEPT.
SALEM, OREGON

1.3 This agreement shall not be assigned or transferred by either party without their prior mutual consent.

1.4 This agreement will be subject to modification or cancellation in the event a court of competent jurisdiction restricts or limits, directly or indirectly, any of The City's rights to obtain, sell, contract for or distribute water from the Kilchis River.

1.5 The City will not be responsible in damages for any interruption or failure to supply water and shall be saved and held harmless by Purchaser from all damage of any kind, nature and description which may arise as a result of making this agreement and furnishing water.

1.6 The Purchaser has the right to renew this contract for an additional 20 years at the end of this agreement under the same terms and conditions of this agreement, subject to negotiation and agreement of the rates paid for the water by Purchaser.

Regulations

2.1 The Purchaser may not permit any water furnished hereunder to be used to supply any party outside the Purchaser's territorial limits without specific approval of The City Council of The City. This shall not apply to temporary emergency service provided to other city water users.

2.2 The City reserves the right to require Purchaser to maintain suitable records of the peak hourly, peak daily, and average monthly consumption of water by the consumers and these records shall be available to The City at all reasonable times.

2.3 The Purchaser shall submit to The City, upon request, a report showing the amount of water received from The City and the amount of water furnished and billed to consumers during any period.

2.4 In times of shortage, water use will be curtailed to the extent permitted by law and on the following basis, the first listed curtailment being adopted to meet the least serious situation, and the succeeding curtailments being adopted in addition to prior listed curtailments, with all curtailments applied uniformly to all users:

A. The curtailment of water supply to users under a surplus water agreement.

B. Restriction of uses which can be accomplished without serious injury to person or property, and prohibition of nonessential uses.

C. Prohibition of every use except for domestic use and for essential commercial enterprises and industry.

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SALEM, OREGON

2.5 Water supplied under this agreement shall not be used for irrigation. Irrigation does not include reasonable domestic lawn irrigation. The City reserves the right to sell water for commercial, industrial or agricultural irrigation on a surplus water basis. Irrigation means the pumping of water for the growing of crops for commercial, industrial or agricultural purposes.

Rights

3.1 The City reserves the right to require the Purchaser to deposit, in advance, a sum equal to the estimated costs for water during a period of 90 days at the prevailing metered rate.

3.2 The City reserves the right to inspect, test, repair and replace the master water meter as required. Such replacements or repairs shall be charged to and paid by the Purchaser or charged as an amortized cost of maintenance.

3.3 Either party reserves the right, either in law or equity, by suit, mandamus or other proceeding, to enforce or compel performance of any or all covenants herein contained.

3.4 Kilchis Regional Water Board. Purchaser is eligible to designate one representative for participation in the Kilchis Regional Water Board. This group shall meet regularly, not less than once annually, to communicate with, make recommendations to, and advise The City regarding matters relating to The City's sale of water pursuant to the terms of this contract, including but not limited to review of those portions of the annual budget and capital improvement program that affect outside City purchasers. The Board shall comply with the Oregon public meeting laws. The Board shall have no powers other than comment and recommendation to The City with regard to water supplied to users outside The City.

Water Quality

4.1 The City shall supply the Purchaser with water of a quality commensurate with the Oregon Health Department and the Federal Environmental Protection Agency rules, standards and regulations for public water supply.

4.2 The City shall supply, upon request, a comprehensive chemical analysis report of the water supplied to the Purchaser.

4.3 The Purchaser shall receive its supply of water from The City by a means or method approved by The City's Engineer. The City's water system must be safeguarded by means specified by The City's Engineer, including but not limited to a required backflow preventer any time a second source of water is physically connected to the water supply. When the requirement for a receiving reservoir is waived to permit a direct connection for emergency use, a backflow preventer, approved by The City Engineer must be installed.

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WATER RESOURCES DEPT.
SALEM, OREGON

4.4 The City bears no degree of responsibility for the water quality at any point beyond the transmission main. The Purchaser bears the responsibility for maintaining the water quality at any point beyond the point of Purchase and within the Purchaser's distribution system.

4.5 The Purchaser shall notify and keep The City informed of their responsible certified water supply operator as required by public regulation.

4.6 The Purchaser shall immediately notify The City's Public Works Superintendent of any emergency or condition which may affect the quality of water in either party's system.

4.7 The City reserves the right to make inspections of those facilities which may affect the quality of the water supplied to the Purchaser and perform required tests.

Equipment and Operation

5.1 The Purchaser shall provide and maintain all service mains and valves and bear the costs for connecting to the mains of The City system after the initial construction. The service main shall be equipped with a valve located on The City transmission and said valve shall be under the sole and complete control of The City and will mark the limit of The City's responsibility for maintenance of the transmission system.

5.2 The City's representatives will regularly inspect the master meter measuring the supply of water furnished and will repair or replace the meter or part of a meter if the meter is not functioning properly.

5.3 The water supply furnished shall be drawn by the Purchaser at a rate prescribed by and controlled by The City throughout 24 hours of each day of the year as prescribed in this agreement.

5.4 The Purchaser shall be responsible for collection of all water bills from the consumers located within the service area of the Purchaser and for all maintenance and repair of the water system located within the service area of the Purchaser beyond the master meter owned by The City.

5.5 In the event Purchaser has a consumer directly connected to the transmission main of The City, The City shall read that consumer's meter to determine the amount of water delivered to the Purchaser. The Purchaser shall pay The City a surcharge, determined by The City, for the reading of meters on the transmission main which are in addition to the master meter.

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WATER RESOURCES DEPT.
SALEM, OREGON

Rates

6.1 Charges for water furnished to the Purchaser for consumers within the territorial limits of the Purchaser shall be at the rate fixed for like large quantities of water furnished through master meters to other water districts, the rate being fixed by agreement and subject to change by agreement at any time after 30 days notice from the party initiating the change.

6.2 The Purchaser shall pay The City within 20 days of the receipt of The City's billing the following amounts:

A. After completing Phase I, the sum of \$73.66 each month for capital costs, and the sum of \$42.80 for operating costs.

B. After completion of Phase II, the capital and operating costs shall be adjusted for the additional construction and operating costs.

C. The amount paid by the Purchaser in §6.2B shall replace the amount paid in §6.2A after completion of Phase II.

For any quantity of water used through the master meter, The City shall make an additional charge monthly for the quantity of water exceeding 1.35 million gallons. All charges shall be calculated under the policy of this section and as outlined in the cost breakdown to be provided Purchaser.

6.3 The cost of the water exceeding the amount stated in §6.2 shall be calculated based upon the actual cost to The City for the operation and maintenance of the transmission of water and treatment and pumping of water from the well to the master meter. This rate shall be calculated on a yearly basis and shall be attached to and made a part of this agreement on or before June 30 of each year, in accordance with the rate policy of this agreement.

6.4 The operation of the water system is considered to be "non-profit." The revenues shall be matched as reasonably as possible to the expenses. The revenues may also generate a reserves fund to meet expected capital demands for repair and replacement. The operating revenues from the transmission system shall be accounted for by The City in a separate and distinct fund called the "Transmission Water Operating Fund."

6.5 Charges for the water used will be based on the sum of the following:

A. Capital retirement for the portion of system capacity allocated to each purchaser. This charge will be at a uniform rate for all purchasers.

B. Operating expenses for the amount of water used during the billing period. This charge will be at a uniform rate for all purchasers.

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WATER RESOURCES DEPT.
SALEM, OREGON

C. Reserves requirements based on the amount of water used during the billing period. This charge will be at a uniform rate for all purchasers; and

D. Delayed repayment of original capital investment. This charge will be levied against Purchasers of guaranteed water supply capacity who enter the system after construction of the transmission line is completed. This charge shall be based on capacity reallocated and be credited to the original purchasers yielding the allocation by rate adjustment and over the remaining life of this agreement or by immediate lump sum payment by the new purchaser.

6.6 Operating revenues, including surpluses, will not be transferred from the Transmission Water Operation Fund to any other accounting fund of The City, except for payment of principal and interest on the water bonds of The City relating to the transmission system.

Service to be Furnished

7.1 The City agrees to furnish and the Purchaser agrees to purchase and take a supply of water in accordance with the terms and conditions hereof. The supply of water shall be taken through an existing service by means of a ten inch meter, connected to The City's ten inch water main located at _____.

7.2 The water furnished shall be used for supplying consumers within the 1979 service boundaries and the 1979 distribution system of the Purchaser unless otherwise mutually agreed, and subject to rate policy of this agreement. The Purchaser furnishes an accurate map of the service boundary and distribution system of the Purchaser, which is attached to this agreement as Exhibit "B."

7.3 The average daily supply of water furnished shall meet all reasonable requirements of consumers regularly supplied by the Purchaser insofar as is possible under the laws governing the allocation of Kilchis River water by the State of Oregon. The average daily supply of water furnished is hereby established as not to exceed 0.045 million gallons per day.

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WATER RESOURCES DEPT.
SALEM, OREGON

Reservoirs

8.1 The City shall be responsible for the maintenance and operation of the 200,000 gallon and the 500,000 gallon reservoir which are part of the transmission system.

8.2 The City reserves the right to require the Purchaser to provide and maintain reservoirs of sufficient capacity to store twice the Purchaser's daily average consumption of water under any of the following conditions:

- A. When 24 hours water usage is consumed in less than 12 hours;
- B. The primary service level of the Purchaser is above the base level of 200-220 feet USGS; or
- C. Purchaser's water usage creates an abnormal impact on the transmission system.

Equipment

9.1 The City shall provide, install, maintain and operate at its own cost and expense, and at such locations as shall be designated by the Engineer of The City, the following:

- A. Chlorination equipment and chlorine residual monitor system.
- B. Standby power.
- C. Reservoir water level sensors and transmitters.

9.2 These devices required by the City Engineer for the purpose of controlling the water supply furnished and taken hereunder shall be of such type, size and design and be installed in a manner meeting with the approval of the said City Engineer.

Pledge and Security

10.1 Purchaser agrees to pledge sufficient revenues to pay the above rates for the period of this contract. Purchaser grants a security interest in the Purchaser's water supply equipment and water distribution facilities to The City as and for a guarantee and security for the payment of the agreed amounts.

10.2 Purchaser shall establish customer (retail) water rates in sufficient amounts to pay The City for water capacity and delivered water as established by this agreement. The Purchaser shall further provide sufficient revenues through the retail rates to maintain the Purchaser's distribution system in a reasonable, businesslike condition adequate to maintain the water pressure on the transmission system.

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WATER RESOURCES DEPT.
SALEM, OREGON

10.3 In the event the Purchaser fails to make timely payments as provided in this agreement, The City may, after 20 days notice to the Purchaser, cut off delivery of water to the Purchaser. The cutoff of water to the Purchaser does not relieve Purchaser of the obligation to pay the minimum fixed sum as provided in §6.2 of this agreement.

Execution

The authority of the officials of The City to execute this agreement is evidenced by the resolution of The City Council of The City of Bay City, given on the 16th day of October, 1980.

The authority of the President and Secretary of the Board of Directors of the Purchaser to execute this agreement is evidenced by the resolution passed by the Board of Directors of the Latimer Road Gate Association at a regular meeting of the Board duly held on the 25th day of November, 1980.

CITY OF BAY CITY

Virgil Simmons
Virgil Simmons, Mayor

William A. Batusic
William A. Batusic, City Recorder

James L. Davis
President

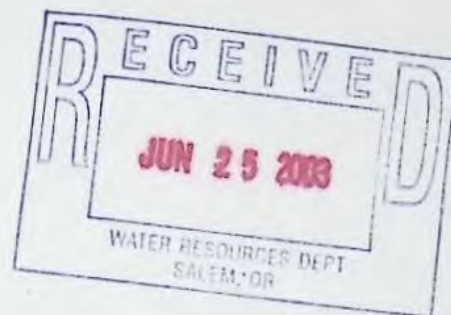
Kenneth E. Vase
Secretary



City of Bay City

PO Box 3309
Bay City, OR 97107
Phone (503) 377-2288
Fax (503) 377-4044

FAX COVER SHEET



TO: Lisa Janel

FAX#: 503-378-6203

FROM: Linda

PAGES TO FOLLOW 1

NOTE: I will mail the original.

Thank you!

DATE FAXED: 6-25-03

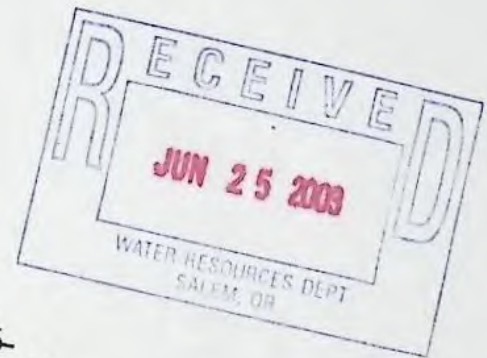


City of Bay City

PO Box 3309
Bay City, OR 97107
Phone (503) 377-2288
Fax (503) 377-4044
TDD 7-1-1

June 25, 2003

Water Resources Department
ATTN: Lisa Juul
158 12th Street NE
Salem, OR 97301-4172



REFERENCE: File 51053, Permit 43858
~~File 33860, Permit 26691, Certificate 33286~~
~~File R-26690, Permit R-1287, Certificate 21584~~

Dear Ms. Juul:

The City of Bay City is currently working on extension of time applications for the above-referenced permits. Per your recommendation, the City of Bay City is requesting an extension of sixty days to submit the extension of time applications.

