

Groundwater Basics and Source Water Protection

Insert Name

Regional Geologist – OHA DWP

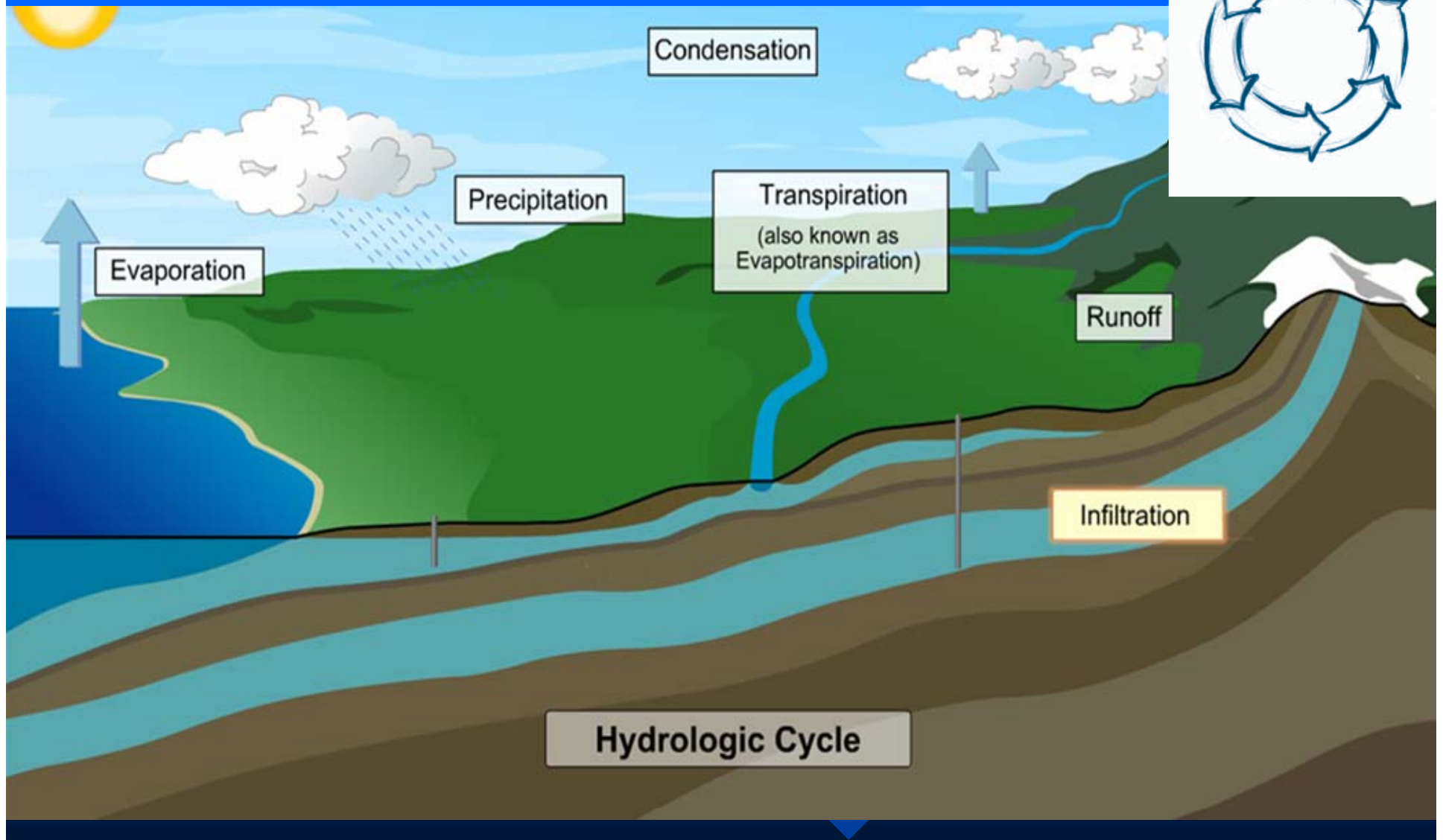
Outline

- What is groundwater; how does it work?
- Well Construction
- Source Water Assessments
- Source Water Protection
- GWUDI & GWR Tie-ins
- Hands-on Exercise

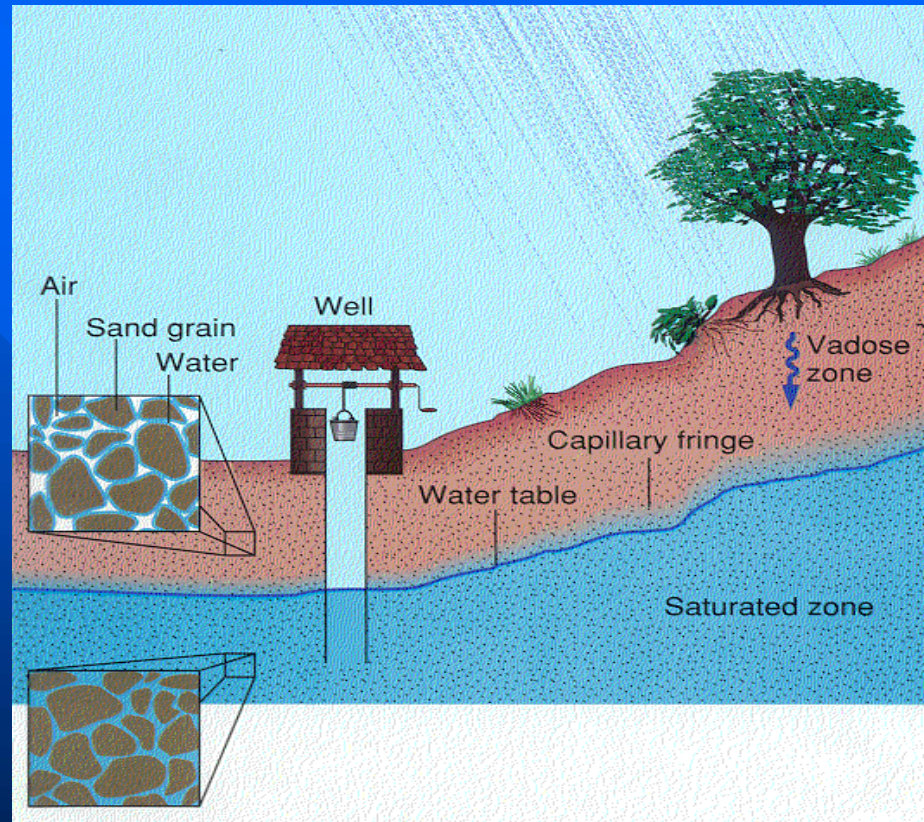
An Introduction to Groundwater



Water Cycle Processes

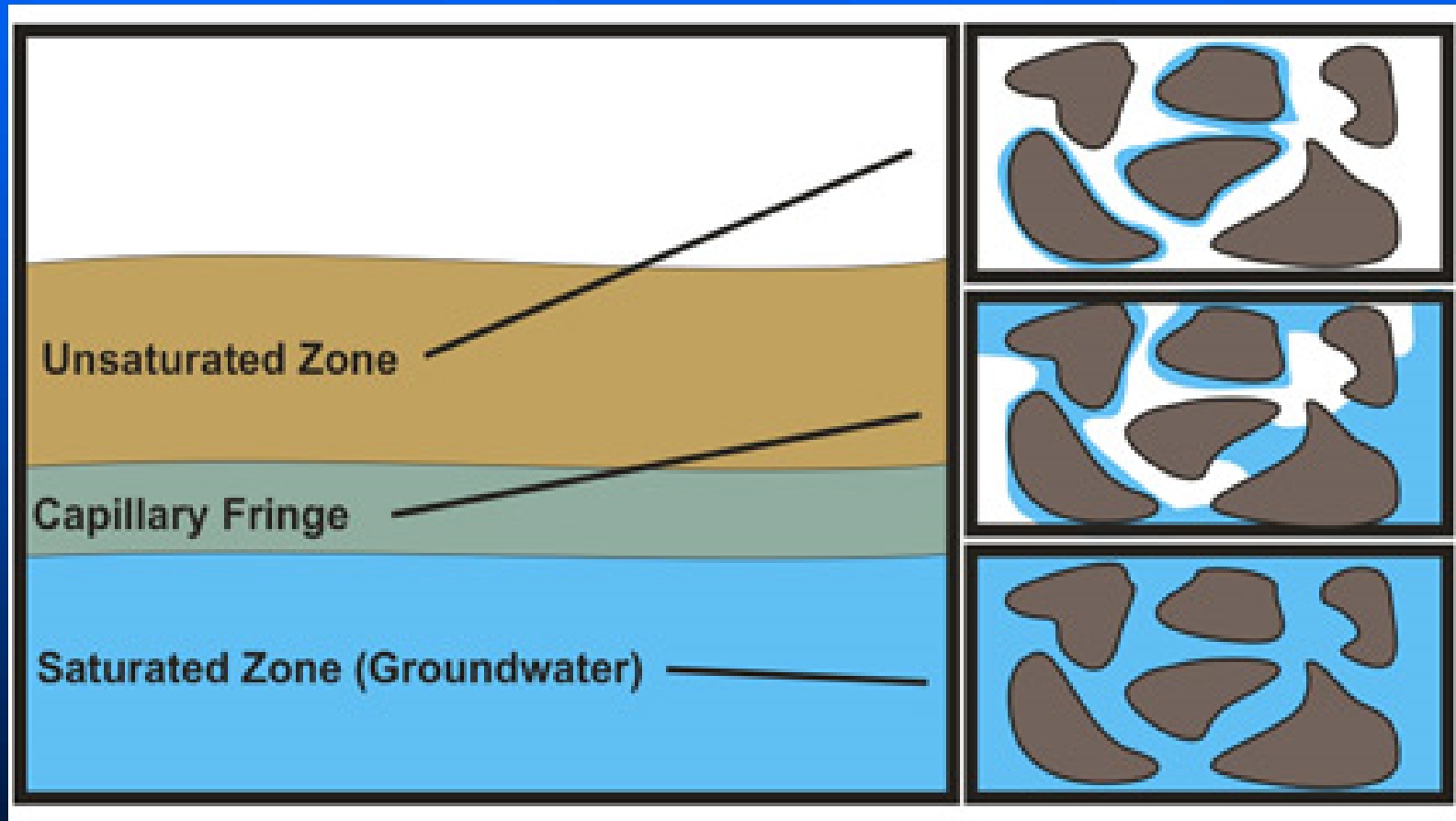


Origin of Groundwater

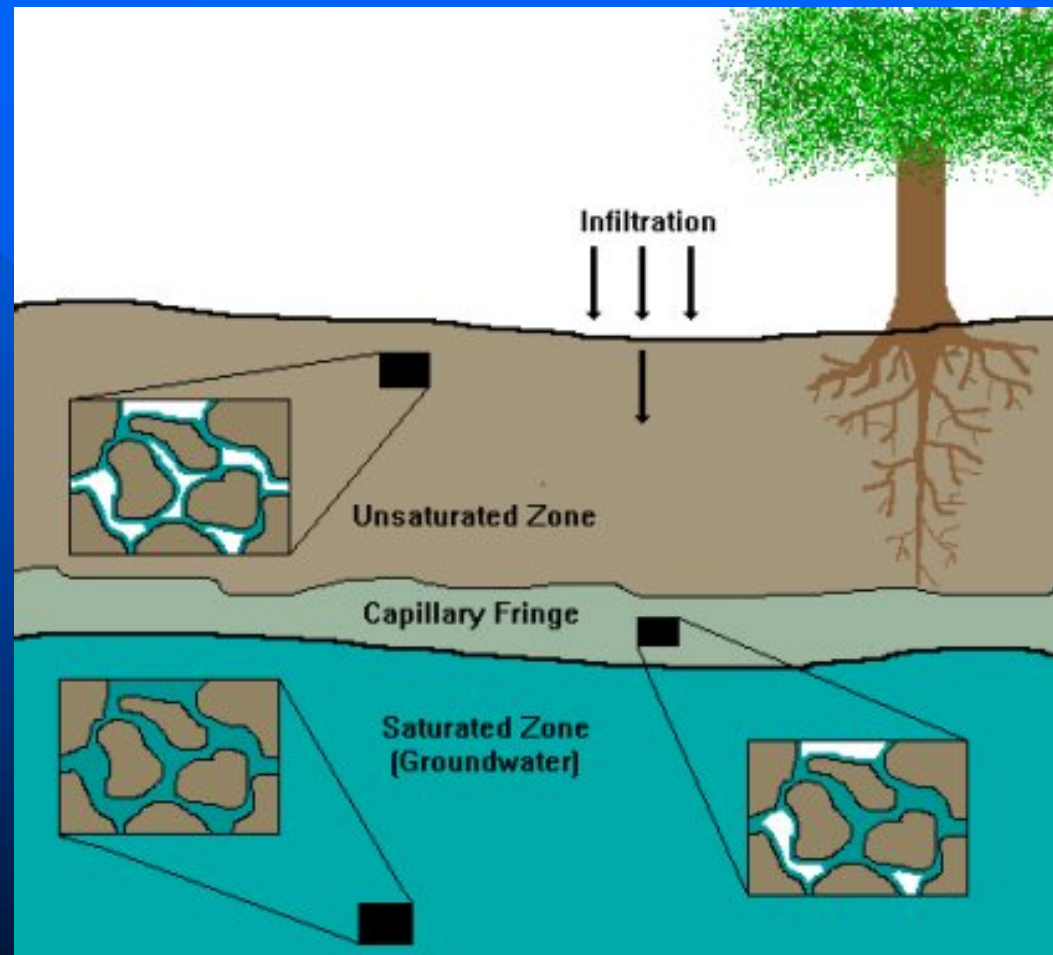


- Groundwater originates from precipitation sinking into the ground from the surface to the water table.
- Groundwater occurs in the open spaces between silt, sand, and gravel particles or in natural fractures with the bedrock.