Thank you for your help on this matter.

If you have any questions, please feel free to contact me.

Sincerely,

Linda M. Dvorak
City Recorder



City of Bay City

PO Box 3309
Bay City, OR 97107
Phone (503) 377-2288
Fax (503) 377-4044
TDD 7-1-1

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JUN 27 2003

WATER RESOURCES DEPT.
SALEM, OREGON

June 25, 2003

Water Resources Department
ATTN: Lisa Juul
158 12th Street NE
Salem, OR 97301-4172

REFERENCE: File 51053, Permit 43858
File 33860, Permit 26691, Certificate 33286
File R-26690, Permit R-1287, Certificate 21584

Dear Ms. Juul:

The City of Bay City is currently working on extension of time applications for the above-referenced permits. Per your recommendation, the City of Bay City is requesting an extension of sixty days to submit the extension of time applications.

Thank you for your help on this matter.

If you have any questions, please feel free to contact me.

Sincerely,

Linda M. Dvorak
City Recorder



Oregon

John A. Kitzhaber, M.D., Governor

Water Resources Department

Commerce Building
158 12th Street NE
Salem, OR 97301-4172
(503) 378-3739
FAX (503) 378-8130

January 16, 2001

CITY OF BAY CITY
ATT: LINDA DVORAK, CITY RECORDER
PO BOX 3309
BAY CITY, OR 97107

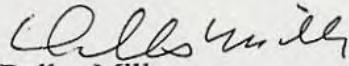
REFERENCE: File 51053, Permit 43858

Dear Ms. Dvorak:

Enclosed is the extension of time form you requested. Because of rulemaking activities holders of municipal permits have until July 1, 2003 to submit extension of time applications without the permit being in jeopardy. Even though the time limits to develop your permit are 10/1/2000, your permit is valid.

If you have questions please contact me at the address below or phone (503)378-3739 ext. 272.

Sincerely,


Dallas Miller
Water Rights Specialist

cc: Watermaster, District 1

Application No. 51053

Permit No.

43858

RECEIVED

JAN 23 1979

STATE OF OREGON WATER RESOURCES DEPARTMENT

Application for Permit to Appropriate Surface WATER RESOURCES DEPT!
SALEM, OREGON

I, Bay City, Oregon

(Name of Applicant)

of City Hall

(Mailing Address)

Bay City

(City)

State of Oregon

97107

(Zip Code)

Phone No. 377-2288

do hereby

make application for a permit to appropriate the following described waters of the State of Oregon:

1. The source of the proposed appropriation is Kilchis River

, a tributary of Tillamook Bay

2. The point of diversion is to be located 819.65 ft. N and 3895.03 ft. E

(N. or S.)

(E. or W.)

from the SW Section corner of Sec. 32, TS 1N, R9S, WM. (present well)

(Public Land Survey Corner)

plus all that portion of the Southwest quarter of Section 33 and the

(If there is more than one point of diversion, each must be described)

Southeast quarter of Section 32, Township 1 North, Range 9 West of the

Willamette Meridian, Tillamook County, Oregon, which lies South and East of the centerline of the Kilchis River and North of Old Whitney Co. Railroad Right of Way.

being within the 1/4 of the 1/4 of

Sec. 32 & 33 Tp. 1 N R. 9W, W. M., in the county of Tillamook

(N. or S.)

(E. or W.)

See Exhibit A & B

3. Location of area to be irrigated, or place of use if other than irrigation. See Exhibit C

Township	Range	Section	List 1/4 1/4 of Section	List use and/or number of acres to be irrigated
1 North	9 West	31	A11	A11
1 North	9 West	32	South 1/2	A11
1 North	9 West	33	S 1/2 & NE 1/4	A11
1 North	9 West	34	W 1/2	A11
1 South	9 West	6	A11	A11
1 South	9 West	5	N 1/2 & SW 1/4	A11
1 South	9 West	4	N 1/2	A11
1 South	9 West	7	A11	A11
1 South	9 West	8	W 1/2	A11
1 South	9 West	15	W 1/2	A11

Application No. 51053

Permit No. 43858

Permit to Appropriate the Public Waters of the State of Oregon

This is to certify that I have examined the foregoing application and do hereby grant the same SUBJECT TO EXISTING RIGHTS INCLUDING THE EXISTING 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 20.0 cubic feet per second measured at the point of diversion from the stream, or its equivalent in case of rotation with other water users, from Kilchis River.

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

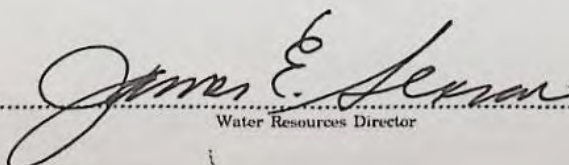
The priority date of this permit is August 10, 1973

Actual construction work shall begin on or before March 2, 1980 and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 1980.

Complete application of the water to the proposed use shall be made on or before October 1, 1981.

WITNESS my hand this 2nd day of March, 1979.

B+C to 10-1-2000


Water Resources Director



Oregon

John A. Kitzhaber, M.D., Governor

Water Resources Department

Commerce Building
158 12th Street NE
Salem, OR 97301-4172
(503) 378-3739
FAX (503) 378-8130
www.wrd.state.or.us

January 13, 2003

CITY OF BAY CITY
PO BOX 3309
BAY CITY OR 97107

REFERENCE: Permit #S43858 (App File #S51053) and the Adoption of New Administrative Rules for Municipal and Quasi-Municipal Water Use Permit Extensions

Dear Municipal and/or Quasi-Municipal Water Use Permit Holder:

The Water Resources Commission has adopted new administrative rules that govern the processing of Municipal and Quasi-Municipal permit extension requests. The new rules are contained in the Oregon Administrative Rules Chapter 690, Division 315 (OAR 690-315-0070 through 690-315-0100). If you wish to view a copy of the new Chapter 690, Division 315 Extension Rules, you may access the document from the Department's web page at:

http://www.wrd.state.or.us/cgi-bin/notices.pl?new_oars

The new rules implement many changes to the extension process for municipal and quasi-municipal permit holders. One of the most significant changes is that an extension is linked to the requirement to develop a Water Management and Conservation Plan under OAR Chapter 690, Division 86.

In preparation for implementing the new extension rules, the Department has reviewed its records and determined that the authorized date for completion of development for your water use permit has passed and that neither a permit extension of time application, nor a claim of beneficial use and final proof survey map, have been received.

As a result of this review, your water use permit falls into one of the three following categories:

1. Development is Not Complete

If development of your water use permit is not finished, you must submit an application for extension of time to complete construction of the water system and/or complete beneficial use of water to the full extent of the permit. You may access the "Application for Extension of Time for Quasi-Municipal and Municipal Water Use Permits" on the Department's website at:

<http://www.wrd.state.or.us/publication/forms/index.shtml>

January 13, 2003
page two

2. Development is Complete and Final Proof Must be Submitted

If your water use permit was issued *after* July 9, 1987, and development of the permit is complete, you are required by law (ORS 537.230 and/or 537.630) to hire a certified water rights examiner to prepare and submit a claim of beneficial use and final proof survey map.

3. Development is Complete and Waiting for WRD to Conduct Final Proof Survey

If you applied for or received a permit *on or before July 9, 1987*, and development of the permit is complete, you must notify the Department that the work has been completed and choose to either: (a) hire a water right examiner certified under ORS 537.798 to conduct a survey, the original to be submitted as required by the Water Resources Department, for issuance of a water right certificate; *or* (b) continue to appropriate water under the water right permit until the Water Resources Department conducts a survey and the commission issues a water right certificate under ORS 537.250 or 537.625.

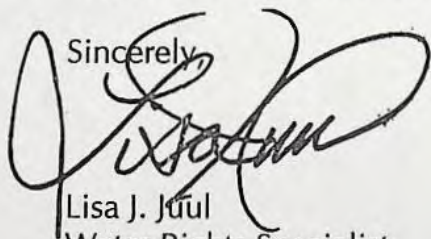
4. Permit is Not Needed and Wish to Authorize Cancellation

If you have determined that this permit is no longer needed and/or you have chosen not to pursue development of the permit, you may choose to authorize its cancellation. If you are interested in this option, please contact Jerry Sauter of our Department at extension 274 for the appropriate cancellation form.

Once you have determined which development category applies to your water use permit, please complete the enclosed "Quasi-Municipal/Municipal Water Use Permit Development Questionnaire" form and return it to my attention at the Water Resources Department by April 13, 2003.

If you would like the new rules or extension application forms sent to you by mail, or if have any questions, please feel free to contact me by telephone at 503-378-8455, extension 272.

Sincerely,



Lisa J. Juul
Water Rights Specialist
Water Rights Section

enclosure

cc: App File #S51053 (Permit #S43858)

Oregon Water Resources Department
Quasi-Municipal/Municipal Water Use Permit Development Questionnaire

Permit Holder: CITY OF BAY CITY

Permit #S43858

Application File #S51053

Please indicate which of the following applies to the above referenced Quasi-Municipal or Municipal water use permit by checking the appropriate box:

1. The Permit is Ready for Final Proof and...

- ☐ a Claim of Beneficial Use and Final Proof Survey map will be prepared and submitted by a Certified Water Rights Examiner;

- OR -

- ☐ the Water Resources Department (WRD) has been notified that development of the permit is complete, and the permit holder is waiting for WRD to conduct the final proof survey.

2. Development of the Permit is Not Complete and...

- ☐ the permit holder will submit a permit extension of time application to WRD no later than 90 days from the date of this letter (April 13, 2003).

3. The Permit is Not Needed and Wish to Authorize Cancellation...

- ☐ the permit holder has determined that this permit is no longer needed and/or has chosen not to pursue development of the permit, and wishes to authorize its cancellation.

Signature of Authorized Personnel

Date

Please return completed form by April 13, 2003 to:
Water Resources Department
Attention: Lisa Juul
158 - 12th Street NE
Salem OR 97301-4172



City of Bay City

RECEIVED

JAN 12 2001

WATER RESOURCES DEPT.
SALEM, OREGON

PO Box 3309
Bay City, OR 97107
Phone (503) 377-2288
Fax (503) 377-4044

January 10, 2001

Oregon Water Resources Department
Permit Section
158 12th St. NE
Salem, OR 97310-0210

FAX: 1-503-378-8130

RE: City of Bay City Permit #43858, Application #51053
REQUEST FOR EXTENSION

To Whom it May Concern:

In November 2000, our City Attorney requested copies from your office of all files for water rights held by the City of Bay City since our records were incomplete. There was some difficulty in getting the right files which the City Attorney finally obtained in mid-December 2000.

The City Attorney informed the City Council at its January 9, 2001 meeting that Permit #43858, Application #51053, had only been extended to October 1, 2000. The City Council instructed me to request an extension to September 1, 2001 for perfecting this permit. If an application for extension form and/or filing fee needs to be submitted for this request to be processed, please forward them to me immediately.

This application is actually for the two wells which the City utilizes to provide the drinking water to the City, as well as to four other water districts. It also provides all the water used by the Tillamook County Creamery in its cheese processing, Pacific Oyster Company in its oyster processing and Tillamook Country Smoker in its meat processing. This is also the water which will be used by the City for bottling. The usage of water from this source has increased 44% over the past five years. The City has 547 acres of buildable land which the City is required to serve with water when it is developed. Due to Bay City's proximity to Tillamook, which has severe growth

RECEIVED

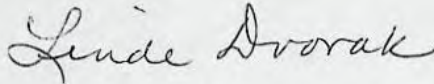
JAN 12 2001

WATER RESOURCES DEPT
SALEM, OREGON

Oregon Water Resources Department
January 10, 2001
Page 2

restraints due to flood plains surrounding the City on all but its east side, the City of Bay City is expected to accommodate the lion's share of any growth in Central Tillamook County. This water right is essential to the City continuing to provide water to its citizens and its businesses.

Sincerely,

A handwritten signature in cursive script that reads "Linda Dvorak".

Linda Dvorak
City Recorder

LD/la



City of Bay City

PO Box 3309
Bay City, OR 97107
Phone (503) 377-2288
Fax (503) 377-4044

January 10, 2001

Oregon Water Resources Department
Permit Section
158 12th St. NE
Salem, OR 97310-0210

FAX: 1-503-378-8130

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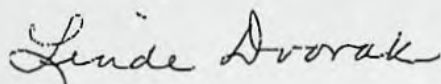
Oregon Water Resources Department

January 10, 2001

Page 2

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Sincerely,

A handwritten signature in cursive script that reads "Linda Dvorak".

Linda Dvorak
City Recorder

LD/la

File No. 51053

APPLICATION FOR EXTENSION OF TIME

RECEIVED

TO THE WATER RESOURCES DIRECTOR OF OREGON

APR 15 1996

WATER RESOURCES DEPT.
SALEM, OREGON

I, City of Bay City

name

PO Box 3309
address

Bay City, OR
city state

97107
zip

(503)377-2288
phone

record owner of permit No. 43858, do hereby request that the time in which to:

☐ complete the construction of works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 19 , be extended to October 1, 19 , and/or the time in which to

☒ accomplish beneficial use of water to the full extent under the terms of the permit, which time, now expires on October 1, 1995, be extended to October 1, 19 2000

I have accomplished the following described works and/or purchase and installation of equipment necessary to use of water under said permit.

(1) within past year extended the waterline

(2) prior to this past year

(3) and have accomplished beneficial use of water to the extent of (if for irrigation, state how many acres have been irrigated)

1.5 cfs

(4) unable to complete ~~construction~~ and/or application of water within the permit time limits because we are still experiencing growth
and have room for 4,495 homes.

Linda McWheeler, City Recorder
signature

4-9-96

date

MAIL APPLICATION AND STATUTORY FEE OF \$100 FOR EACH PERMIT TO:

WATER RESOURCES DEPARTMENT
158 12TH ST NE
SALEM, OREGON 97310

MUNI
OK 10-1-0000 B-C
DSM

CITY OF BAY CITY

P.O. Box 3309
BAY CITY, OREGON 97107
Phone (503) 377-2288
Fax (503) 377-4044

RECEIVED

MAR 12 1996

WATER RESOURCES DEPT.
SALEM, OREGON

March 7, 1996

Oregon Water Resources Department
ATTN: Dallas Miller
158 12th Street, NE
Salem, OR 97310-0210

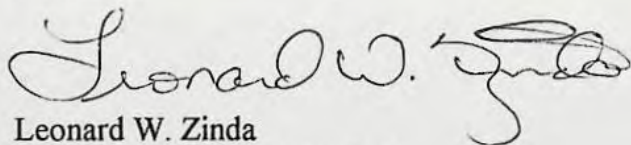
RE: File 51053, Permit 43858

Dear Mr. Miller:

The City of Bay City requests that an extension of time be granted to complete the application of water under Permit 43858 due to the City experiencing massive growth. We have approximately 200 single family home sites being developed at this time. The City also has 555 acres of buildable land within its City limits that could and probably will be turned into another 4,495 home sites. The City's permit is for 20 cfs, and we are currently using only 1.55 cfs. The City also serves four other water districts and the Tillamook County Cheese Factory. The City does not feel that it would be prudent to finalize the permit at this time and leave itself without an adequate supply of water for its future.

Your prompt attention to this matter will be greatly appreciated.

Sincerely,



Leonard W. Zinda
Public Works Superintendent

cc: City Council

January 29, 1996

CITY OF BAY CITY
PO BOX 307
BAY CITY OR 97107

WATER
RESOURCES
DEPARTMENT

REFERENCE: File 51053

According to the terms of your Permit 43858 complete application of water was to have been made by October 1, 1995.

Complete application of water means use of the water for the beneficial purpose described in the permit to the full extent intended. (In the case of irrigation, it means beneficial irrigation of the lands the permittee intends to cover.) This may be a smaller amount than the permit allowed. If the water has been used, you should promptly submit notice describing the extent of completion as set forth in the letter accompanying your permit and also in our postal card of October 25, 1995.

ORS 537.260 provides that: "Whenever the time within which any appropriation under a permit should have been perfected has expired and the owner of the permit fails or refuses within three months thereafter to submit to the Water Resources Director proof of completion of the appropriation as required by ORS 537.230 and 537.250, the Water Resources Director may, after 60 days notice by registered mail, order the cancellation of the permit."

You are hereby notified that, unless proof of beneficial use is received by April 29, 1996 (within 60 days from the date of this letter) the permit may be canceled without further notice.

If you are no longer interested in the project described by the permit, we would appreciate being advised. If the property involved has been sold and any part of the project was completed, you should assign the permit to the new owner. An assignment form will be furnished upon request.

If additional information is needed, please contact the Water Rights Section at 378-3739 or toll-free 1-800-624-3199.

Sincerely,

Dallas Miller
Water Rights Specialist

DM:jh

CC: Greg Beaman, Watermaster

CERTIFIED - RETURN RECEIPT REQUESTED



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

June 20, 1994

WATER
RESOURCES
DEPARTMENT

«DATA MacintoshHD: MiscData:Conservation:ExtNames»
«name»«IF street»
«street»«ENDIF»
«city», «st» «zip»

You recently received an extension of time to complete work under Permit «permno». In our letter notifying you of the extension, we indicated that you were required to prepare conservation and long-term water supply plans. We have since re-evaluated our requirements for extensions and have decided not to require the preparation of the plans at this time.

This change does not relieve municipal water suppliers from compliance with a similar condition which was included in many recently issued water use permits. The Water Resources Commission has recently authorized hearings on rules which will provide standards and criteria for the plans required under the permit conditions. A copy of the hearing notice is enclosed. You should be aware that, at some point in the future, the Commission may consider the adoption of rules extending the requirement for preparation of plans to other municipal water suppliers.

While we are not requiring water management and conservation plans as a condition of time extensions, we still encourage you to consider preparing a plan. Because of current demands, there is little water available for new appropriations from many streams in the state. As a result, many communities will have to rely on alternate sources of water such as conservation, storage or acquisition and transfer of existing water rights to support continued growth. The planning approach which is reflected in the rules is already providing many cities with an effective framework within which to identify future needs for water and to evaluate alternatives for meeting those needs.

We welcome the opportunity to work with local water suppliers in evaluating their future water supply options. Please contact Jack Donahue at 378-8455 extension 283 if you have any questions or would like our advice and guidance in preparing a water management and conservation plan.

Sincerely,

Douglas M. Parrow
Conservation/Basin Planning Manager

Enclosure



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

April 30, 1991

City of Bay City
P.O. Box 307
Bay City OR 97107

REFERENCE: File 51053

We received your application for extension of the time to complete work under Permit 43858. We also have your check for \$100. Our receipt number 72286 is enclosed.

Your request is approved. The time limits under this permit are extended to October 1, 1995.

Oregon Administrative Rules (OAR) 690-410-060, (enclosed), requires water suppliers, such as you, to prepare water conservation management plans. The schedules, standards and procedures for the development of management plans will be adopted in rule form in the near future. These rules also require you to notify the Commission of your plans to assure a long-term water supply.

Accordingly, before future extension requests will be approved, there are two requirements:

1. You will need to submit a plan describing the schedules, standards, and procedures for your water conservation management plans. This will need to be done within your time extension period following the date the Water Resources Commission adopts these rules.
2. You will need to prepare a plan/timetable for the Water Resources Commission which shall indicate the steps you intend to pursue to obtain a long-term water supply. This will need to be done by October 1, 1995.

If you have any questions, please call the Department's Water Rights Section at 378-3739.

LHN:jh

Enclosure



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

Application for Extension of Time

TO THE WATER RESOURCES DIRECTOR OF OREGON

I, City of Bay City Name
PO Box 307 Mailing Address
Bay City Oregon 97107
City State Zip

- record owner of water permit No. 43858, do hereby request that the time in which to:
- ☐ complete the construction of works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 19__, be extended to October 1, 19__;
and/or the time in which to
- ☒ accomplish beneficial use of water to the full extent now intended under the terms of said permit, which time now expires on October 1, 1990, be extended to October 1, 1995.

I have accomplished the following described works and/or purchase and installation of equipment necessary to the use of water under said permit:

- (1) within the past year _____

_____;
- (2) prior to this past year _____

_____;

- (3) and have accomplished beneficial use of water to the extent of (IF FOR IRRIGATION, STATE HOW MANY ACRES HAVE BEEN IRRIGATED) The City of Bay City, being owners of the Kilchis Regional Water System, is in the process of completing a master plan as required by Oregon State Health Dept., Drinking Water Section. They have also indicated that due to the
(If additional space is required, attach separate sheet) (See attached page)

Leonard W. Zander
(If signing for a corporation please identify your title)

Dated 3-13-91

MAIL COMPLETED APPLICATION AND STATUTORY FEE
OF \$100.00 FOR EACH PERMIT TO:

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

B-C
10-1-95
LHN
Rec #
72286
3/14/91
can

(Cont. from (3))

requirements of the Safe Drinking Water Act, that two other water districts may be required to hook on to our water system. We request that an extension of time be granted so that we may accomplish beneficial use of the water.



Water Resources Department

3850 PORTLAND ROAD NE, SALEM, OREGON 97310

PHONE 378-8508

December 11, 1985

City of Bay City
P.O. Box 307
Bay City, OR 97107

Dear Mr. Jack R. Hills,
City Engineer

REFERENCE: File 51053

Your application for an extension of the time limits in which to complete construction and make complete application of water under the terms of your Permit Number 43858 was received. We also have your check in the amount of \$100.00.

The application indicates reasonable diligence has been exercised toward completion of the proposed project; therefore, the time limits to complete construction and make complete application of water is being extended to October 1, 1990.

Sincerely,

Bruce E. Estes, Supervisor
Survey/Certificates Section

BAE:cle

Enclosure

cc: Boatwright Engineering, Inc.

Application for Extension of Time

RECEIVED

OCT 30 1985

TO THE WATER RESOURCES DIRECTOR OF OREGON

WATER RESOURCES DEPT
SALEM, OREGON

I, City of Bay City Name
P.O. Box 307 Mailing Address
Bay City Oregon 97107
City State Zip

record owner of water permit No. 43858, do hereby request that the time in which to:

- ☒ complete the construction of works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 1985, be extended to October 1, 1990; and/or the time in which to
- ☒ accomplish beneficial use of water to the full extent now intended under the terms of said permit, which time now expires on October 1, 1985, be extended to October 1, 1990.

I have accomplished the following described works and/or purchase and installation of equipment necessary to the use of water under said permit:

- (1) within the past year Installation of water meters (\$5000) in Bay City.
- (2) prior to this past year Phase I construction (\$1,100,000) installed some 42,000
L.F. of supply line piping, 2 walls, pumps, controls and 500,000 & 200,000 gallon reservoirs. Phase
- (2) prior to this past year II construction (\$750,000) installed some 44,000 L.F. of distribution
piping booster pumping, controls and 100,000 gallon reservoir.

- (3) and have accomplished beneficial use of water to the extent of (IF FOR IRRIGATION, STATE HOW MANY ACRES HAVE BEEN IRRIGATED) presently serving some 650 domestic users.

(If additional space is required, attach separate sheet)

Jack R. Hills City engineer
 (If signing for a corporation please identify your title)

Dated Oct 29, 1985

MAIL COMPLETED APPLICATION AND STATUTORY FEE
 OF \$100.00 FOR EACH PERMIT TO:

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

10-30-85
 \$100.00
 #A7918

B-C
 10-1-90
 BAE

cc Boatwright



Water Resources Department

MILL CREEK OFFICE PARK

555 13th STREET N.E., SALEM, OREGON 97310

PHONE 378-8508

November 5, 1980

Bay City, Oregon
City Hall
Bay City, OR 97107

Gentlemen:

REFERENCE: File Number 51053

Your application for an extension of the time limits in which to complete construction and make complete application of water under the terms of your permit numbered 43858 has been received. We also have your check in the amount of \$10.

The application indicates reasonable diligence has been exercised toward completion of the proposed project; therefore, the time limits to complete construction and make complete application of water are being extended to October 1, 1985.

Sincerely,

Bruce A. Estes, Supervisor
Survey-Certificate Section

BAE:lrs

Application for Extension of Time

THE WATER RESOURCES DIRECTOR OF OREGON

RECEIVED
OCT 31 1980
WATER RESOURCES DEPT.
SALEM, OREGON

I, Bay City, OREGON

Name

% City Hall

Mailing Address

Bay City

City

Oregon

State

97107

Zip

record owner of water right permit No. 43858, do hereby request that the time in which to:

☐ complete the construction of works and/or purchase and installation of the equipment necessary to the use of water, which time now expires on October 1, 1980, be extended to October 1, 1985; and/or the time in which to

☐ accomplish beneficial use of water to the full extent now intended under the terms of said permit, which time now expires on October 1, 1980, be extended to October 1, 1985

I have accomplished the following described works and/or purchase and installation of equipment necessary to the use of water under said permit:

within the past year Passed a bond issue \$900,000, developed grant funds & initiated phase I Construction \$1,100,000
2 well pumps Pump house & controls a 500,000 & 200,000 gallon reservoirs
& Misc Piping to be completed prior to DEC. 31 1980.
prior to this past year Drilled two wells

and have accomplished beneficial use of water to the extent of (IF FOR IRRIGATION, STATE HOW MANY ACRES HAVE BEEN IRRIGATED) System will be in partial

operation by Dec 1, 1981

(If additional space is required, attach separate sheet)

M. B. Bonting City Engineer

(If signing for a corporation please identify your title)

Dated 10-31-80

MAIL COMPLETED APPLICATION AND STATUTORY FEE OF \$10.00 TO:

Water Resources Department
Mill Creek Office Park
555 13th Street, N.E.
Salem, Oregon 97310

10-31-80
10:00
#21286

B-C
10-1-85
BAE

March 9, 1979

Bay City
City Hall
Bay City, Oregon 97107

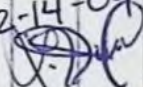
51053 .

43858

Note:

Ves Garner
WRD letter
dated 8-29-78.

Water from
Kilchis River
diverted well(s)
located in
nearby shallow
gravel(s).

- 12-14-04




Water Resources Department
MILL CREEK OFFICE PARK

555 13th STREET N.E., SALEM, OREGON 97310

PHONE 378-3066

51053

October 9, 1978

Boatwright & Associates
ATTN: Russ H. Fetrow, P.E.
2613 12th St. SE
Salem, OR. 97302

Dear Mr. Fetrow:

Thank you for your letter of September 25, 1978 regarding the progress by the City of Bay City in completing their application numbered 51053.

We can allow a reasonable length of time to complete the application. However, you will note that the application has been endorsed so that in order to retain its priority date, it must be received in this office on or before December 29, 1978.