Origin of Groundwater

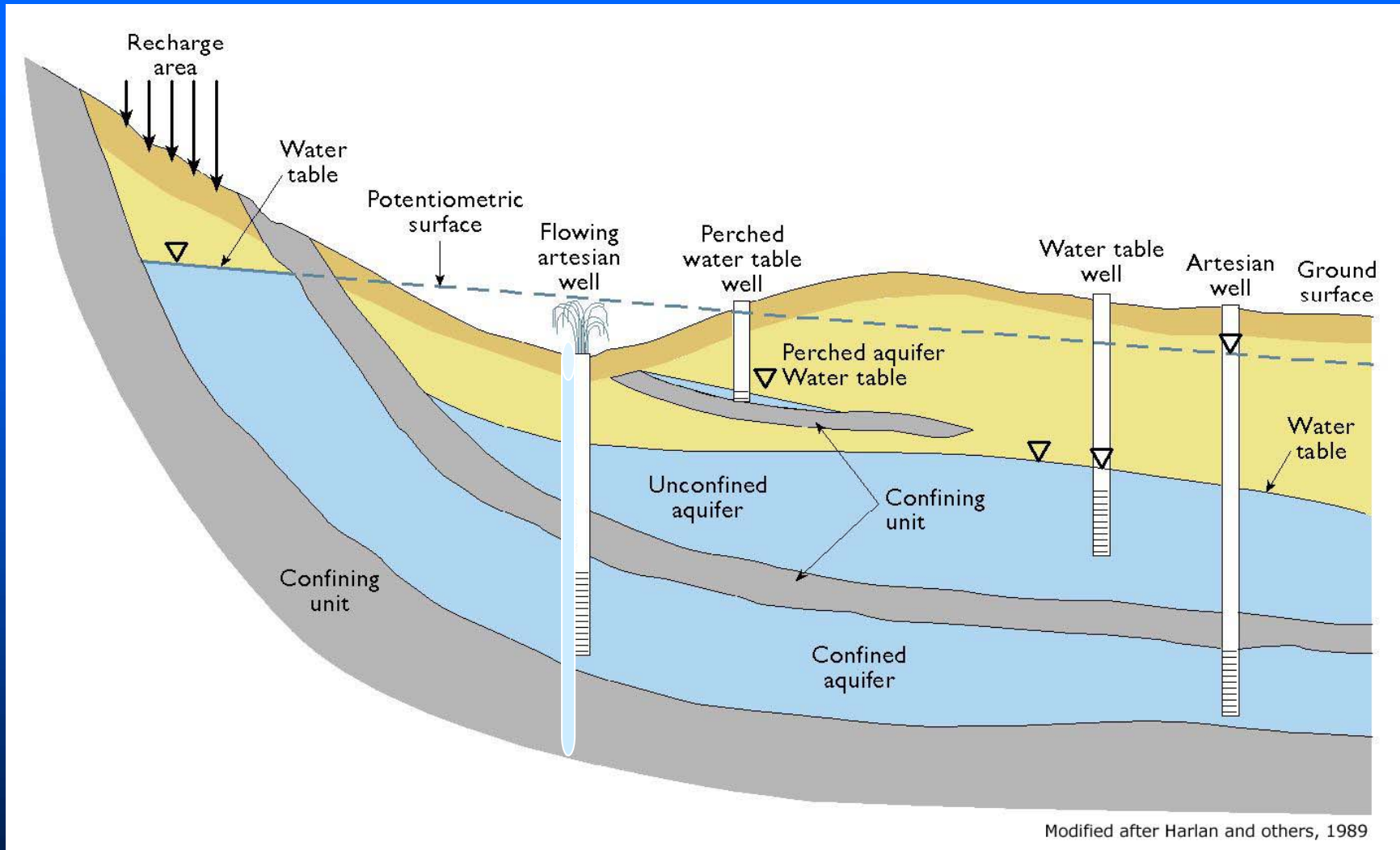


Origin of Groundwater

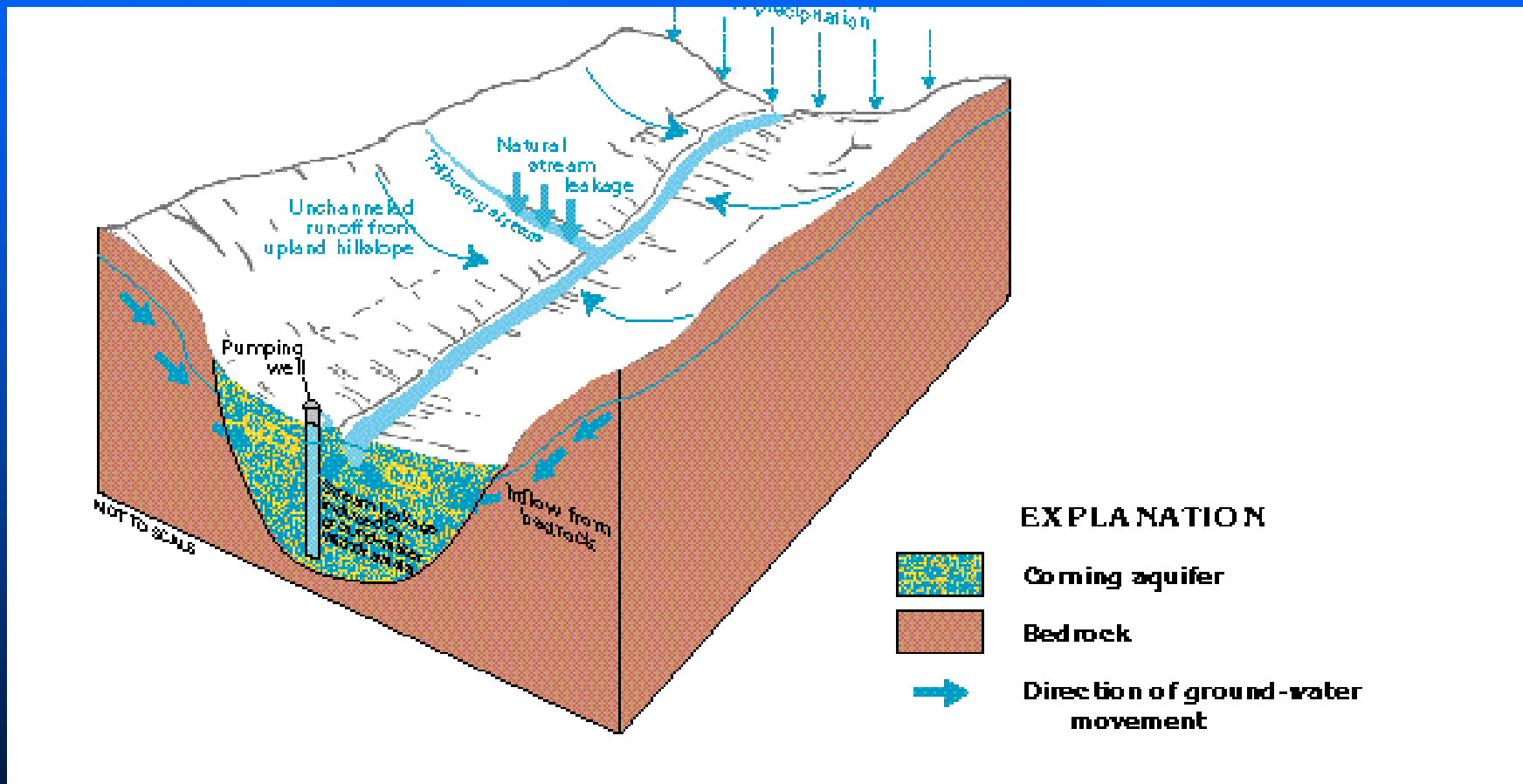


Aquifers

- Once water reaches the saturated zone it is called groundwater.
- If the geologic material of this saturated zone is permeable and can yield water to a well in sufficient quantity to supply user needs, it is referred to as an **aquifer**.
- Aquifers can be either **unconfined** or **confined**.

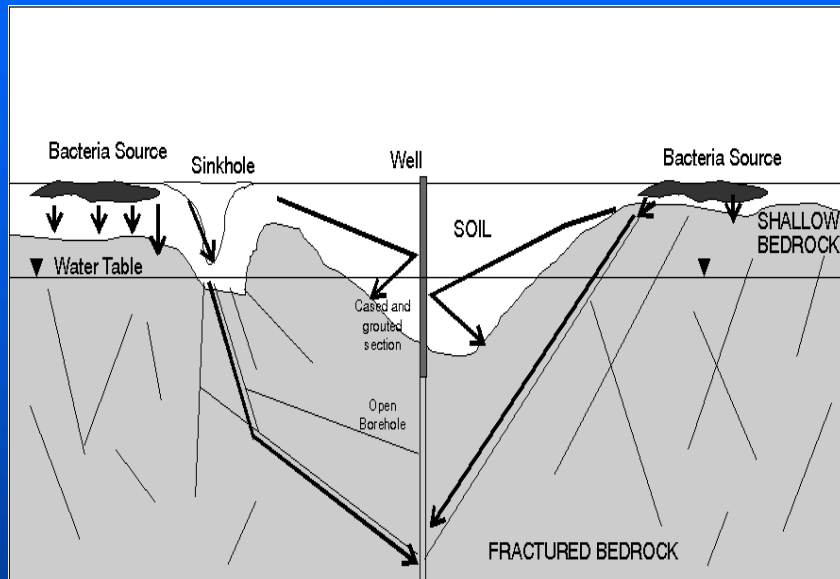


Alluvial Aquifer: Valley Fill

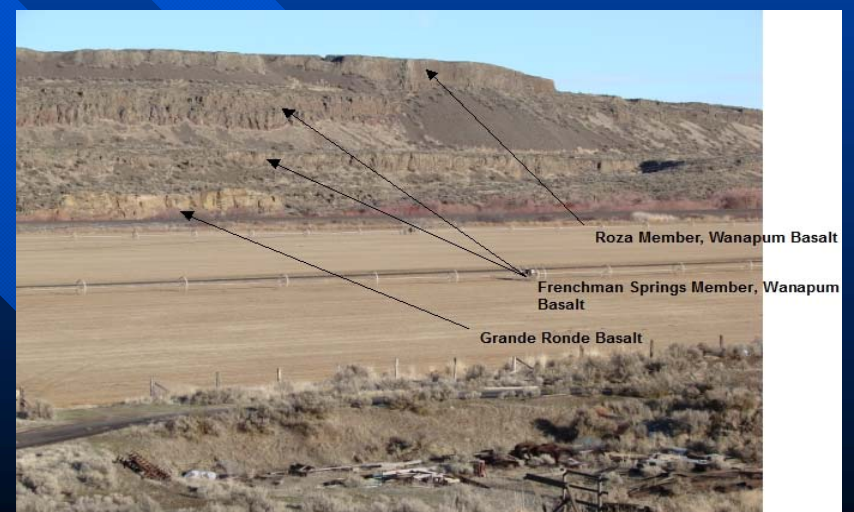
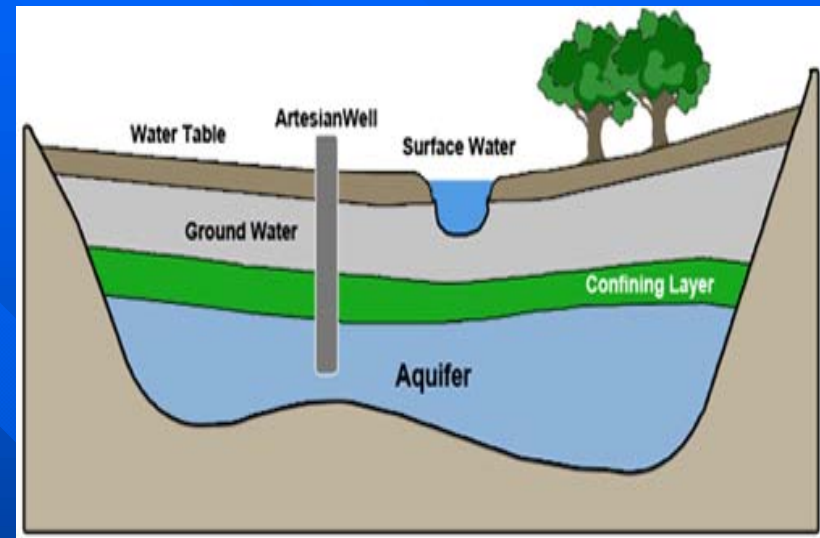