If additional time beyond December 29, 1978 is needed to complete the application and additional information, the application should be returned prior to the endorsement date so that the priority date may be maintained. After receiving the application in this office, it can be returned to you or the City for completion.

Should you have questions, please do not hesitate to give me a call.

Sincerely,

VESTAL GARNER
Water Rights Engineer

VG:tld
cc: City of Bay City

378-3056

51053

February 20, 1979

Boatwright Engineering, Inc.
2613 Twelfth Street SE
Salem, Oregon 97302

ATTENTION: Russ H. Fetrow, P. E.

Dear Mr. Fetrow:

Thank you for returning the original and superceding applications along with maps of the diversion points and place of use.

Application No. 51053 is now for a permit to appropriate 20.0 cubic feet per second from Kilches River for municipal use by one or more infiltration diversions within the SE $\frac{1}{4}$ of Section 32, and SW $\frac{1}{4}$ of Section 33, Township 1 North, Range 9 West, W.M.

Permits will be issued for use of water from Kilches River and its tributaries. However, water may not be available during dry periods. The water may be needed to satisfy existing rights or minimum flow standards.

Application No. 51053 is now in satisfactory form and will be considered further for the issuance of a permit in thirty to sixty days.

Sincerely,

Vestal R. Garner
Water Rights Engineer

VRG:slm
cc: Bay City, Applicant

BOATWRIGHT ENGINEERING, INC.

2613 Twelfth Street S.E.
SALEM, OREGON 97302
January 22, 1979

Area Code (503) 363-9225

Vestal Garner
Water Rights Engineer
Water Resources Department
Mill Creek Office Park
555 13th Street N.E.
Salem, Oregon 97310

RE: BAY CITY'S WATER APPROPRIATION APPLICATION NUMBERED 51053

Dear Mr. Garner:

Enclosed are the following documents:

1. Initially filed water appropriate application dated August 10, 1973.
2. Up dated Water Appropriate Application with reproducible copy of land survey of initial well and property ownership map of Bay City.

You will note that the property ownership map of Bay City (diversion point) is not to scale. To compensate for this we have placed two reference monuments on the property while locating the existing well which will be used to tie down all future wells. It should be also noted that negotiations between Bay City and Tillamook City are presently underway and we should know in about 3 to 4 weeks the service area of the initial regional system.

If you have any questions please call me at 363-9225.

Very truly yours;

Russ H Fetrow

Russ H. Fetrow, P.E.

Enclosures: (2) Water Appropriate Applications

CC: Bay City w/o enclosures

RHF/kb

M. G. BOATWRIGHT & ASSOCIATES

2613 Twelfth Street S. E.
SALEM, OREGON 97302

Area Code (503) 363-9225

September 22, 1978

RECEIVED

SEP 25 1978

WATER RESOURCES DEPT.
SALEM, OREGON

Vestal Garner
Water Rights Engineer
Water Resources Department
Mill Creek Office Park
555 13th Street N.E.
Salem, Oregon 97310

RE: BAY CITY'S WATER RIGHTS APPLICATION NO. 51053

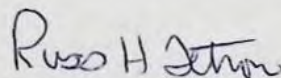
Dear Mr. Garner:

We have reviewed your August 29, 1978 letter and are in full agreement with your request. The only problem confronting us is the timing which I want to make you aware of.

At this time the grant situation from EDA and FmHA has not been completely resolved. Without knowing this, the local financing cannot be established for voters approval. With information presented to us, we feel that many of these questions will be resolved by January-February, 1979. This will definitely make more information available to the Water Rights Application.

Therefore, we request a time extension until January 19, 1979 for completion and submittal of the application form. We have marked our calendar as a reminder. If this time schedule creates problems for you please let me know what would be acceptable. Thank you for your consideration.

Very truly yours;



Russ H. Fetrow, P.E.

RHF/kb

Page Two
application 51053

The new application and supporting maps must be in agreement and identify the points of diversion, a description of the major distribution facilities, and the proposed place of use.

I am returning the City's map and application to you along with a new application form. After completing the proper maps and the application, please return them to this office for issuance of a permit.

Sincerely,

VESTAL GARNER
Water Rights Engineer

VG:tld
cc: City of Bay City

Endorsed Jan 12, 29, 78
VG

STATE OF OREGON

INTEROFFICE MEMO

TO: Ves Garner

DATE: August 18, 1978

FROM: Rob Almy *RBA*

SUBJECT: Information Pertaining to Application File #51053.

I have reviewed the material in File #51053, Mr. Petrow's letter of "Auguste" 14, 1978, and the appropriate geologic information. The water withdrawn from these test wells, (as well as any water withdrawn from this gravel bar) will be in direct hydraulic connection with the Kilchis River, probably underflow. At the extraction rate applied for (20 cfs) or anything near that rate, river water will be drawn steadily through the gravels and its residence time as "ground water" will be rather short. In addition, the ratio of stream water to ground water will be rather high, at least 95% (probably >99%) of the water produced will be derived directly from the river. Under these conditions, a surface water filing is appropriate.



Water Resources Department

MILL CREEK OFFICE PARK

555 13th STREET N.E., SALEM, OREGON 97310

PHONE 378-3066

51053

August 29, 1978

Martin Boatwright
Boatwright & Associates
2613 12th St. SE
Salem, OR. 97302

ATTN: Russ Fetrow, P.E.

Dear Mr. Fetrow:

Thank you for your letter of August 14, 1978 setting forth progress towards finalizing a plan for use of water by the City of Bay City as described by their Water Rights Application No. 51053.

From the information you have provided, it has been determined that an appropriation of water from the Kilchis River may be made by developing shallow wells within the immediate gravel areas adjacent to the Kilchis River, therefore, the type of development being proposed would be considered as a surface water appropriation.

The City of Bay City should make every attempt to complete their plan for putting this water to beneficial use and their map and application should be completed accordingly to reflect the project intended to be carried out.

I believe the map submitted with the application does not show sufficient detail regarding the diversion facilities. For this purpose, you may consider submitting a separate map prepared to a scale of no less than 4" is equal to 1 mile and with reference to the Government Survey showing the section lines and quarter-quarter section lines in the vicinity. The map should show the location of the Kilchis River and the location of each proposed infiltration well. These would be considered points of diversion from Kilchis River, and therefore, each must be identified on the application and map giving their location with reference to a known Government Survey Corner.

Since the application form has been changed, it may be best that the project intended to be carried out is described on the new application form and used to supersede the original. This would not affect the tentative priority date of August 10, 1973.



STATE OF OREGON

INTEROFFICE MEMO

TO: Files 51053, 41117, 46756

DATE: February 9, 1978

FROM: Vestal R. Garner

SUBJECT: On February 8, 1978, Martin Boatright, of Boatright Engineering came into the office to discuss the status of application numbered 51053 in the name of Bay City, permit numbered 30725, in the name of Wauna Water District, and application number 46756 also in the name of Wauna Water District.

Mr. Boatright stated that the city of Bay City had purchased a parcel of land approximately $\frac{1}{2}$ mile in length between the road way and Kilchis' River within Section 33. He stated that the city had constructed an infiltration type of well approximately 200 feet from the river and that the well was drilled into river gravels approximately 60 feet in depth. The well was constructed with the Johnson Sand Screen and test pumped at 1300 gallons of water per minute with almost no draw down and immediate recovery. He stated that the water in the well was definitely river water and that the city would propose to use this well and others as necessary for appropriation of Kilchis' River water.

I asked Mr. Boatright to prepare a letter to the office setting forth the location of the well and any other pertinent data regarding its construction as well as the plans to complete the application. Mr. Boatright agreed and stated that a letter would be submitted in the near future.

Regarding Wauna Water District, there is a permit to use an existing spring and unnamed stream as sources of supply for the District's water. These two sources are described by Permit numbered 30725. Mr. Boatright stated that the sources described by permit number 30725 are no longer in use and the only source of water being utilized is Peterson Spring as described by application numbered 46756.

Apparently the spring and unnamed spring as described by permit 30725 have not been in use for a number of years. Therefore, the permit cannot be considered valid for construction of facilities in use of water *and* from these two sources. Mr. Boatright was informed that the District should request cancellation of permit number 30725 and in order to allow for the present use of water a permit should be issued in approval of application numbered 46756. Mr. Boatright stated that the request cancel *to* permit number 30725 would be submitted and if any further information was needed for completion of application number 46756 he should be contacted for additional details.

VRG:slk

51053

4 December 1975

Boatwright Engineering
2613 Twelfth Street S.E.
Salem, Oregon 97302

ATTENTION: Martin Boatwright

Dear Mr Boatwright:

On August 10, 1973, you submitted an application in behalf of Bay City, Oregon. The application requests a permit for the use of 20.0 cubic feet per second of water from Kilchis River for quasi municipal use.

The application, as submitted, did not contain sufficient data for examination and consideration for approval by the issuance of a permit.

Our last conversation with you was in early 1975. At that time, you indicated it may be possible to have a firm plan for the use of the water sometime late in 1975. As of this date, we have not received the additional data required to examine the permit.

Would you please advise this office of the intent of the applicant regarding obtaining a permit for use of water. We would also appreciate an indication as to the date we might receive the additional information to support the application.

Sincerely,

Vestal R. Garner
Water Rights Engineer

VRG:lcm
cc: Bay City, Oregon

M. G. BOATWRIGHT & ASSOCIATES

2613 Twelfth Street S. E.
SALEM, OREGON 97302

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AUG 15 1978

WATER RESOURCES DEPT.
SALEM, OREGON

Area Code (503) 363-9225

Auguste 14, 1978

Vestal Garner
Water Rights Engineer
Water Resources Department
Mill Creek Office Park
555 13th Street N.E.
Salem, Oregon 97310

RE: CITY OF BAY CITY (WATER RIGHTS APPLICATION NUMBER 51053)

Dear Mr. Garner,

The purpose of this letter is to attempt to answer your July 18, 1978 questions concerning Bay City's Water Rights Application numbered 51053. Prior to answering your questions, an update on the water system seems appropriate.

Due to water resources available in the area and potential E.D.A. Grants, the City of Tillamook is now being brought into the picture. It looks like a potential of 2 MGD may be delivered to Tillamook. Also the water districts in the area are united closer than ever before. Appropriate grant applications have also been forwarded to E.D.A. and Fm.H.A.

E.D.A. has responded with a potential grant of \$574,000.00 for the regional approach. Additional grants could be coming next year from them as well. Fm.H.A. has also shown an interest which may have grants available in 1978-80. Therefore, the construction of the system and use of the water should commence within the next year or two.

Regarding the question of whether the water right is for surface water or ground water we offer the following. The geology of the Kilchis River is basically one of an area cut into rock. Certain areas, however, do have bar buildups of gravel especially the lower areas prior to going into the Tillamook Bay. Bay City has purchased one of the bars located upstream from the mouth area of the Kilchis. It is a small area ($\frac{1}{2}$ mile long) adjacent to the stream with rock outcroppings above, below and across from the well area. One test well (6-inch) and one permanent well (10-inch and capped) were drilled. During the pump testing of these wells, it was found that the recovery rate was instantaneous. Since the gravel deposit and its associated storage capacity is rather small, it is a good indication that the water being pumped is direct Kilchis River Water. To further reinforce our position, the water level in the well has a direct relationship to the level of water in the river. When the river level rose, the level in the well rose also.

Chemical analysis were also made on the well water and adjacent Kilchis River Water. They were found to be very comparable except for a higher iron content in the well. As pumping occurred for a period of time this also decreased. The iron content of the well is felt to be related to

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SALEM, OREGON

old mineral deposits of the gravel bar which will be removed as water is used from the wells.

By using wells in the gravel bar, even though it is direct river water, we eliminate the need for full treatment beyond chlorination since the gravel deposits provide a natural filtration of the Kilchis River Water during periods of high turbidity. By using wells, it eliminates the need for an infiltration gallery with a dam in the area. Due to the fish habitat the use of wells was strongly supported by Dave Heckenroth of the Fish & Wildlife Department.

In regard to the point of diversion, Bay City will eventually be constructing a series of wells parallel to the Kilchis River along their property. Therefore, we feel that the point of diversion can best be handled by a legal description of the property that Bay City purchased. This will be similiar to how the water rights were developed for the springs for Gobel and Grand Ronde. Please review the information and if this meets your needs let us know and we will obtain the legal description of the property.

I hope this answers your questions. If you wish to discuss these items please contact me at 363-9225.

Very Truly Yours,

Russ H Fetrow

Russ H. Fetrow P.E.

cc. Bay City

RHF/mb

M. G. BOATWRIGHT & ASSOCIATES

2613 Twelfth Street S. E.
SALEM, OREGON 97302

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AUG 15 1978

WATER RESOURCES DEPT.
SALEM, OREGON

Area Code (503) 363-9225

Auguste 14, 1978

Vestal Garner
Water Rights Engineer
Water Resources Department
Mill Creek Office Park
555 13th Street N.E.
Salem, Oregon 97310

Post-it® Fax Note 7671

To	Greg B	C
Co./Dept.		PI
Phone #		Fe
Fax #		

RE: CITY OF BAY CITY (WATER RIGHTS APPLICATION NUMBER 51053)

Dear Mr. Garner,

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E.D.A. has responded with a potential grant of \$574,000.00 for the regional approach. Additional grants could be coming next year from them as well. Fm.H.A. has also shown an interest which may have grants available in 1978-80. Therefore, the construction of the system and use of the water should commence within the next year or two.

Regarding the question of whether the water right is for surface water or ground water we offer the following. The geology of the Kilchis River is basically one of an area cut into rock. Certain areas, however, do have bar buildups of gravel especially the lower areas prior to going into the Tillamook Bay. Bay City has purchased one of the bars located upstream from the mouth area of the Kilchis. It is a small area ($\frac{1}{2}$ mile long) adjacent to the stream with rock outcroppings above, below and accross from the well area. One test well (6-inch) and one permanent well (10-inch and capped) were drilled. During the pump testing of these wells, it was found that the recovery rate was instantaneous. Since the gravel deposit and its associated storage capacity is rather small, it is a good indication that the water being pumped is direct Kilchis River Water. To further reinforce our position, the water level in the well has a direct relationship to the level of water in the river. When the river level rose, the level in the well rose also.

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AUG 15 1978
WATER RESOURCES DEPT.
SALEM, OREGON

old mineral deposits of the gravel bar which will be removed as water is used from the wells.

By using wells in the gravel bar, even though it is direct river water, we eliminate the need for full treatment beyond chlorination since the gravel deposits provide a natural filtration of the Kilchis River Water during periods of high turbidity. By using wells, it eliminates the need for an infiltration gallery with a dam in the area. Due to the fish habitat the use of wells was strongly supported by Dave Heckenroth of the Fish & Wildlife Department.

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I hope this answers your questions. If you wish to discuss these items please contact me at 363-9225.

Very Truly Yours,

Russ H. Fetrow

Russ H. Fetrow P.E.

Date	10-15-03	# of pages	2
From	D French		
To			
one #			
ix #			

cc. Bay City

RHF/mb

378-3066

41117
46756
51053

July 18, 1978

Martin Boatwright
Boatwright and Associates
2613 12th St. SE
Salem, OR. 97302

Dear Mr. Boatwright:

On February 8, 1978 we discussed in this office applications pending by Wauna Water District and the City of Bay City, Oregon.

You may recall that Wauna Water District holds permit numbered 30725 for use of water from an unnamed spring and an unnamed stream. You had indicated during our visit that the District is no longer using these two sources but is instead using water from Peterson Spring. You stated that you would contact the District and obtain authorization to cancel permit numbered 30725 so that application numbered 46756 (Peterson Spring) could be completed. As of this date, we have not heard from Wauna Water District.

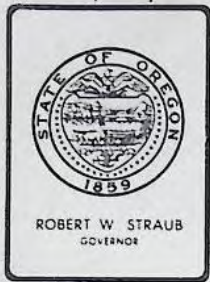
Application numbered 51053 submitted by the City of Bay City is requesting use of water from Kilchis' River for Quasi-municipal use. Again, you may recall the discussion regarding the appropriation. You had indicated that the City had obtained land adjacent to the Kilchis' River and had constructed a well into the River gravels. You were to prepare information regarding the well, its location and proposed use by the City, so it could be determined whether it was a ground water or a surface water appropriation. Your letter has not been received.

We are most interested in completing the applications by Wauna Water District and the City of Bay City and would appreciate hearing from you regarding these matters.

Sincerely,

VESTAL GARNER
Water Rights Engineer

VG:tld



Water Resources Department

MILL CREEK OFFICE PARK

555 13th STREET N.E., SALEM, OREGON 97310

PHONE 378-3066

51053

26 January 1978

M.G. Boatwright and Associates
2613 12th Street S.E.
Salem, Oregon 97302

ATT: Martin Boatwright

Dear Mr. Boatwright:

On December 10, 1975, you advised us of the current status of completing the necessary data, maps and application for a permit numbered 51053 submitted by Bay City, Oregon.

You may recall that this application is requesting a permit to use 20.0 cubic feet of water per second from Kilchis River for quasi-municipal use.

Once again, we would appreciate being advised of the current status in completing the necessary data so that the permit could be issued.

Any information that you could give us at this time would be helpful.

Sincerely,

Vestal R. Garner
Water Rights Engineer

VRG:clh

51053

22 December 1975

M.G. Boatwright & Associates
2613 Twelfth Street S.E.
Salem, Oregon 97302

Dear Mr Boatwright:

Thank you for your letter of December 10, 1975,
outlining progress made on the part of the City
of Bay City in formalizing a final plan regarding
their application No. 51053.

We will withhold action on this application for a
reasonable length of time pending receipt of the
balance of the supporting data for the application.

Sincerely,

Vestal R. Garner
Water Rights Engineer

VRG:lem
cc: Bay City, City Hall

M. G. BOATWRIGHT & ASSOCIATES

2613 Twelfth Street S. E.
SALEM, OREGON 97302
December 10, 1975

Area Code (503) 363-9225

Water Resources Department
1178 Chemeketa St. N. E.
Salem, Oregon 97310

Attention: Mr. Vestal R. Garner

RE: WATER RIGHTS APPLICATION DATED AUGUST 10, 1973.

Dear Mr. Garner:

This letter will confirm my telephone explanation as to the intent of the City of Bay City to utilize water, filed for under water rights number 51053. Since the filing of the water rights on August 10, 1973, the City of Bay City has entered into a contract with this engineering firm to make an Engineering Feasibility Study covering long range city needs utilizing waters from the Kilchis River as the primary source of supply. It became apparent during the investigation of this feasibility study, that there were present water needs for adequate, high quality water for most of the adjoining groups domestic and municipal water supply systems. Four of these small existing systems have indicated in writing to the City of Bay City that they desire consideration in the City's plans of development for possible service from the City as to a source of supply. The City Council has authorized this firm to prepare preliminary application for federal financing and the preparation for an A-95 Review. I feel that the intent of the City to utilize this water in the near future has been positively expressed by the following steps taken to date:

1. The filing of the water rights.
2. The Engineering Feasibility Study that has been authorized and completed utilizing this source of supply.
3. The development of a test well at the subject site.
4. The development of a permanent well with well screens at a cost of approximately \$10,000 at the site.
5. The authorization of the council to proceed on the A-95 Review and preliminary application for funding from Farmers Home Administration.
6. Their request jointly with Tillamook County for HUD planning funds to study the possible managerial and political system that could be utilized to develop the Kilchis River water as a regional source of supply.

RECEIVED

DEC 12 1975

WATER RESOURCES DEPT.
SALEM, OREGON

7. The land purchasing entered into by the City for the acquisition of between $\frac{1}{2}$ & 1 mile of river frontage of the Kilchis River. This obligation is in the neighborhood of \$50,000.

I feel that these steps taken and the financial obligation incurred definitely substantiate the City's intent to develop and utilize water covered by the filing you have questioned.

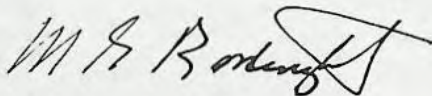
For your information, it is the intent to divert water from the Kilchis River via a series of shallow wells developed in natural river deposited sands and gravels adjacent to the river on high ground above flood stage. The test well and the permanent well developed indicate that well yields in excess of 1300 - 1500 gpm at a depth of 40' or less are possible. Observation during testing indicated that the ground waters are directly affected by changes in the river level; substantiating the taking of river water through a well diversionary system.

As soon as the scope of initial development is finalized defining the area of service, and the number of wells to be developed, we will be prepared to complete the water rights filing as to the point of diversion actually developed.

We trust this explanation answers questions raised and explains how and when we can complete the water rights filings.

If you have any questions, please contact me at your earliest convenience.

Yours truly,



Martin G. Boatwright, P.E.

MGB/lb

cc: City of Bay City

2-11-75

Martin Boatwright called re: Appl 51053. Some investigation of possibilities for diversion has been continued & he believes plans will be firm sometime in summer 1975. We'll inquire as to progress late 1975 if nothing submitted prior to then

Jones

51053

August 29, 1973

M. G. Boatwright & Associates
2613 Twelfth Street S.E.
Salem, OR 97302

Dear Mr. Boatwright:

This will acknowledge the application submitted for Bay City for a permit to appropriate 20 cubic feet of water per second of waters of Kilchis River for quasi-municipal use, a map showing the proposed service area and fees of \$69.75 for which our receipt No. 36040 was handed to you.

The application has been filed as number 51053 and will be held for a reasonable time pending submission of the balance of the data required as discussed with you.

Very truly yours,

TREVOR JONES
Assistant

TJ:mjf

cc: Bay City, Oregon

August 14, 1973

51053

Mr. Cornelius C. Bateson, Health Division
Mr. Kess Cannon, Natural Resource Agencies
Dr. Thomas E. Kruse, Fish Commission of Oregon
Mr. Robert K. Logan, Local Government Relations
Mr. John W. McKean, State Game Commission
Mr. Tucson Myers, State Water Resources Board
Mr. Ken Spies, Department of Environmental Quality

Gentlemen:

Bay City has filed an incomplete application for a permit to appropriate 20 cubic feet per second of water from the Kilchis River for quasi-municipal use. The application was filed by Bay City but contains the following:

"Bay City, Oregon, Kilchis River Water District, Tuno Water Company, Garibaldi, Bar View, Twin Rocks, Rockaway, Fairview Water District and Wilson River Water District all need or will need additional sources of supply. Public agencies have stressed the elimination of small systems and to solve water needs on an area wide basis. Some of these systems have been contacted and have indicated a desire to obtain water from this source of supply".

Bay City has engaged a consulting engineer to make a water supply study and the only contact my office has had was a brief conversation with the engineer. This conversation as well as the application indicates that the proposal is in the preliminary investigation stage. Considerable more data are required to complete the application before I may consider it for approval. The required data will be dependent upon how many and which water distribution agencies will join in the final proposal. It appears probable that 20 cubic feet per second is excessive for the entire possible service area.

Page 2

August 14, 1973

When all the information is submitted so the application can be considered complete, I will notify the State Water Resources Board so they may request further information or referral to the Board if it appears proper.

Sincerely,

CHRIS L. WHEELER
State Engineer

CLW:eh

"EXHIBIT C"

Application No. 51053

Permit No. 43858

Township	Range	Section	List $\frac{1}{4}$ $\frac{1}{4}$ of Section	List use and/or number of acres to be irrigated
1 South	9 West	16	A11	A11
1 South	9 West	17	A11	A11
1 South	9 West	18	A11	A11
1 South	9 West	19	A11	A11
1 South	9 West	20	A11	A11
1 South	9 West	21	A11	A11
1 South	9 West	22	S 1/2 and NW 1/4	A11
1 South	9 West	23	S 1/2	A11
1 South	9 West	26	A11	A11
1 South	9 West	27	A11	A11
1 South	9 West	28	A11	A11
1 South	9 West	29	A11	A11
1 South	9 West	30	E 1/2	A11
1 South	9 West	31	NE 1/4	A11
1 South	9 West	32	N 1/2	A11
1 South	9 West	33	N 1/2	A11
1 South	9 West	34	N 1/2	A11
1 South	9 West	35	N 1/2	A11
1 North	10 West	6	E 1/2	A11
1 North	10 West	5	A11	A11
1 North	10 West	7	E 1/2	A11
1 North	10 West	8	A11	A11
1 North	10 West	13	SW 1/4	A11
1 North	10 West	14	S 1/2	A11
1 North	10 West	15	S 1/2	A11

(CONTINUED)

"EXHIBIT C"
(continued)

Application No. 51053

Permit No. 43858

Township	Range	Section	List $\frac{1}{4}$ $\frac{1}{4}$ of Section	List use and/or number of Acres to be irrigated
1 North	10 West	16	S $\frac{1}{2}$	A11
1 North	10 West	17	A11	A11
1 North	10 West	18	E $\frac{1}{2}$	A11
1 North	10 West	20	A11	A11
1 North	10 West	21	A11	A11
1 North	10 West	22	A11	A11
1 North	10 West	23	W $\frac{1}{2}$	A11
1 North	10 West	26	W $\frac{1}{2}$	A11
1 North	10 West	27	A11	A11
1 North	10 West	34	A11	A11
1 North	10 West	35	A11	A11
1 North	10 West	36	A11	A11
1 South	10 West	1	A11	A11
1 South	10 West	2	A11	A11
1 South	10 West	3	E $\frac{1}{2}$	A11
1 South	10 West	11	A11	A11
1 South	10 West	12	A11	A11
1 South	10 West	13	A11	A11
1 South	10 West	14	A11	A11
1 South	10 West	15	SE $\frac{1}{4}$	A11
1 South	10 West	18	A11	A11
1 South	10 West	22	A11	A11
1 South	10 West	23	A11	A11
1 South	10 West	24	A11	A11
2 North	10 West	29	A11	A11
2 North	10 West	30	A11	A11

(CONTINUED)

"EXHIBIT C"
(CONTINUED)

Application No. 51053

Permit No. 43858

Township	Range	Section	List $\frac{1}{4}$ $\frac{1}{4}$ of Section	List use and/or number of Acres to be irrigated
2 North	10 West	31	A11	A11
2 North	10 West	32	A11	A11

Superseded

Permit No.

RECEIVED
AUG 10 1973
STATE ENGINEER
SALEM, OREGON

*APPLICATION FOR PERMIT

To Appropriate the Public Waters of the State of Oregon

I, Bay City, Oregon

(Name of applicant)

of City Hall

(Mailing address)

Bay City

(City)

State of Oregon97107

(Zip Code)

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

If the applicant is a corporation, give date and place of incorporation an Oregon municipal corporation. Charter vote August 5, 1913; filed August 15, 1913 with Sec. of State.