Bedrock Aquifers

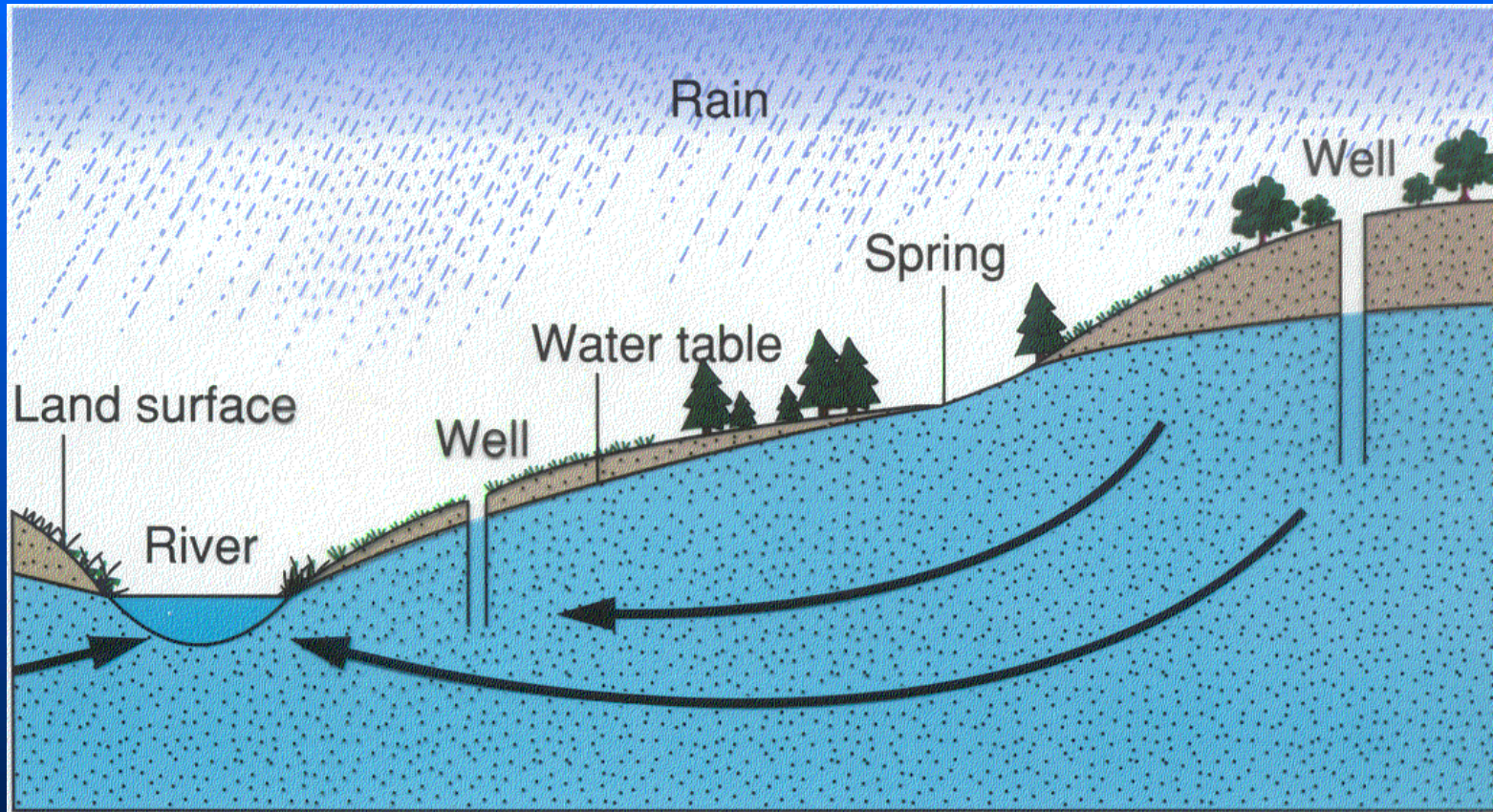
■ Fractured Bedrock



■ Layered Volcanics



Groundwater Movement: Winter

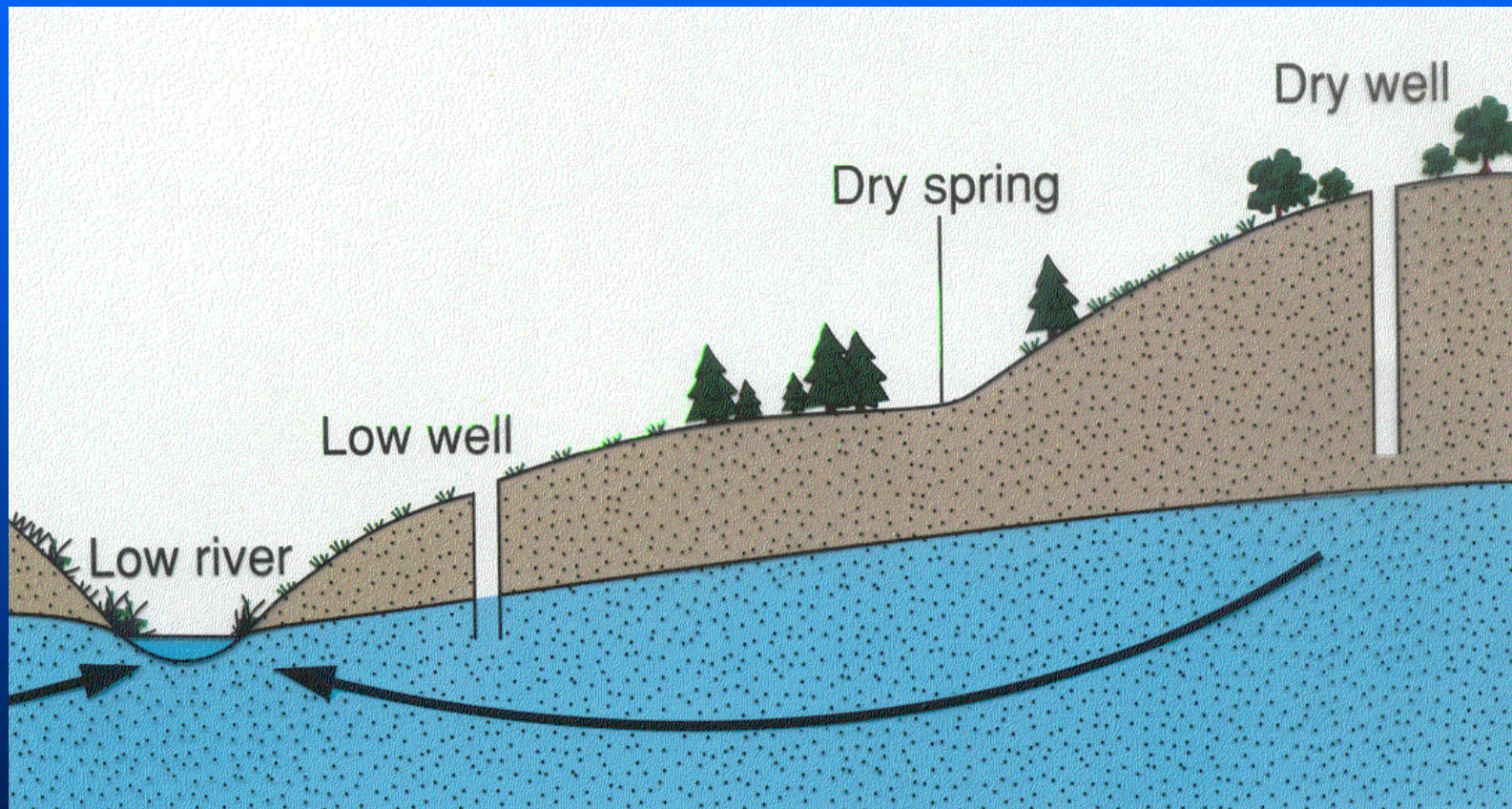


- Groundwater moves from areas of high elevation to areas of low elevation.
- How easily water travels underground is a function of the type of material that it is moving through.

OHA Drinking Water Services

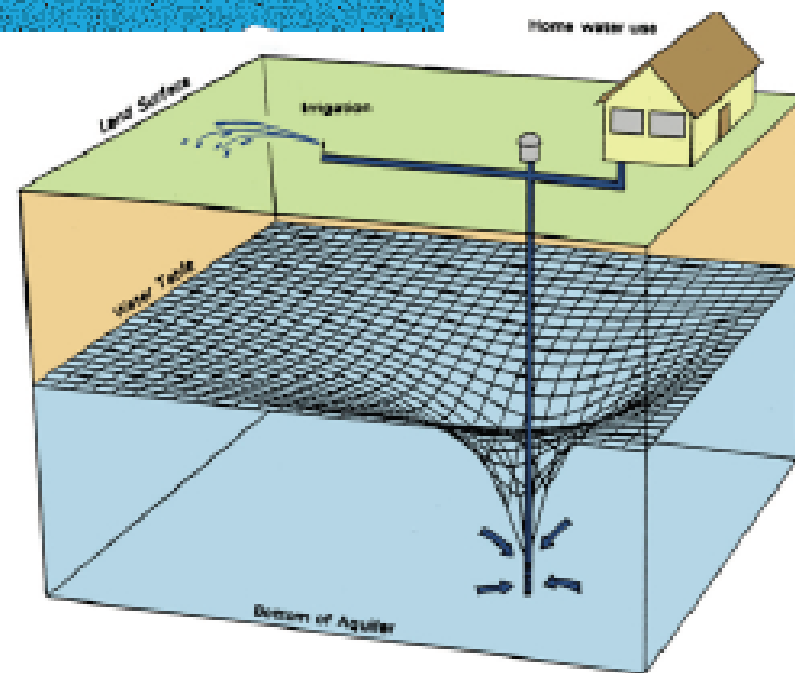
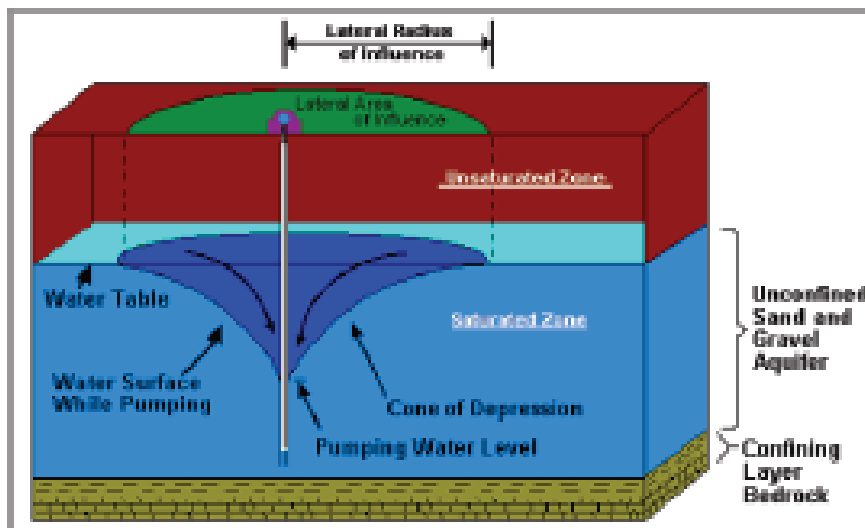
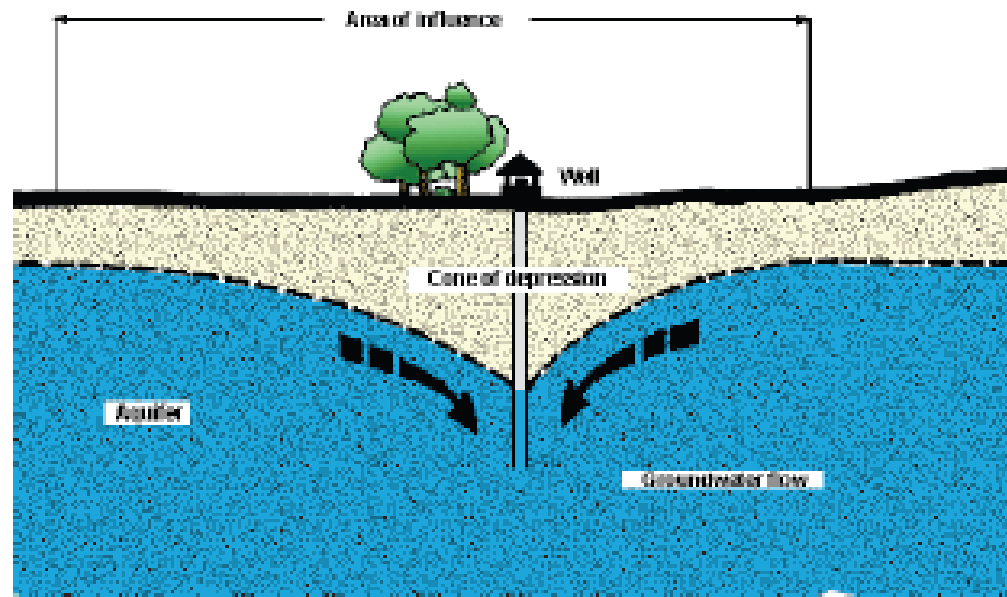
- Permeability: gravel > sand > clay

Groundwater Movement: Summer



Groundwater fall during the drier summer months.

- Additionally, the greater number of pumping of wells in the summer impacts groundwater levels of wells through drawdown.