1. The source of the proposed appropriation is Kilchis River

(Name of stream)

, a tributary of Tillamook Bay2. The amount of water which the applicant intends to apply to beneficial use is 20

cubic feet per second

(If water is to be used from more than one source, give quantity from each)

3. The use to which the water is to be applied is quasi municipal

(Irrigation, power, mining, manufacturing, domestic supplies, etc.)

4. The point of diversion is located ft. and ft. from the

(N. or S.)

(E. or W.)

corner of

(Section or subdivision)

in Section 33, Township 1 North, Range 9 West, Willamette Meridian, TillamookCounty, Oregon

(If preferable, give distance and bearing to section corner)

(If there is more than one point of diversion, each must be described. Use separate sheet if necessary)

being within the

(Give smallest legal subdivision)

of Sec. 33, Tp. 1 North,

(N. or S.)

R. 9 West, W. M., in the county of Tillamook

(E. or W.)

5. The

(Main ditch, canal or pipe line)

to be

(Miles or feet)

in length, terminating in the

(Smallest legal subdivision)

of Sec. , Tp. ,

(N. or S.)

R. , W. M., the proposed location being shown throughout on the accompanying map.

(E. or W.)

DESCRIPTION OF WORKS

Diversion Works—

6. (a) Height of dam feet, length on top feet, length at bottom feet; material to be used and character of construction

(Loose rock, concrete, masonry,

rock and brush, timber crib, etc., wasteway over or around dam)

(b) Description of headgate

(Timber, concrete, etc., number and size of openings)

shallow wells or Rainy type collector system(c) If water is to be pumped give general description stage development, first stage

(Size and type of pump)

1,000 GPM, 50 HP electric well type pump. Others to be developed as needed.

(Size and type of engine or motor to be used, total head water is to be lifted, etc.)

Canal System or Pipe Line—

7. (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.

8. Location of area to be irrigated, or place of use quasi municipal.....

Township North or South	Range E. or W. of Willamette Meridian	Section	Forty-acre Tract	Number Acres To Be Irrigated
1 North	9 West	31	All	All
1 North	9 West	32	South $\frac{1}{2}$	All
1 North	9 West	33	S $\frac{1}{2}$ and N $\frac{1}{4}$ NE $\frac{1}{4}$	All B/B
1 North	9 West	34	W $\frac{1}{2}$	All
1 South	9 West	6	All	All
1 South	9 West	5	N $\frac{1}{2}$ and SW $\frac{1}{4}$	All
1 South	9 West	4	N $\frac{1}{2}$	All
1 South	9 West	7	All	All
1 South	9 West	8	W $\frac{1}{2}$	All
1 South	9 West	15	W $\frac{1}{2}$	All
1 South	9 West	16	All	All
SEE ATTACHED SHEET				

(If more space required, attach separate sheet)

(a) Character of soil

(b) Kind of crops raised

Power or Mining Purposes—

9. (a) Total amount of power to be developed theoretical horsepower.

(b) Quantity of water to be used for power sec. ft.

(c) Total fall to be utilized feet.

(Head)

(d) The nature of the works by means of which the power is to be developed

(e) Such works to be located in of Sec.

(Legal subdivision)

Tp., R., W. M.

(No. N. or S.)

(No. E. or W.)

(f) Is water to be returned to any stream?

(Yes or No)

(g) If so, name stream and locate point of return

....., Sec., Tp., R., W. M.

(No. N. or S.)

(No. E. or W.)

(h) The use to which power is to be applied is

(i) The nature of the to be served

Township North or South	Range E. or W. of Willamette Meridian	Section	Forty Acre Tract	Number Acres To Be Irrigated
1 South	9 West	17	All	All
1 South	9 West	18	All	All
1 South	9 West	19	All	All
1 South	9 West	20	All	All
1 South	9 West	21	All	All
1 South	9 West	22	S $\frac{1}{2}$ and NW $\frac{1}{4}$	All
1 South	9 West	23	S $\frac{1}{2}$	All
1 South	9 West	26	All	All
1 South	9 West	27	All	All
1 South	9 West	28	All	All
1 South	9 West	29	All	All
1 South	9 West	30	E $\frac{1}{2}$	All
1 South	9 West	31	NE $\frac{1}{4}$	All
1 South	9 West	32	N $\frac{1}{2}$	All
1 South	9 West	33	N $\frac{1}{2}$	All
1 South	9 West	34	N $\frac{1}{2}$	All
1 South	9 West	35	N $\frac{1}{2}$	All
1 North	10 West	6	E $\frac{1}{2}$	76
1 North	10 West	5	All	All
1 North	10 West	7	E $\frac{1}{2}$	472
1 North	10 West	8	All	All
1 North	10 West	13	SW $\frac{1}{4}$	All
1 North	10 West	14	S $\frac{1}{2}$	All
1 North	10 West	15	S $\frac{1}{2}$	All
1 North	10 West	16	S $\frac{1}{2}$	All

Township North or South	Range E. or W. of Willamette Meridian	Section	Forty Acre Tract	Number Acres To Be Irrigated
1 North	10 West	17	All	All
1 North	10 West	18	E $\frac{1}{2}$	245
1 North	10 West	20	NE$\frac{1}{4}$ all	140 all
1 North	10 West	21	N$\frac{1}{2}$ all	345 all
1 North	10 West	22	All	All
1 North	10 West	23	W $\frac{1}{2}$	All
1 North	10 West	26	W $\frac{1}{2}$	All
1 North	10 West	27	All	All
1 North	10 West	34	E$\frac{1}{2}$ and NW$\frac{1}{4}$ all	460
1 North	10 West	35	All	All
1 North	10 West	36	All	All
1 South	10 West	1	All	All
1 South	10 West	2	All	All
1 South	10 West	3	E $\frac{1}{2}$	96
1 South	10 West	11	E$\frac{1}{2}$ and NW$\frac{1}{4}$ all	377
1 South	10 West	12	All	All
1 South	10 West	13	All	All
1 South	10 West	14	All	All
1 South	10 West	15	SE $\frac{1}{4}$	64
1 South	10 West	18	All	All
1 South	10 West	22	all	all
1 South	10 West	23	all	all
1 South	10 West	24	all	all
2 North	10 West	29	all	all
2 North	10 West	30	all	all
2 North	10 West	31	all	all
2 North	10 West	32	all	all

Application No. 51053
Permit No.

BB

Municipal or Domestic Supply-

10. (a) To supply the city of Bay City, Oregon

Tillamook
(Name of)

County, having a present population of 960

and an estimated population of 1,800 in 1990

(b) If for domestic use state number of families to be supplied 350 (now)

(Answer questions 11, 12, 13, and 14 in all cases)

11. Estimated cost of proposed works, \$ 400,000

12. Construction work will begin on or before July, 1974

13. Construction work will be completed on or before 1990 Oct, 1975

14. The water will be completely applied to the proposed use on or before 2,000 Oct. 1976

MS Butte
(Signature of applicant)

Authorized Agent of City

Remarks: Bay City, Oregon, Kilchis River Water District, Tuno Water Company, Garibaldi, Bar View, Twin Rocks, Rockaway, Fairview Water District and Wilson River Water District all need or will need additional sources of supply. Public agencies have stressed the elimination of small systems and to solve water needs on an area-wide basis. Some of these systems have been contacted and have indicated a desire to obtain water from this source of supply.

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 JANUARY 29 79 PAB
December 29, 1978

WITNESS my hand this 29th day of August, 1978.

RECEIVED

DEC 27 1978

WATER RESOURCES DEPT
SALEM, OREGON

RECEIVED

JAN 23 1979

WATER RESOURCES DEPT
SALEM, OREGON

James E. Sexson

Director

STATE ENGINEER

By

Ves Garner

Ves Garner

ASSISTANT

PERMIT

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

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 cubic feet per second measured at the point of diversion from the stream, or its equivalent in case of rotation with other water users, from

The use to which this water is to be applied is

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

The priority date of this permit is

Actual construction work shall begin on or before and shall thereafter be prosecuted with reasonable diligence and be completed on or before October 1, 19.....

Complete application of the water to the proposed use shall be made on or before October 1, 19.....

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

STATE ENGINEER

Application No. 51053

Permit No.

PERMIT

TO APPROPRIATE THE PUBLIC
WATERS OF THE STATE
OF OREGON

This instrument was first received in the

Office of the State Engineer at Salem, Oregon,

on the 10th day of August,

1923, at 10:35 o'clock A. M.

Returned to applicant:

Approved:

Recorded in book No. of

Permits on page

STATE ENGINEER

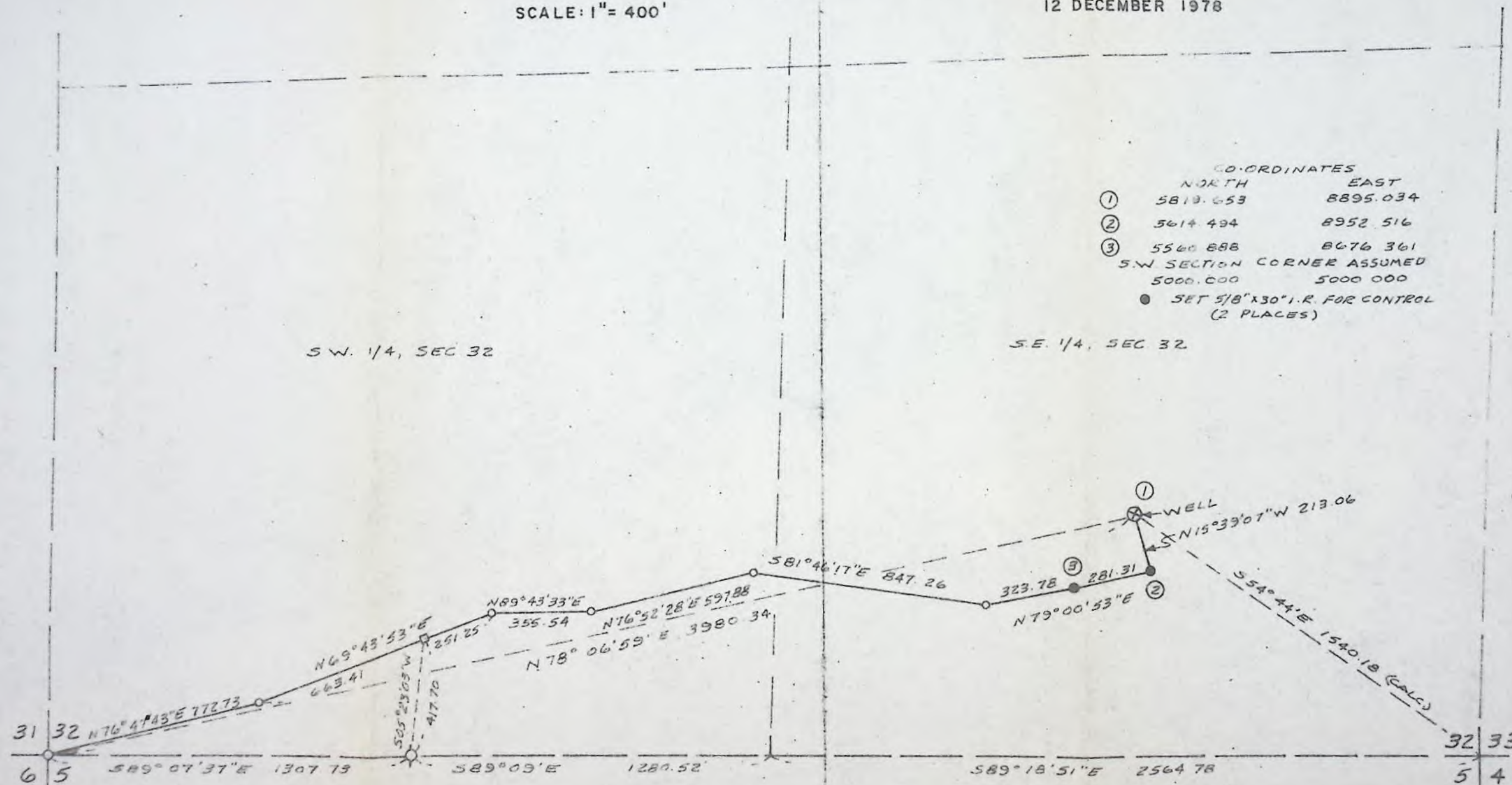
Drainage Basin No. 1 page 51

Fees

MAP SHOWING LOCATION OF WELL FOR BAY CITY, OREGON WATER STUDY
IN THE S.E. 1/4 SECTION 32, T1N, R9W, W.M. TILLAMOOK COUNTY, ORE.

SCALE: 1" = 400'

12 DECEMBER 1978



Application No. 51053
Permit No. 43858

MAP SHOWING LOCATION OF WELL FOR BAY CITY, OREGON WATER STUDY
IN THE S.E. 1/4 SECTION 32, T1N, R9W, W.M. TILLAMOOK COUNTY, ORE.