Interfering Wells

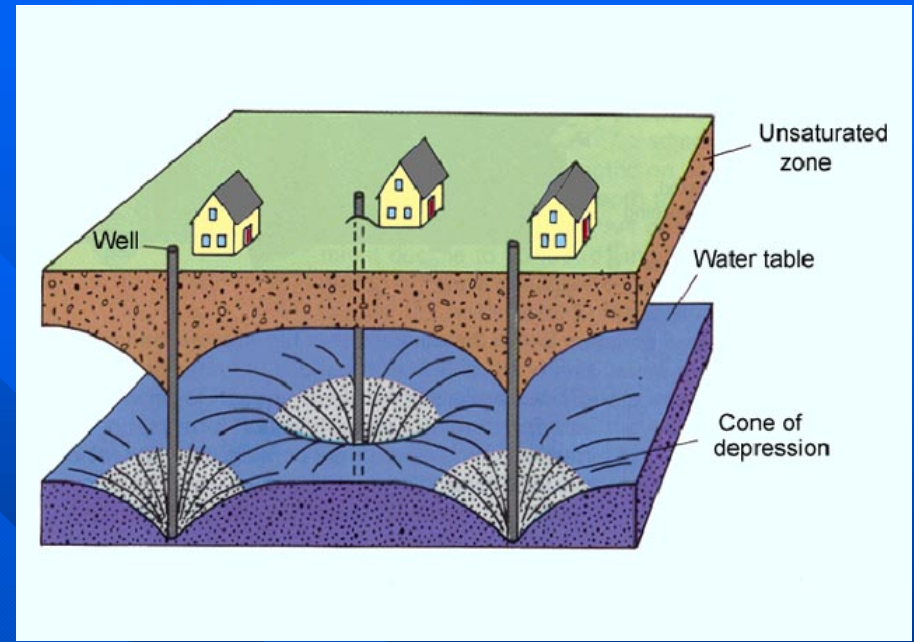
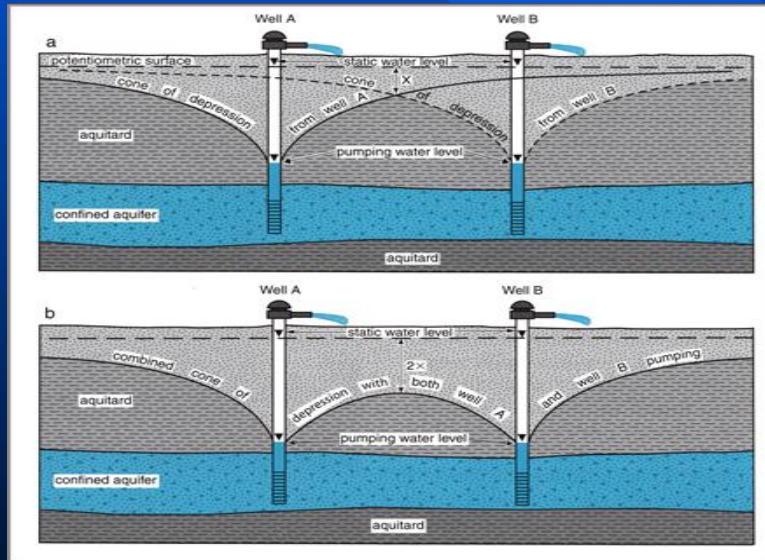
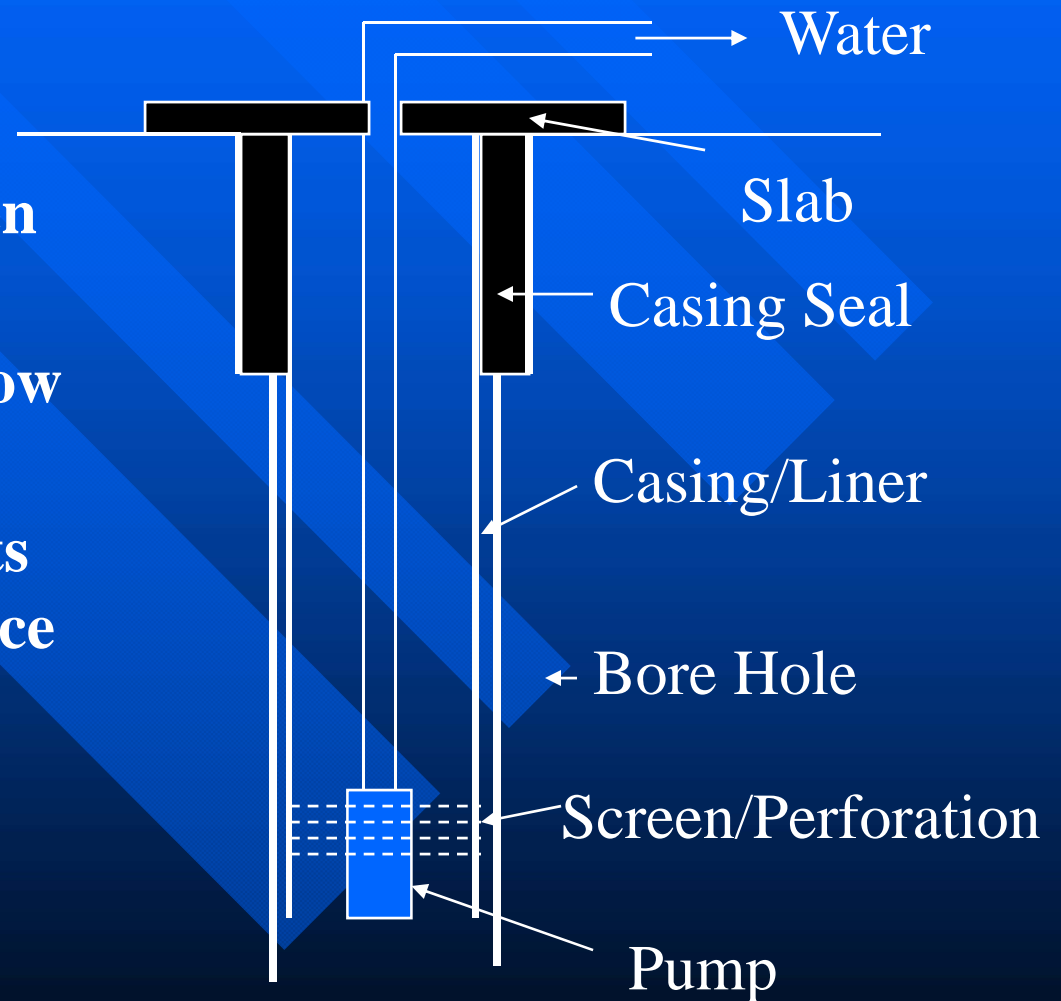


Image supplied by Mahometaquiferconsortium.org

Well Construction: Components

- **Bore Hole**
- **Casing:** holds hole open
- **Casing Seal:** Protects against inflow of shallow water
- **Concrete Slab:** protects against inflow of surface water
- **Screens/Perforations:** allow access of water



Well Construction

- If not constructed properly, wells can provide access to the aquifer of contaminants from the surface or near surface.
- The Oregon Water Resources Department (WRD) regulates the construction of water wells. WRD recognizes that DWP may have additional rules for public water systems.
- When a new well is proposed during plan review, the DWP evaluates well reports from the local area in order to make recommendations regarding well construction characteristics like placement of casing seals.

Well Log Data

OHA Data Online: <https://yourwater.oregon.gov>

Oregon Public Health
Drinking Water Data Online

Introduction :: [Data Search Options](#) :: [WS Name Look Up](#) :: [WS ID Look Up](#) :: [DWS Home](#) :: [Quick Data Links](#)

OR41 00504 MALIN MUNICIPAL WATER Classification: COMMUNITY

Contact: ROB GROUNDS Phone: 541-892-1572
PO BOX 61 County: KLAMATH
MALIN, OR 97632 Activity Status: ACTIVE -- History
Population: 805 Number of Connections: 307
Operating Period: January 1 to December 31 Regulating Agency: KLAMATH COUNTY
Certified Operator(s) Owner Type: LOCAL GOVERNMENT
Required: Y Licensed By: N/A
Distribution class: 1 Approved Drinking Water Protection Plan: No
Treatment class: None Source Water Assessment: Yes
Filtration Endorsement Required: No Last Survey Date: Jun 24, 2011

Sources

Facility ID	Facility Name - Well Logs	Activity Status	Availability	Source Type
EP-A	EP FOR WELLS #2 AND #5	A		GW
SRC-AB	WELL #2 - KLAM15096	A	Permanent	GW
SRC-AC	WELL #5 - L65624	A	Permanent	GW
EP-B	EP FOR WELL #3	I		GW
SRC-BA	WELL #3 - KLAM15097	I	Emergency	GW
EP-C	EP FOR WELL #4	I		GW
SRC-CA	WELL #4 - L29461	I	Emergency	GW

[Show Disconnected and Abandoned Sources](#)

Treatment

State ID	Facility Name	Treatment Process	Treatment Objective	Filter Type
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Consumer Confidence Reports (Last 5 Years)

For Year	Date Received	Date Certified
2013	Due 7/1/2014	
2012	Not received	Jun 27, 2013
2011	Not received	Jun 27, 2012

Groundwater/GWUDI Source Detail Page

SRC-AB: WELL #4

GW, Active, Permanent ---- Operating Period: Jan 1 - Dec 31
Disinfection: HYPOCHLORINATION, PRE ; RESID. MAINT. HYPOCHLORINATION

Sensitivity Analysis Data

Aquifer sensitivity:	High	Surface water within 500 feet:	No
Construction adequate?:	No - Seal Not Constructed Properly	Surface water type:	Unknown
<i>E. coli</i> sources within 2-year time-of-travel:	Yes	Data last updated:	02/13/2008

Monthly Assessment Monitoring Data

Monthly Assessment Monitoring Required? Completed

Monthly Schedule (Closed): 1 sample(s) per month to be taken beginning 01/01/2010 - 12/31/2010

	Jan	Mar	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
# Samples	0	0	2	1	1	1	1	1	1	0	1	1	10
TC+	-	-	0	0	0	0	0	0	0	-	0	0	0
<i>E. coli</i> +	-	-	0	0	0	0	0	0	0	-	0	0	0

Outcome/Determination: **Low Risk**

No historic GWUDI data were found.

[Back to top](#)

SRC-AF: WELL #9

GW, Active, Permanent ---- Operating Period: Jan 1 - Dec 31
Disinfection: HYPOCHLORINATION, PRE ; RESID. MAINT. HYPOCHLORINATION

Sensitivity Analysis Data

Aquifer sensitivity:	Moderate	Surface water within 500 feet:	No
Construction adequate?:	Yes	Surface water type:	Unknown
<i>E. coli</i> sources within 2-year time-of-travel:	Yes	Data last updated:	02/13/2008

Monthly Assessment Monitoring Data

Monthly Assessment Monitoring Required? No

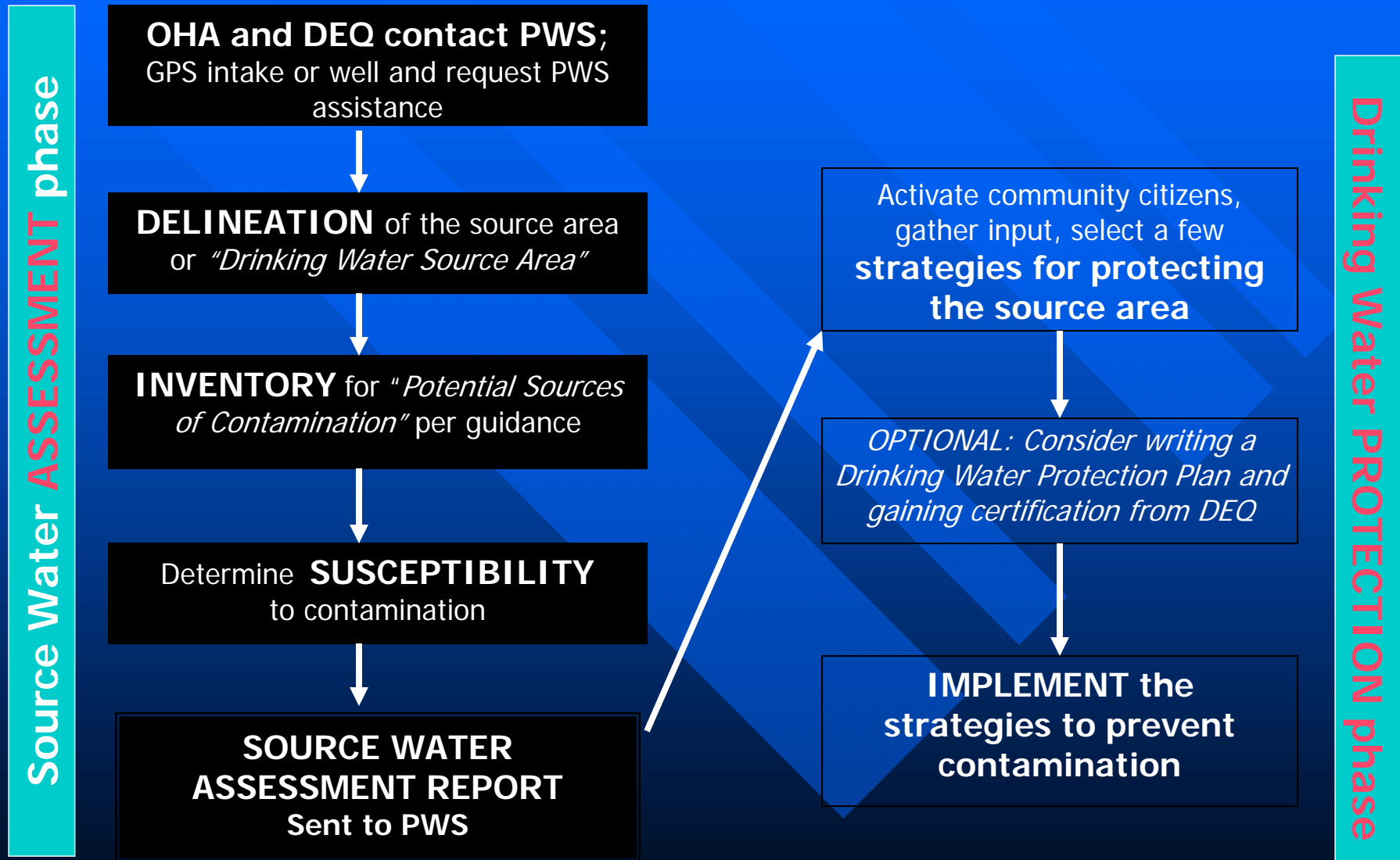
No monthly assessment monitoring schedule found.

No historic GWUDI data were found.

Source Water Assessments

*1996 Amendments to the Safe
Drinking Water Act*

Drinking Water Protection Process for Public Water Systems (PWS)



SOURCE WATER ASSESSMENT REPORT

Summary of Analysis

Water System Name

City, Oregon

County

PWS #41XXXXX

Date

Prepared By

Oregon Department of Human Services

Health Services

Drinking Water Program



And

Oregon Department of Environmental Quality

Water Quality Division

Drinking Water Protection



State of Oregon
Department of
Environmental
Quality

I

Value of Planning and Protection

- Protecting the current resource
 - Water quality – Multiple barrier approach
 - Sustainable supply for the future: Resource Adequacy
- Preserving public trust
- Protecting investment
- Protecting economic value: Property values
- Community Viability: Attracting new residents and businesses
- Avoiding costly treatment, M&O
- New regulations, emerging contaminants of concern

“Price Tag” of Contamination

- Lakewood Utilities in Marion County: population ~350
- February 1991: TCA, 1,1-DCE – MCL violation
- Initial Direct Costs covered by DEQ:
 - Water and soil analysis: \$120,000
 - Contractor field work: \$300,000
 - Treatment System: \$150,000
 - Total Initial Direct costs = ~\$1600/person
- Other Costs
 - Bottled Water: \$300-500/household/year
 - O & M of treatment unit: \$20/month/household

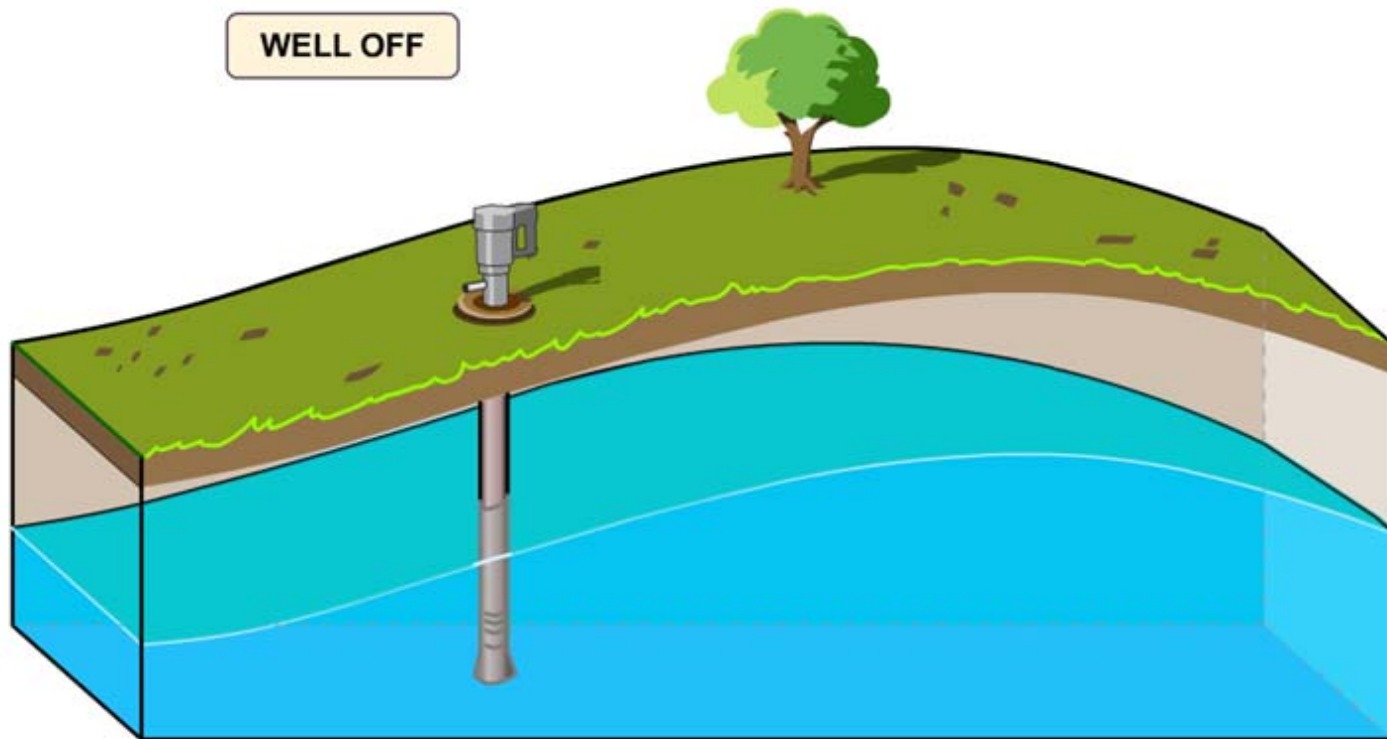
“Price Tag” of Contamination

- Indirect costs
 - Fear of unknown chemicals
 - Loss of trust in water system
 - Frustration in lengthy process
 - Noise/Appearance of treatment tower
 - Change in water quality
 - Negative press
 - Decrease in property values
- Some residents still use individual home treatment device in spite of successful system treatment unit
- “An ounce of prevention is worth a pound of cure”

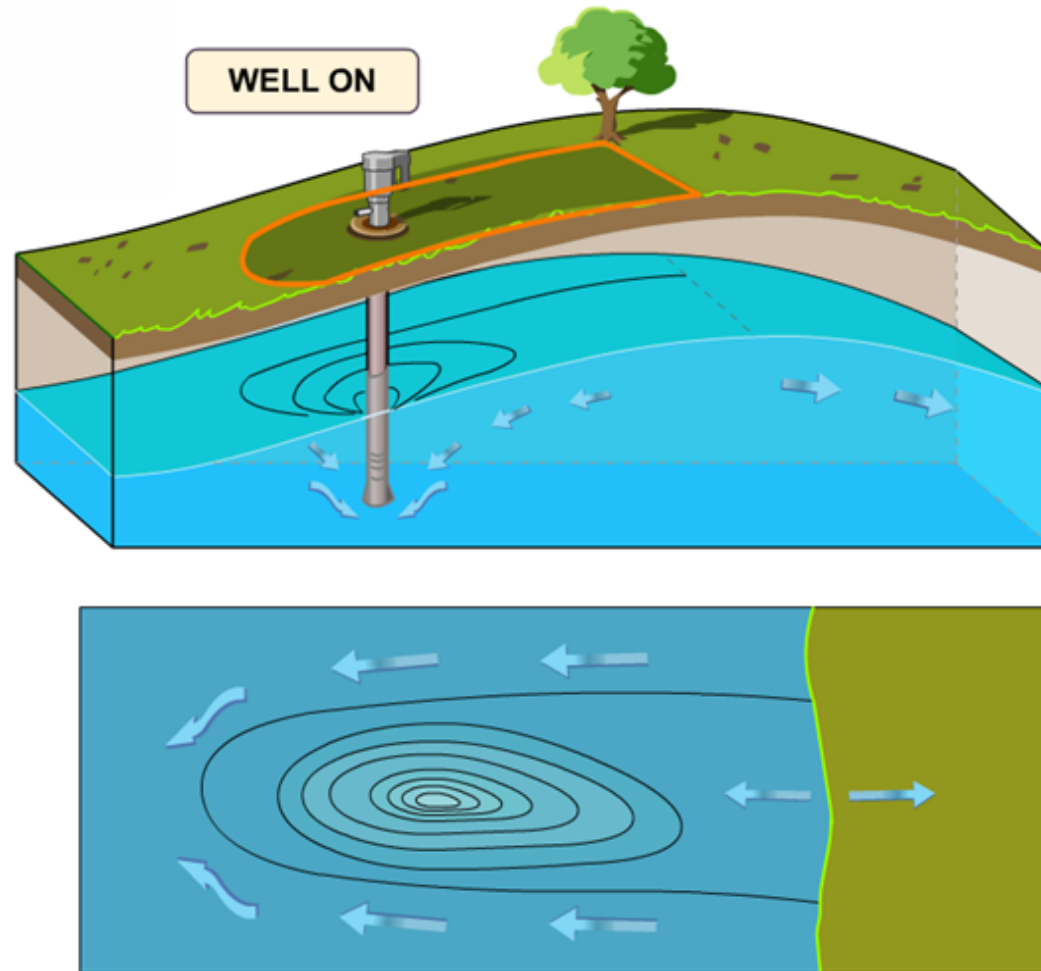
Source Water Assessments completed for all public water systems

- Groundwater: 948 systems statewide
- Surface Water: 154 systems statewide
- Each assessment unique to individual water system