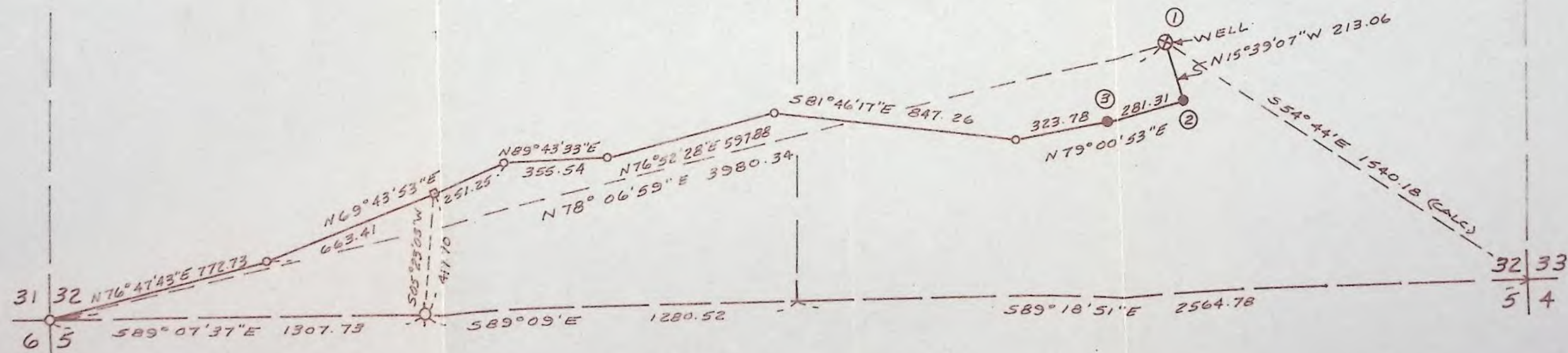
12 DECEMBER 1978

SCALE: 1" = 400'

CO-ORDINATES		
	NORTH	EAST
①	5813.653	8895.034
②	5614.494	8952.516
③	5560.888	8676.361
S.W. SECTION CORNER ASSUMED		
	5000.000	5000.000
● SET 5/8" x 30" I.R. FOR CONTROL (2 PLACES)		

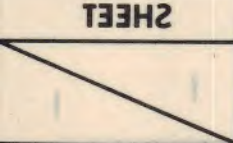
S.E. 1/4, SEC. 32

S.W. 1/4, SEC. 32



Application No. 51053
Permit No. 43858

SUNCO LAND SERVICES, INC.

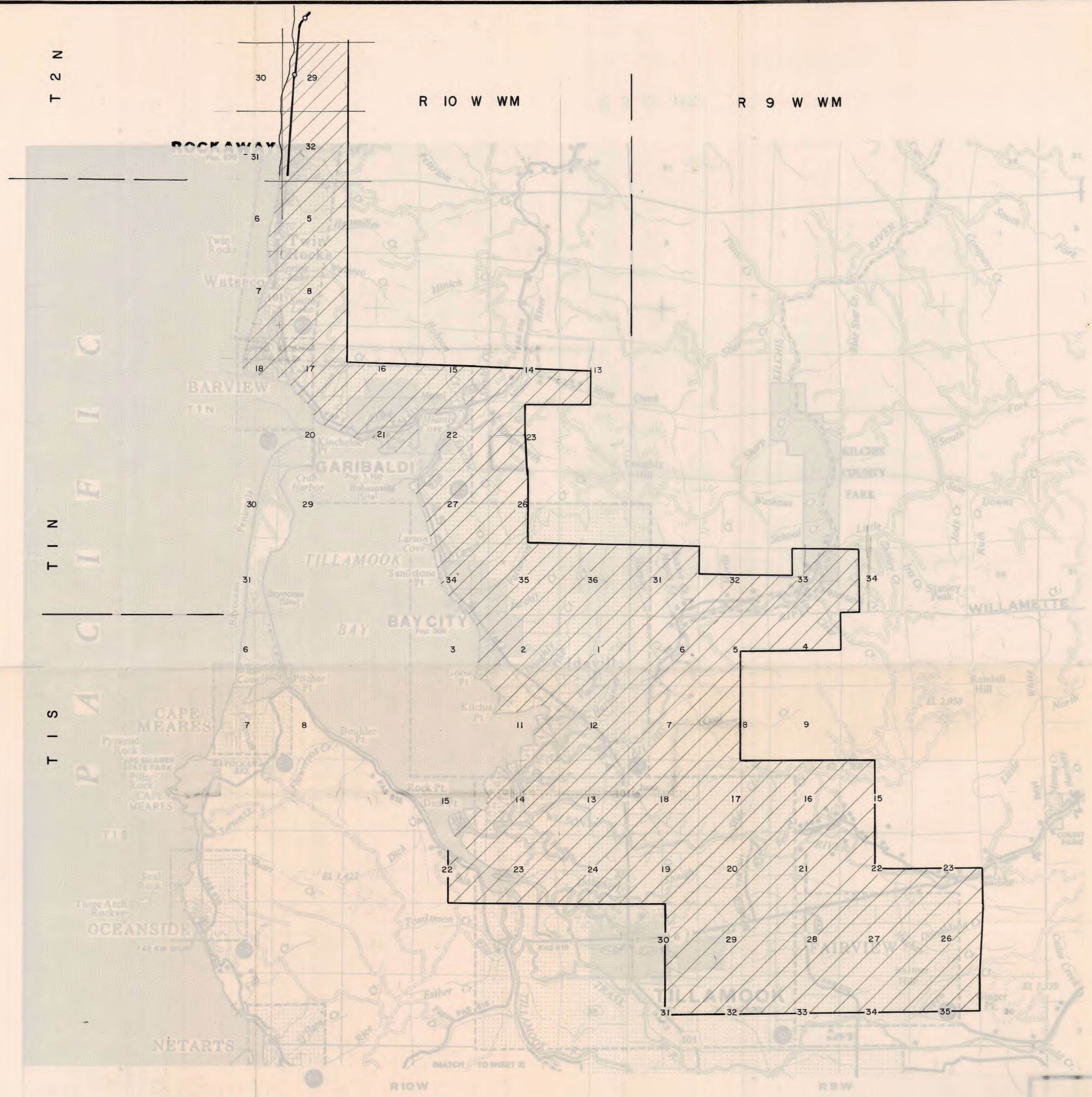
Checked	M.B.	M. G. BOATWRIGHT & ASSOCIATES 2513 Twelfth Street S. E. SALEM, OREGON 97305		SHEET	Revised	CITY OF BAY CITY, OREGON	
Drawn	M.B.				Date: 2 AUG 73	WATER RIGHTS MAP - KILCHNIS RIVER	
Design	M.B.				Scale: 1" = 1 MILE		

Application No. 51053
 Permit No. 43858

Application No. 51053
 Permit No. 43858



CITY OF BAY CITY, OREGON
 WATER RIGHTS MAP - KITCHINS RIVER



4" to note river

Application No. 51053
Permit No. 43858

Application No. 51053
Permit No. 43858

CITY OF BAY CITY, OREGON		
WATER RIGHTS MAP - KILCHIS RIVER		
Scale: 1" = 1 MILE	Date: 9 AUG. 73	Revised
Design: M.G.B.	M. G. BOATWRIGHT & ASSOCIATES	SHEET
Drawn: B.J.Z.	2513 Twelfth Street S. E.	1
Checked: M.G.B.	SALEM, OREGON 97302	1

T 2 N

R 10 W WM

R 9 W WM

ROCKAWAY

4" to make river

T 1 N

T 1 S

Application No. 51053
Permit No. 43858

CITY OF BAY CITY, OREGON

WATER RIGHTS MAP - KILCHIS RIVER

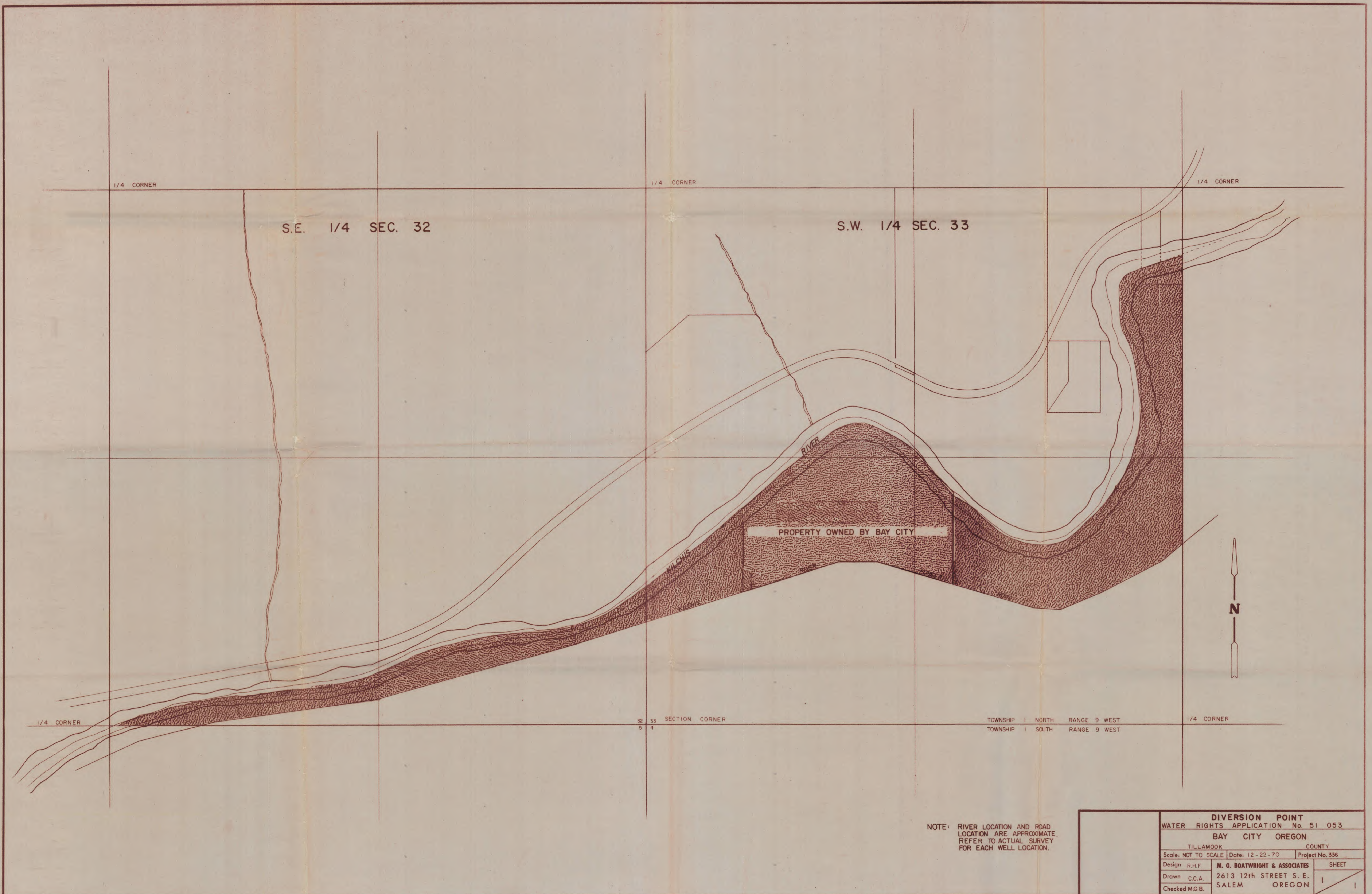
1" = 1 MILE

9 AUG. 73

M.G.B.

B.J.Z.

M.G.B.



NOTE: RIVER LOCATION AND ROAD
LOCATION ARE APPROXIMATE.
REFER TO ACTUAL SURVEY
FOR EACH WELL LOCATION.

DIVERSION POINT		
WATER RIGHTS APPLICATION No. 51 053		
BAY CITY OREGON		
TILLAMOOK		COUNTY
Scale: NOT TO SCALE	Date: 12-22-70	Project No. 336
Design R.H.F.	M. G. BOATWRIGHT & ASSOCIATES	SHEET
Drawn C.C.A.	2613 12th STREET S.E.	1
Checked M.G.B.	SALEM OREGON	1

T.1S.
T.2S.

WATER USERS

1. HUNT W.D.
2. LONG PRAIRIE W.D.
3. NORTHLINE ASSOC.
4. PLEASANT VALLEY
5. ROGERS WATER ASSOC.
6. SOUTH PRAIRIE
7. TONE W.D.
8. WEST HILLS
9. WILSON RIVER W.D.
10. PORT OF TILLAMOOK BAY
11. CITY OF TILLAMOOK
12. FAIRVIEW W.D.

STUDY AREA

R.10 W. R.9 W.

R.9 W. R.8 W.

T.1S.
T.2S.

R.10 W. R.9 W.

R.9 W. R.8 W.

PLATE
I

STUDY AREA

Application No. 53575
Permit No. 41438

HGE
ENGINEERS & PLANNERS
PORTLAND, OREGON / 520 OREGON PIONEER BUILDING 97204

BC 2000

8/10/73

Application No.

Permit No.

51053
43858

Name Bay City, OR, P.O. Box 307
Address City Hall, Bay City, OR 97107

Assigned

Address

Beginning construction MAR 2 1980

Completion of construction OCT 1 1980

Extended to 10-1-85, 10-1-90, 10-1-95, 10-1-2000

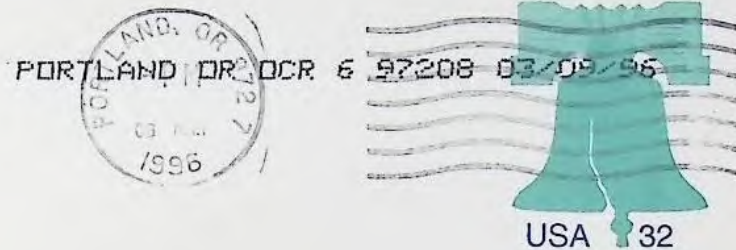
Complete application of water OCT 1 1981

Extended to 11-1-85, 10-1-90, 10-1-95, 10-1-2000

City of Bay City

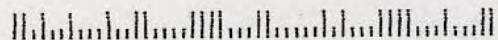
P. O. Box 3309

Bay City, Oregon 97107-3309



Oregon Water Resources Department
ATTN: Dallas Miller
158 12th Street, NE
Salem, OR 97310-0210

11 000



CITY OF BAY CITY

8484

WATER RESOURCES DEPT.