Capture Zone

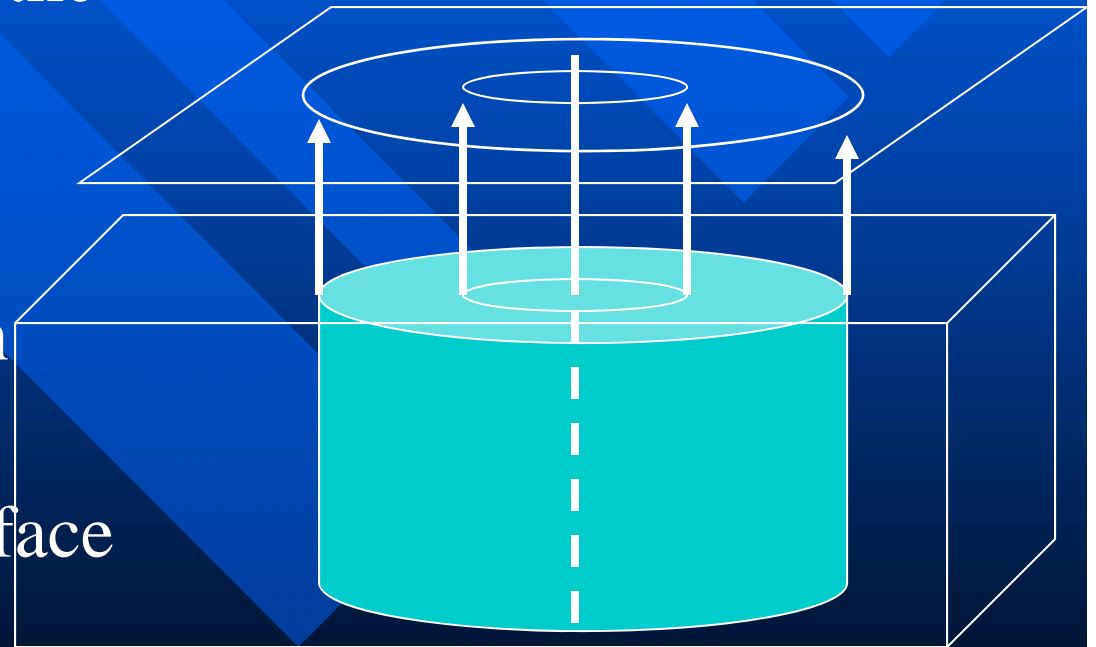


Capture Zone



Procedures for Delineation: Groundwater

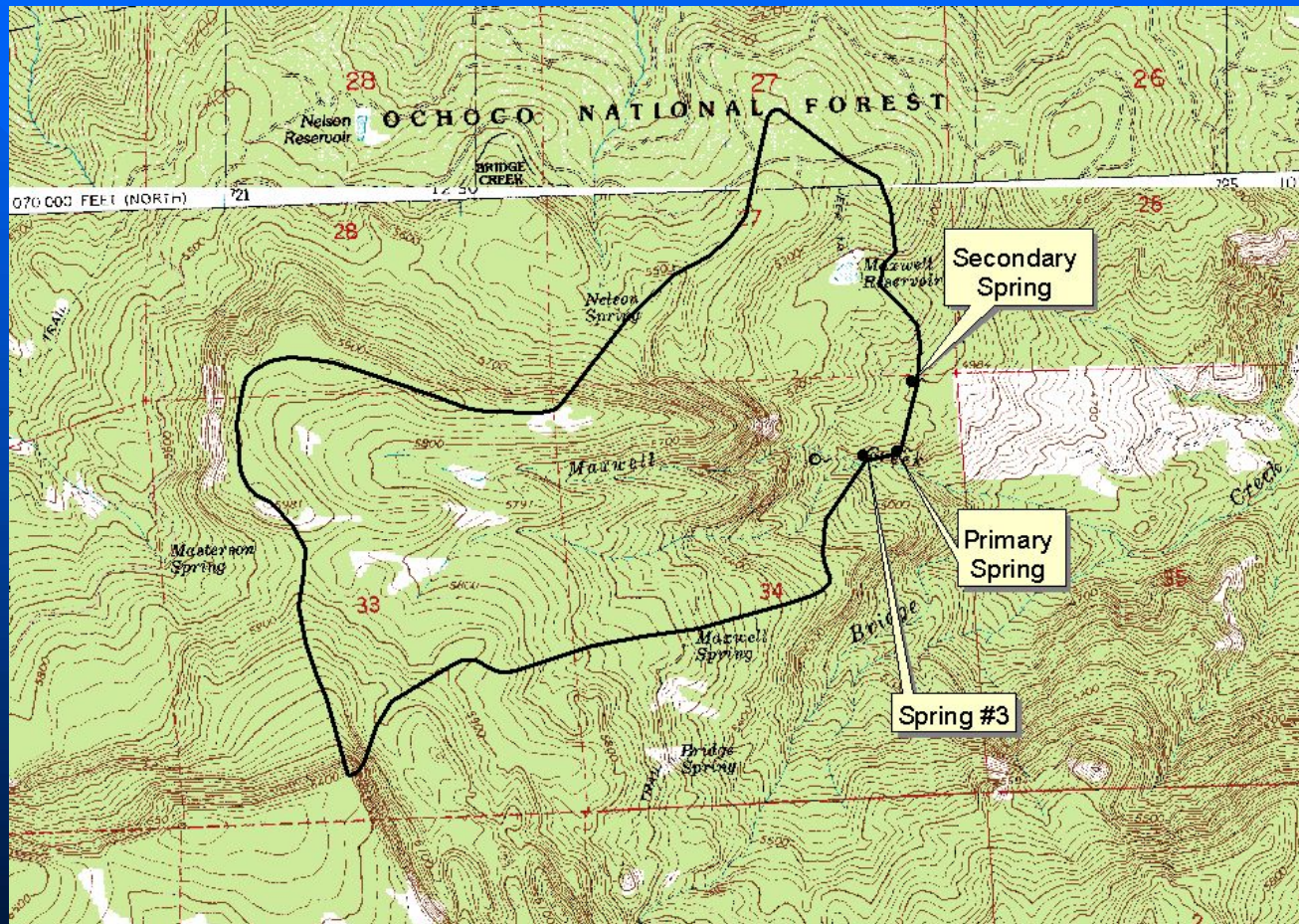
- Identify that part of the aquifer that supplies water to the well or spring
- Site-specific parameters
- Radius a function of time
- Project to the surface



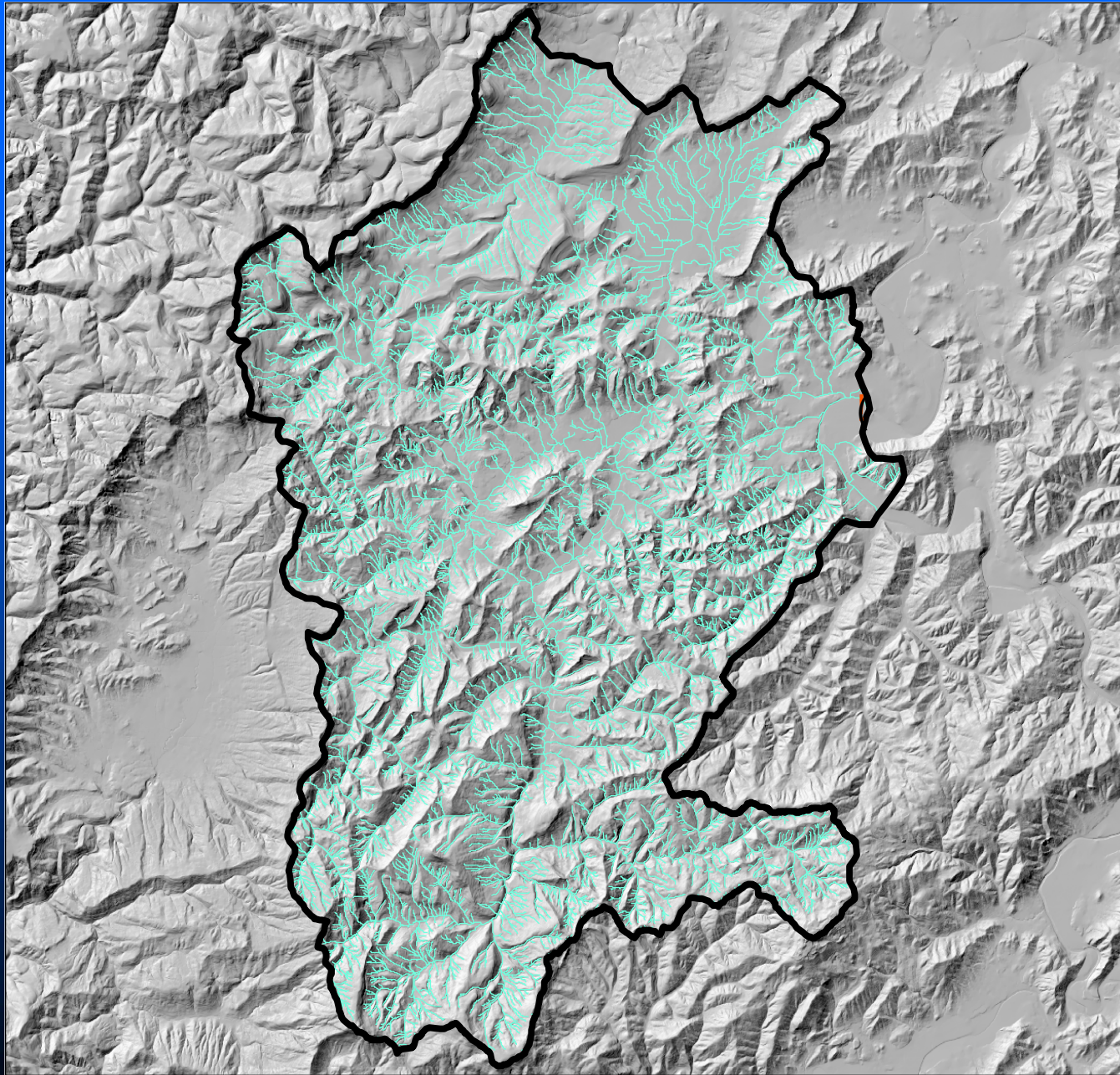
Groundwater DWSA



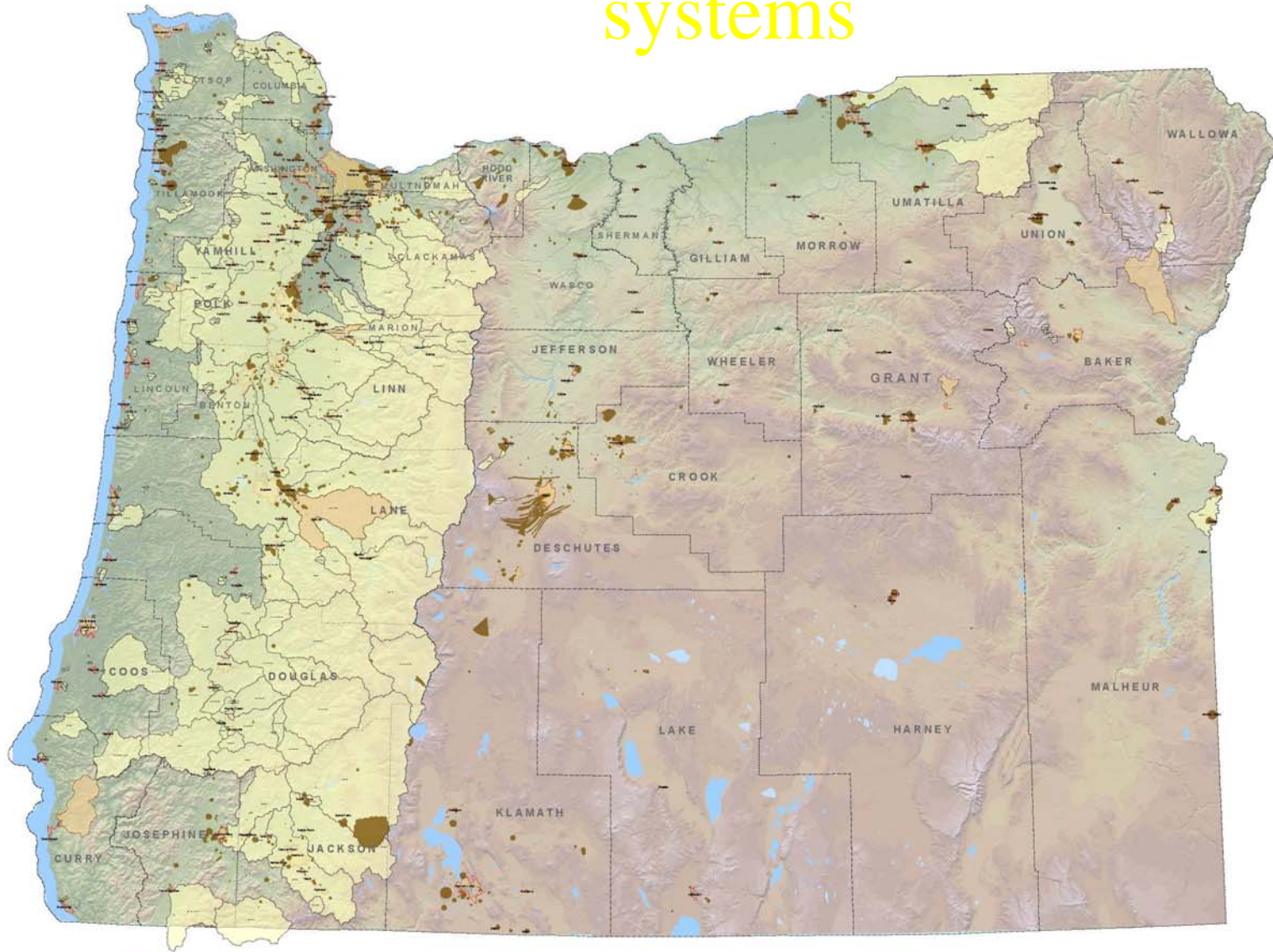
Hydrogeologic Mapping



Surface Water-DWSA



Oregon's source areas for public water systems



Groundwater Drinking Water Source Area Surface watershed for GWUDI system Surface Water DWSAs

SWA includes... List of potential sources of contaminants

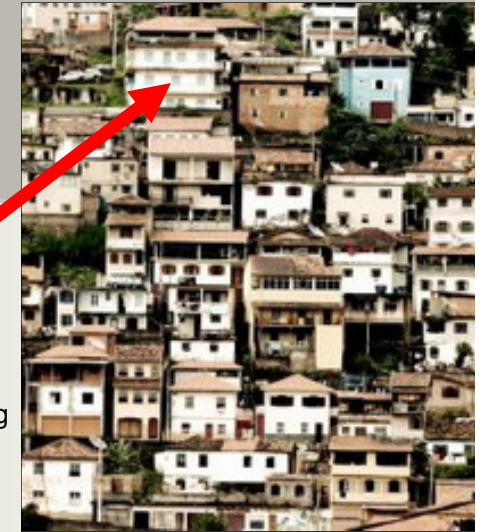
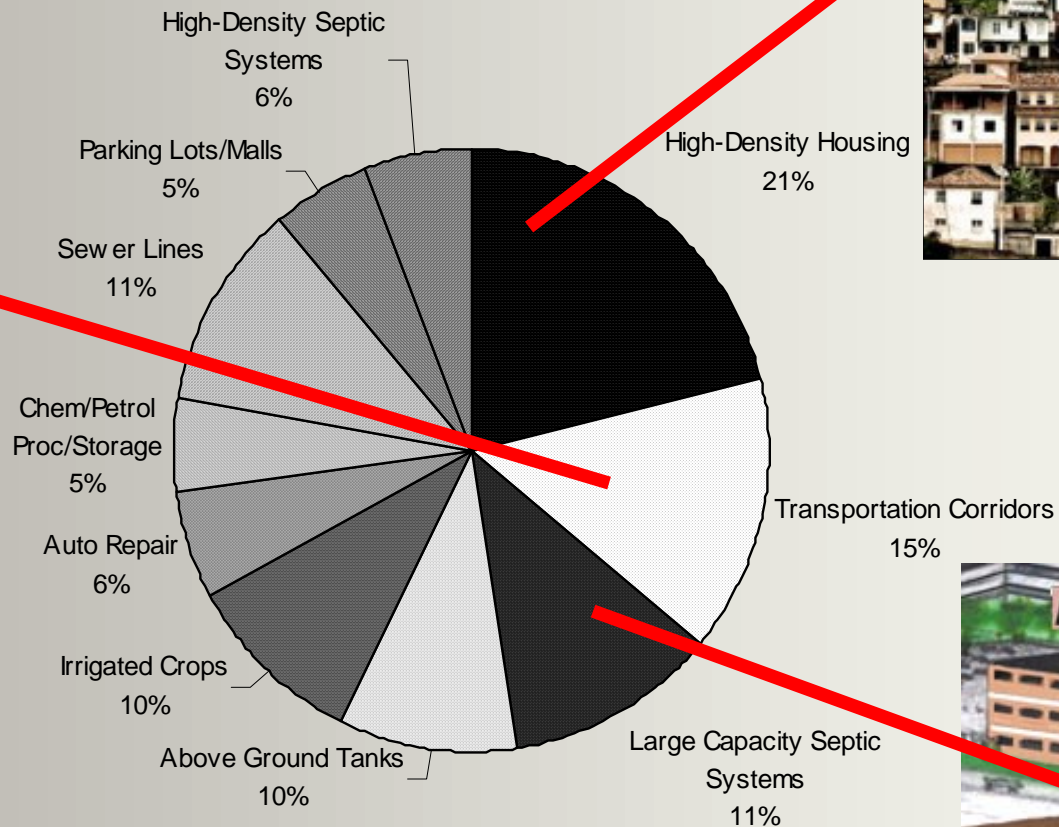
- Inventoried >100 types covering various land uses
- Identified >15,000 PCSs in source areas
- Access Database – readily accessible data



Oregon's SWA Inventory Results

Groundwater Systems

Highest Potential Risks in 2-yr TOT



SWA includes...

- Evaluation of sensitive areas within source area
 - Aquifer characteristics and ease with which water can move from the surface to the aquifer,
 - Chemical or coliform detections,
 - Well construction, and
 - Potential contaminant source inventory
- Recommendations for how to protect the water quality, but *no new requirements*

Source Water Assessments

Sensitive Areas (Natural Factors)

+

Contamination Risks

=

Susceptibility of the Drinking Water Source

Protecting The Source

The background of the slide features a gradient from light blue at the top to dark blue at the bottom. Overlaid on this are several thick, parallel diagonal stripes in a slightly darker shade of blue, running from the upper left towards the lower right.

Protecting the Source

What Steps Should We Take?

- Know where the Drinking Water Source Area is located.
 - Within city limits
 - Extends into the county
 - Rural/private land
- Identify who has jurisdiction/regulatory control?
 - City
 - County
 - Dept of Agriculture
 - US Forest Service / Oregon Forestry Dept

Protecting the Source

Developing Protection Strategies

- Use Source Water Assessment to identify high- and moderate- risks. Update list
 - Risk factors
 - Aquifer sensitivity
- Evaluate based on
 - Benefit achieved (risk reduction, economic factors)
 - Challenges (time, staff, cost)
 - Community buy in
 - Long-term plans
- Associate appropriate BMPs with each identified risk
- Implementation of BMPs through Local authority
 - Through land use planning process or through changes in City code

CHECKLIST: PLEASE RETURN TO DHS

Public Water System #4100909

Barlow Water District

Please trifold (see other side) and return to DHS upon completion of any actions

Land Use Type	Recommended Actions for Drinking Water Protection (check off any strategies you have completed)	Date Completed
Drinking Water Facilities	<ul style="list-style-type: none"><input type="checkbox"/> Verify that no chemicals are stored near the wellhead or spring, and that all backup fuel supplies have secondary containment.<input type="checkbox"/> Alert residents and businesses within your drinking water source area to opportunities to properly dispose of common hazardous wastes	
Housing - High Density	<ul style="list-style-type: none"><input type="checkbox"/> Notify residents of their location within your source area and communicate the information found in the fact sheets listed on backside of the Example Letter to Customers. Help educate them about pesticide and fertilizer use, and disposal of household hazardous wastes, pharmaceuticals, and pet waste.<input type="checkbox"/> Identify underground injection wells and dry wells for stormwater disposal. Verify permit status.<input type="checkbox"/> Review a stormwater management document and develop a program to address stormwater.	
Homes with Septic Systems	<ul style="list-style-type: none"><input type="checkbox"/> Notify residents that they are located within the Drinking Water Source Area and send fact sheets on septic system maintenance.<input type="checkbox"/> Ongoing education program on household hazardous waste and disposal of pharmaceuticals.<input type="checkbox"/> For residents with horses, send "Managing Small-acreage Horse Farms" fact sheet.<input type="checkbox"/> Work with local government to require septic inspections when property is transferred	
Crops (inc. orchards, vineyards, nurseries, greenhouses, Christmas trees, grains, grass seed, pasture)	<ul style="list-style-type: none"><input type="checkbox"/> Notify the owner(s) or operator(s) of their location within your Drinking Water Source Area and send fact sheets on "Managing Agricultural Fertilizer Application" and "Managing Large-Scale Application of Pesticides."<input type="checkbox"/> Encourage farm operator to work with their local Soil and Water Conservation District (SWCD) or Oregon State University County Extension Agent to develop a farm plan, if they have not done so already.<input type="checkbox"/> If this land covers a large percentage of your Drinking Water Source Area, notify your local SWCD of your Source Area location.<input type="checkbox"/> Identify and document any pesticides used to maintain site and areas applied.<input type="checkbox"/> Encourage growers to participate in local pesticide collection event for unused and legacy pesticides.	

Implementation Matrix: Prioritizing the Approach

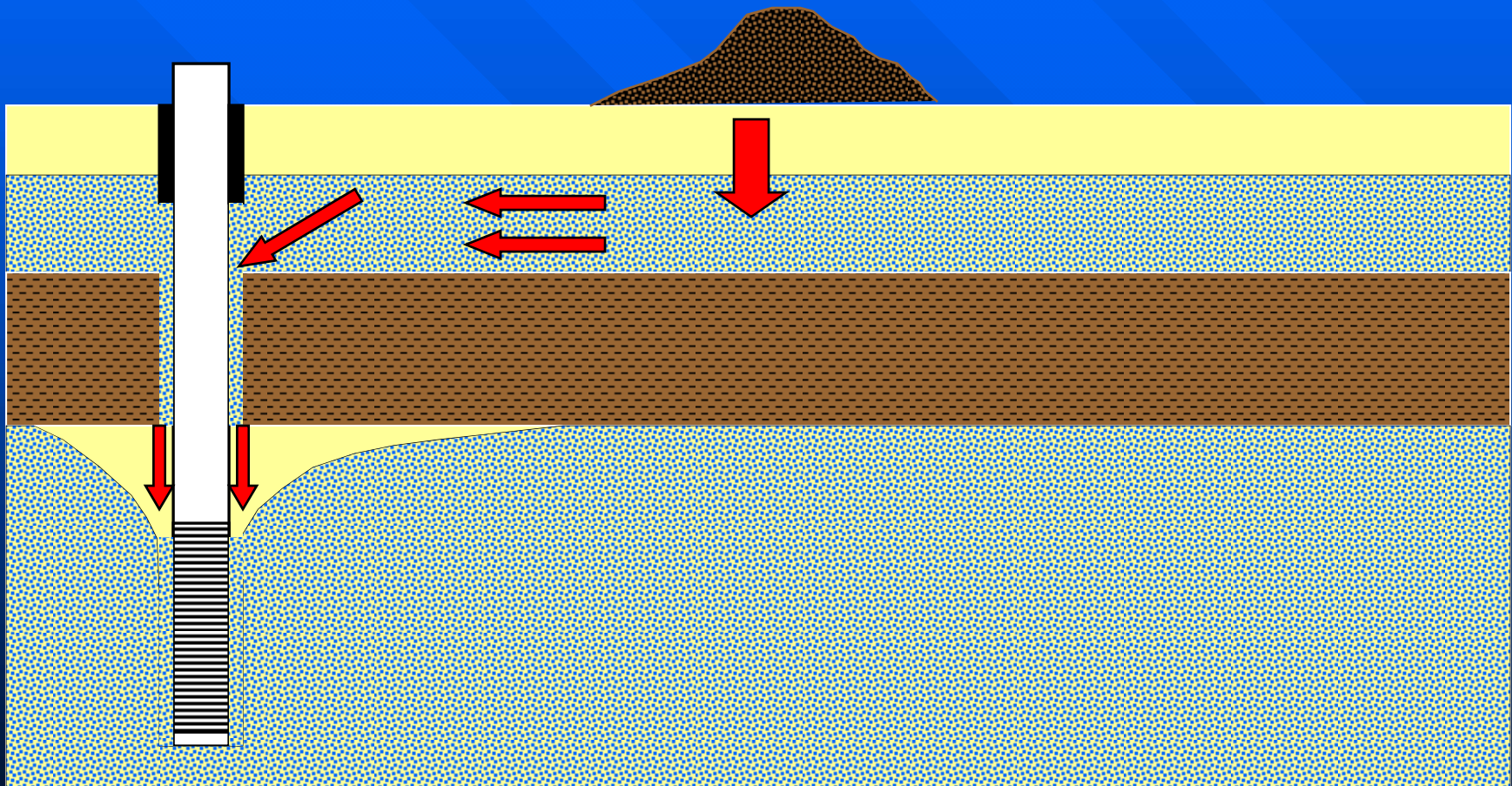
BMPs <i>Ease of Implementation</i>	BMPs for High Risk PCSs	BMPs for Mod Risk PCSs	BMPs for Low Risk PCSs
<i>Easy to do</i>	High Risk PCS BMP Easy to do		
<i>Mod difficult to do</i>			
<i>Difficult to do</i>			Low Risk PCS BMP Hard to do

Examples of Drinking Water Protection Strategies

- public awareness – news features, sign installation
- incorporate pollution prevention concepts and BMPs for high-risk locations
- household hazardous waste education/collection
- community/watershed spill response plans
- local zoning ordinances
- easements in sensitive areas – agriculture/forestry
- septic system outreach/maintenance program
- technical training for high risk facilities' employees
- County overlay; early notification re: changes

Linking Source Water
Protection with Groundwater
Rule and GWUDI

Inadequately Constructed Well Susceptible to Fecal Contamination



Monthly Assessment Monitoring

- Monthly tracking of samples
 - Schedules now available on SDWIS on-line
 - Violations to be issued for not sampling starting in 2011

The screenshot shows a web browser window displaying the Oregon Department of Human Services (DHS) website. The page title is "Drinking Water Program" and the URL is "http://170.104.63.9/schedulescoliform.php?pwino=90751". The page content includes the following information:

BAKER CO PKs - HEWITT
PWS #: 90751 System Status: Active System Type: NC Population: 100

Current Open Coliform Sample Schedule
(subject to change based upon future test results)
DIST-A: 1 Routine sample(s) per Quarter to be taken beginning 10/01/2010 -
GWR: SRC-AB: 1 Routine sample(s) per Month to be taken beginning 01/01/2010 -

(A begin date of 01/01/1991 indicates the year the Total Coliform Rule was established)

Community and Non-transient Non-community water systems that use chlorine or chloramines must measure the [residual disinfectant level](#) at the same points in the distribution system and at the same time when total coliforms are sampled.

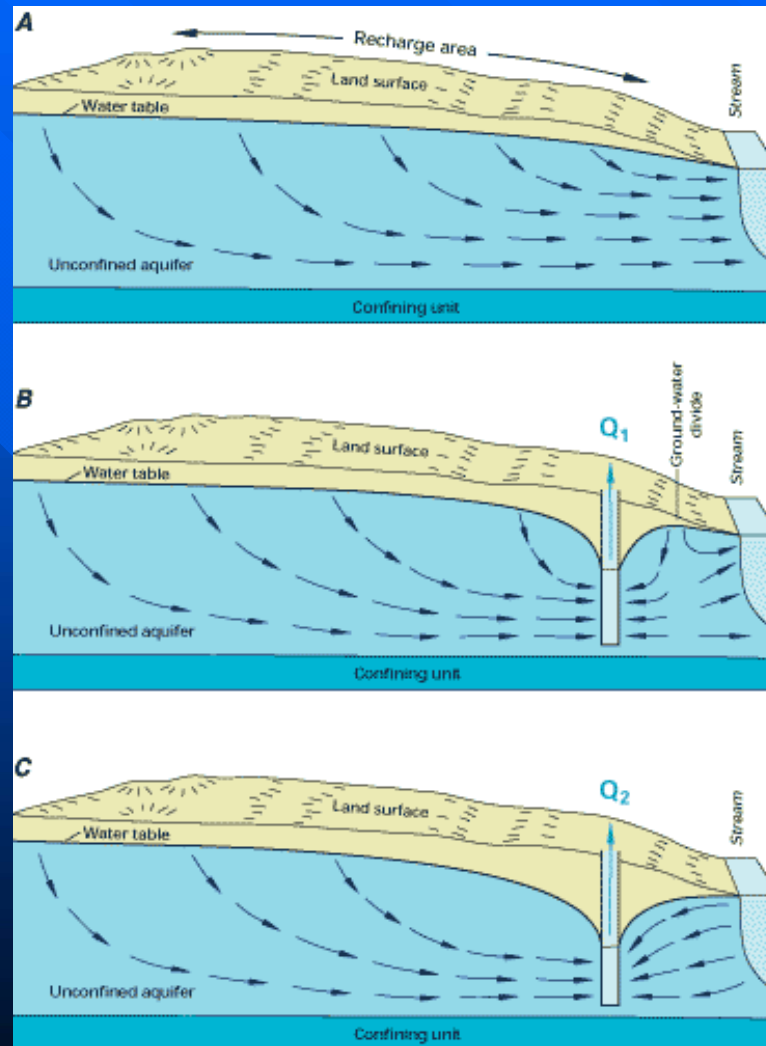
Repeat, Temporary Routine, and Prior Coliform Sample Schedules

- 5 Temporary Routine sample(s) per Month to be taken 09/01/2010 - 09/30/2010 at DIST-A
- 4 Repeat sample(s) within 24 hours of a TC+ Routine Sample to be reported 08/26/2010 - 09/09/2010 at DIST-A
- GWR: 1 Triggered sample(s) to be taken 08/25/2010 - 09/08/2010 at SRC-AB WELL L69756
- 1 Routine sample(s) per Quarter to be taken 10/01/2008 - 08/31/2010 at DIST-A
- 5 Temporary Routine sample(s) per Month to be taken 09/01/2008 - 09/30/2008 at DIST-A
- 4 Repeat sample(s) within 24 hours of a TC+ Routine Sample to be reported 08/29/2008 - 09/12/2008 at DIST-A
- 5 Temporary Routine sample(s) per Month to be taken 08/01/2008 - 08/31/2008 at DIST-A
- 4 Repeat sample(s) within 24 hours of a TC+ Routine Sample to be reported 08/05/2008 - 08/19/2008 at DIST-A

The Source Has a Confirmed EC+ result. What Next?