DATE
04/11/96

CHECK NO.
8484

INVOICE NO.
51053

DISCOUNT
.00

NET AMT
100.00

TOTAL =

1

.00

100.00

CITY OF BAY CITY

8484

WATER RESOURCES DEPT.

DATE
04/11/96

CHECK NO.
8484

INVOICE NO.	AMOUNT	DISCOUNT	NET AMT
51053	100.00	.00	100.00
	-----	-----	-----
TOTAL =	100.00	.00	100.00

- **SENDER:** Complete Items 1 and 2 when additional services are desired, and complete items 3 and 4.

Put your address in the "RETURN TO" Space on the reverse side. Failure to do this will prevent this card from being returned to you. The return receipt fee will provide you the name of the person delivered to and the date of delivery. For additional fees the following services are available. Consult postmaster for fees and check box(es) for additional service(s) requested.

1. ☐ Show to whom delivered, date, and addressee's address. (Extra charge) 2. ☐ Restricted Delivery (Extra charge)

3. Article Addressed to:

Bay City
PO Box 307
Cay City OR 97107

4. Article Number

P-57741

Type of Service:

- ☐ Registered ☐ Insured
☐ Certified ☐ COD
☐ Express Mail ☐ Return Receipt for Merchandise

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature - Addressee

X

6. Signature - Agent

X

7. Date of Delivery

1/28/91 Juv

8. Addressee's Address (ONLY if requested and fee paid)

UNITED STATES POSTAL SERVICE

OFFICIAL BUSINESS

SENDER INSTRUCTIONS

Print your name, address and ZIP Code in the space below.

- Complete items 1, 2, 3, and 4 on the reverse.
- Attach to front of article if space permits, otherwise affix to back of article.
- Endorse article "Return Receipt Requested" adjacent to number.



PENALTY FOR PRIVATE
USE, \$300

RETURN
TO

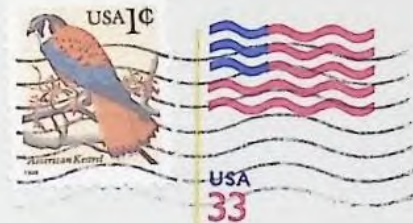


Print Sender's name, address, and ZIP Code in the space below.

WATER RESOURCES DEPARTMENT
3850 PORTLAND ROAD NE
SALEM OR 97310



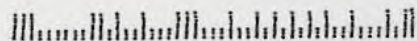
City of Bay City
P. O. Box 3309
Bay City, Oregon 97107-3309



Oregon Water Resources Department
Permit Section
158 12th St. NE
Salem, OR 97310-0210

51053

97301/4172



WATER RESOURCES DEPT.
3850 Portland Rd. NE
Salem, Oregon 97310

Dick

RSB - Time

Generally - Security

escorts

leaving alone

five sick

carb room

Greg Bennett FAX
503 842-3680

STATE OF OREGON
Water Resources Department
Salem, Oregon 97310

This will acknowledge the notice of beginning of construction under the terms of permit No. _____.

Under the provisions of the permit the time limit for completion of construction and/or the purchase and installation required for the authorized use of water will expire October 1, _____.

CITY OF BAY CITY

04680

WATER RESOURCES DEPARTMENT

DATE
03/13/91

CHECK NO.
4680

INVOICE NO.	AMOUNT	DISCOUNT	NET AMT
0	100.00	.00	100.00
TOTAL =	100.00	.00	100.00

RECEIVED

MAR 14 1991

WATER RESOURCES DEPT.
SALEM, OREGON

NOTICE OF BEGINNING OF CONSTRUCTION

I, Bay City, Oregon, the holder of Permit No. 43853

to appropriate the public waters of the state of Oregon, began the actual construction of the works described therein on the 15 day of September, 1976

Remarks: One municipal well is complete; a second municipal well is under contract. Aerial photograph of the entire service area were completed in

acquired for the water system up to the date of this statement, and any additional information which shows a substantial beginning of construction as November 1979. Bay City passed a bond issue for \$900,000 in June 1979 and authorized by your permit.

final commitment on grants and loans has been received. IN WITNESS WHEREOF, I have hereunto set my hand this 28th day of March, 1980.

City Engineer 2613 12th Street S.E., Salem, OR 97302

(Signature of Applicant)

(Address)

Fill out, detach and mail to the Water Resources Department, Salem, OR 97310, when construction work is begun.

12/5/75

Boatwright phoned -

Project still alive &
65000.00 spent by applicant
on design & land acquisition.
Morden will mail
letter describing status
on plans next week
Cee.

Russ in 12-27-79

reendared appl 51053

for 1-29-79 —

Don



SENDER:

- Complete items 1 and/or 2 for additional services.
- Complete items 3, and 4a & b.
- Print your name and address on the reverse of this form so that we can return this card to you.
- Attach this form to the front of the mailpiece, or on the back if space does not permit.
- Write "Return Receipt Requested" on the mailpiece below the article number.
- The Return Receipt will show to whom the article was delivered and the date delivered.

I also wish to receive the following services (for an extra fee):

1. ☐ Addressee's Address
2. ☐ Restricted Delivery
- Consult postmaster for fee.

3. Article Addressed to:

City of Bay City
P.O. Box 307
Bay City, OR 97107
51053

4a. Article Number

P56432

4b. Service Type

- ☐ Registered ☐ Insured
- ☐ Certified ☐ COD
- ☐ Express Mail ☐ Return Receipt for Merchandise

7. Date of Delivery

2/5/96 TH

5. Signature (Addressee)

Leonard W. Smith

6. Signature (Agent)

8. Addressee's Address (Only if requested and fee is paid)

UNITED STATES POSTAL SERVICE



Official Business

PENALTY FOR PRIVATE
USE TO AVOID PAYMENT
OF POSTAGE, \$300



Print your name, address and ZIP Code here

WATER RESOURCES DEPARTMENT
158 12th ST NE
SALEM OR 97310

RECEIPT #

STATE OF OREGON
WATER RESOURCES DEPARTMENT

158 12TH ST. N.E.

SALEM, OR 97310-0210

378-8455 / 378-8130 (FAX)

INVOICE #

001458

RECEIVED FROM:

BY:

APPLICATION

PERMIT

TRANSFER

CASH:

CHECK: #

OTHER: (IDENTIFY)

TOTAL REC'D

\$

0417 WRD MISC CASH ACCT

ADJUDICATIONS

\$

PUBLICATIONS / MAPS

\$

OTHER: (IDENTIFY)

\$

OTHER: (IDENTIFY)

\$

REDUCTION OF EXPENSE

CASH ACCT.

\$

PCA AND OBJECT CLASS

VOUCHER #

0427 WRD OPERATING ACCT

MISCELLANEOUS

0407

COPY FEES

\$

0410

RESEARCH FEES

\$

0408

MISC REVENUE: (IDENTIFY)

\$

TC165

DEPOSIT LIAB. (IDENTIFY)

\$

WATER RIGHTS:

0201

SURFACE WATER

EXAM FEE

\$

0202

RECORD FEE

\$

0203

GROUND WATER

\$

0204

\$

0205

TRANSFER

\$

0206

\$

WELL CONSTRUCTION

EXAM FEE

0218

WELL DRILL CONSTRUCTOR

\$

0219

LICENSE FEE

\$

LANDOWNER'S PERMIT

0220

\$

OTHER (IDENTIFY)

0437 WELL CONST. START FEE

0211

WELL CONST START FEE

\$

CARD #

0210

MONITORING WELLS

\$

CARD #

OTHER (IDENTIFY)

0539 LOTTERY PROCEEDS

1302

LOTTERY PROCEEDS

\$

0467 HYDRO ACTIVITY

LIC NUMBER

0233

POWER LICENSE FEE (FW/WRD)

\$

0231

HYDRO LICENSE FEE (FW/WRD)

\$

HYDRO APPLICATION

\$

RECEIPT #

001458

DATED:

4-15-96

BY:

Fla L

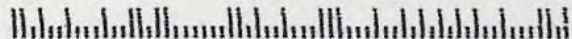
Distribution-White Copy-Customer, Yellow Copy-Fiscal, Blue Copy-File, Buff Copy-Fiscal

City of Bay City
P. O. Box 3309
Bay City, Oregon 97107-3309



Water Resources Department
ATTN: Lisa Juul
158 12th Street NE
Salem, OR 97301-4172

97301-4172



**STATE OF OREGON
WATER RESOURCES DEPARTMENT**

RECEIPT # **61835**

158 12TH ST. N.E.
SALEM, OR 97301-4172
378-8455 / 378-8130 (FAX)

INVOICE # _____

RECEIVED FROM: City of Bay City
BY: _____

APPLICATION	51053
PERMIT	
TRANSFER	

CASH: ☐ CHECK: # 6025 ☒ OTHER: (IDENTIFY) ☐

TOTAL REC'D \$ 100.00

0401 TREASURY 0417 WRD MISC CASH ACCT

0407	COPIES		\$
_____	OTHER: (IDENTIFY)	_____	\$
_____	OTHER: (IDENTIFY)	_____	\$

0427 WRD OPERATING ACCT

MISCELLANEOUS			\$
0407	COPY & TAPE FEES		\$
0410	RESEARCH FEES		\$
0408	MISC REVENUE: (IDENTIFY)	_____	\$
TC162	DEPOSIT LIAB. (IDENTIFY)	_____	\$
0240	EXTENSION OF TIME		\$ <u>100.00</u>

WATER RIGHTS:		EXAM FEE		RECORD FEE
0201	SURFACE WATER	\$	0202	\$
0203	GROUND WATER	\$	0204	\$
0205	TRANSFER	\$		
WELL CONSTRUCTION		EXAM FEE		LICENSE FEE
0218	WELL DRILL CONSTRUCTOR	\$	0219	\$
	LANDOWNER'S PERMIT		0220	\$
_____	OTHER (IDENTIFY)	_____		

0536 TREASURY 0437 WELL CONST. START FEE

0211	WELL CONST START FEE	\$	CARD #	
0210	MONITORING WELLS	\$	CARD #	
_____	OTHER (IDENTIFY)	_____		

0607 TREASURY 0467 HYDRO ACTIVITY LIC NUMBER

0233	POWER LICENSE FEE (FW/WRD)		\$
0231	HYDRO LICENSE FEE (FW/WRD)		\$
_____	HYDRO APPLICATION		\$

TREASURY OTHER / RDX

FUND _____	TITLE _____	
OBJ. CODE _____	VENDOR # _____	
DESCRIPTION _____		\$

RECEIPT: **61835**

DATED: 08/04/03 BY: Paula Taylor

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

S-51053
CITY OF BAY CITY
ATTN: JOHN LAW
PO BOX 3309
BAY CITY, OR 97107

2. Article Number

(Transfer from service label)

7002 3150 0005 3664 0468

PS Form 3811, August 2001

Domestic Return Receipt

WR/LJJ

102595-02-M-1540

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

James L. Heup

☐ Agent☐ Addressee

B. Received by (Printed Name)

James L. Heup

C. Date of Delivery

D. Is delivery address different from item 1? ☐ YesIf YES, enter delivery address below: ☐ No

3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☐ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

S-51053
CITY OF BAY CITY
ATTN: JOHN LAW
P. O. BOX 3309
BAY CITY OR 97107

2. Article Number

(Transfer from service label)

7004 1160 0007 0796 9276

PS Form 3811, February 2004

Domestic Return Receipt WR

102595-02-M-1540

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X

James L. Heup

☐ Agent☐ Addressee

B. Received by (Printed Name)

James L. Heup

C. Date of Delivery

D. Is delivery address different from item 1? ☐ YesIf YES, enter delivery address below: ☐ No

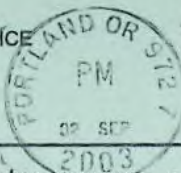
3. Service Type

☒ Certified Mail☐ Express Mail☐ Registered☐ Return Receipt for Merchandise☐ Insured Mail☐ C.O.D.

4. Restricted Delivery? (Extra Fee)

☐ Yes

UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

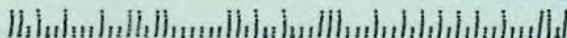
WATER RESOURCES DEPARTMENT
158 12TH STREET NE
SALEM OR 97301-4172

RECEIVED

SEP 03 2003

WATER RESOURCES DEPT
SALEM, OREGON

7301+4172



UNITED STATES POSTAL SERVICE



First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

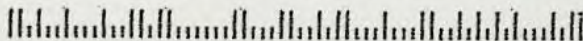
WATER RESOURCES DEPARTMENT
725 SUMMER STREET NE SUITE A
SALEM OR 97301-1271

RECEIVED

JAN 27 2005

WATER RESOURCES DEPT
SALEM, OREGON

07



" Application File Number: S-51053

Permit Number: S-43858

Applicant: City of Bay City

Water Source: Kilchis River, tributary to the Tillamook Bay

Authorized Use of Water Under Permit: Municipal