- Assessment monitoring for that specific source can stop.
 - If your water system has multiple sources on assessment monitoring, the other sources must continue with assessment monitoring.
- Regional Hydrogeologist will review the SWA results and determine:
 - If GWUDI Coordinator should review results for possible MPA test
 - If there are well construction issues that suggest that the groundwater source should be repaired or replaced.
- If needed, the GWUDI Coordinator will contact you regarding MPA testing requirements.
- Communicate with your County/State Health Dept contact

Pumping Wells Close to Streams

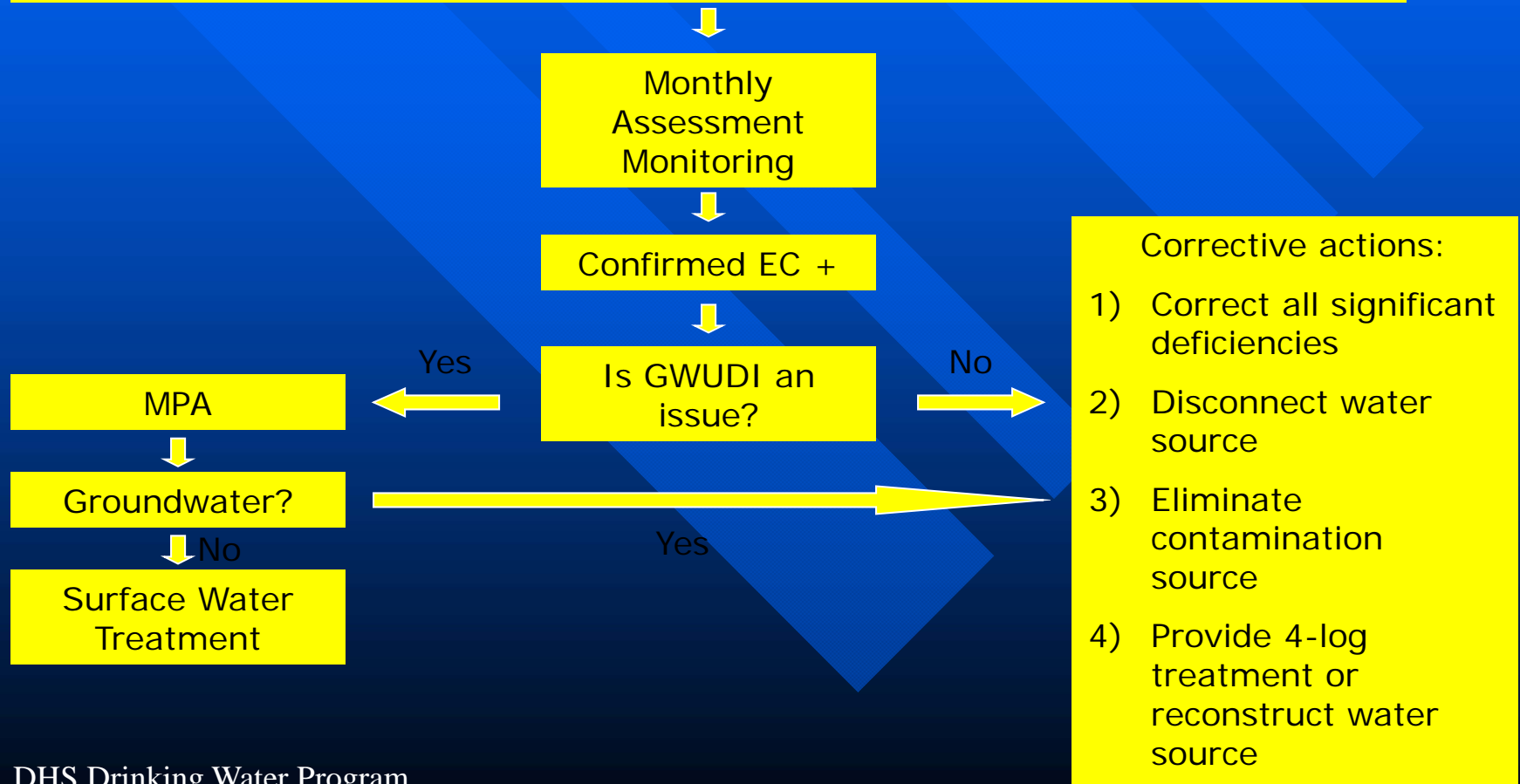


Groundwater Under the Influence of Surface Water

- Water system vulnerable to microorganisms such as *Giardia lamblia* or *Cryptosporidium*.
- Protocol for determination:
 - Hydrogeologic Assessment (SWA)
 - Assessment monitoring - year-long collection of raw water coliform data (if needed): confirmed fecal coliform?
 - Microscopic Particulate Analysis (if needed)
- If source determined to be GWUDI, then must treat as a surface water source or take other corrective action.
- Contact Russ Kazmierczak for more details
 - (541) 726-2587 x26

Monthly Assessment Monitoring for GW Rule

Wells and Springs identified as susceptible to fecal contamination.
High sensitivity & fecal contaminant source (includes surface water) within 2-yr
TOT Zone.



Protecting the Source

SDWA grant opportunities

- Apply with simple form to DHS
- \$30,000 per PWS, per year, maximum
- Selection based on risks, reduction, etc.
- Examples of eligible projects:
 - Drug take-back projects
 - Pesticide use / application rate reduction workshops, etc
 - Household hazardous waste collection events
 - Workshops promoting alternative nonhazardous products
 - Abandonment of nearby unused private wells
 - Reforestation / replanting of sensitive riparian areas
 - Installation of signs / fencing of sensitive protection areas
 - Decommissioning septic systems & installation of sewer hookups
- If applying for infrastructure loans, having implemented protection strategies will give you more points (but, we must be aware of it!)

Protecting the Source

Technical Assistance & Information

■ Technical Assistance ■ Information

Groundwater

Insert Regional Hydrogeologist
OHA Drinking Water Services
(541) 726-2587 x??
XXX.XXXX@state.or.us

Surface Water

Sheree Stewart
DEQ Drinking Water Protection
(503) 229-5413
Stewart.sheree@deq.state.or.us

- <http://public.health.oregon.gov/HealthyEnvironments/DrinkingWater/SourceWater/Pages/swp.aspx>
 - » Drinking Water Protection Bulletins
 - » Fact sheets

- <http://www.deq.state.or.us/wq/dwp/dwp.htm>
 - » Management strategies for specific land uses
 - » Fact sheets
 - » GIS resources

Summary

- Water resources are scarce. A decline in water quality can reduce the quantity of water available locally.
- Source Water Assessment Reports help identify potential threats to drinking water quality.
- The goal of Drinking Water Protection is to reduce the risk of contamination, not necessarily eliminate it
- DEQ/OHA can help public water systems prioritize their protection efforts and identify specific strategies
- Drinking Water Protection in Oregon is voluntary but is necessary in order to protect existing and future drinking water sources.

Implementation Exercise

1. Open SWA Report (see Table of Contents for pg #): Review Table 4.1 Aquifer Sensitivity Analysis and Table 4.2 Well Construction Sensitivity Analysis
2. Review Table 2 Inventory Results located in Appendix. Note BMP section.
3. Complete BMP Matrix for each of the PCSs.
4. Discuss completion of the matrix.
 - Are the BMPs easy to do, moderate or hard to complete?
5. Complete Recommended Actions List
6. Complete Sign-up Sheet or Call for Additional Technical Assistance
 - Provide Guidance
 - Copies of Fact Sheets

Implementation Exercise

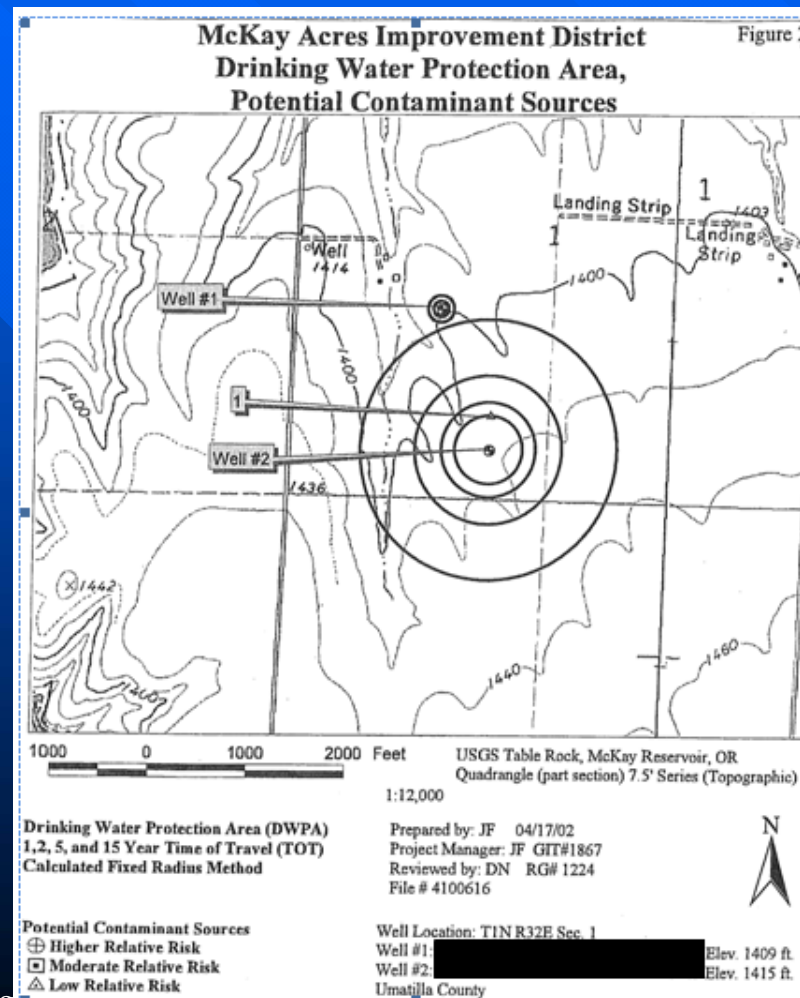
1. Open the Source Water Assessment Report and turn to Table 2. Inventory Result, near the end of the report, located in Appendix (see below for example).
2. Select a high relative risk PCS in the 2 year Time of Travel (TOT), see example below. Select a lower risk PCS if none in the 2 yr TOT and/or move out to the next TOT if no PCSs in the 2 yr TOT.

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (2)	Potential Impacts	Comments
1	Homesteads - Rural - Septic Systems (< 1/acre)	Rural homesteads on septic	Throughout DWPA	Pandleton	Field-Observation Interview	Within the 2-yr TOT.	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.	

Implementation Exercise

3. Example of the Potential Contaminate Source Map showing TOT zones, PCSs and well locations



Implementation Exercise

- Using handout, review initial/substantial implementation Best Management Practices (BMPs) for each PCS identified in Table 2.

ACTIVITY	All_BMPs	Initial Implementation	Substantial Implementation	FactSheetLinks	PCS Code	Pot_Impact
Homesteads - Rural - Septic Systems (< 1/acre)	<ul style="list-style-type: none"> □ Notify the residents of their location within your Drinking Water Source Area and send the following fact sheets: **"Groundwater Basics" **"Managing Septic Systems to Prevent Contamination of Drinking Water" **"What is Household Hazardous Waste" **Hea 		<ul style="list-style-type: none"> □ Notify the residents of their location within your Drinking Water Source Area and send the following fact sheets: **"Groundwater Basics" **"Managing Septic Systems to Prevent Contamination of Drinking Water" **"What is Household Hazardous Waste" **Hea 	Groundwater Basics: http://www.deq.state.or.us/wq/pubs/factsheets/drinkingwater/gwbasics.pdf Healthy Lawns, Healthy Families: http://www.healthylawns.org/how/print.pdf Managing Septic Systems: http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_septi	M09	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.

Implementation Exercise

- Complete Best Management Practices (BMPs) Implementation Matrix for each of the PCSs listed in Table 2 (see above for example).

PWS Name: McKay Acres Improvement District PWS ID# 4100616			
Implementation Impact/Benefit based on Relative Risk Level of the Potential Contaminant Source (PCS). For use with Table 2 in the Appendix of the SWA Report and the Recommended Actions Checklist			
Ease of Implementation*	BMPs for High Risk PCSs	BMPs for Moderate Risk PCSs	BMPs for Low Risk PCSs
Easy to do			<ul style="list-style-type: none"> □ Notify the residents of their location within your Drinking Water Source Area and send the following fact sheets: <ul style="list-style-type: none"> ***Groundwater Basics** ***Managing Septic Systems to Prevent Contamination of Drinking Water** ***What is Household Hazardous Waste** ***Healthy Lawns, Healthy Families** ***Recycle Used Motor Oil** ***Drinking Water Protection for shallow injection well owners & operators** ***Twelve Simple Things You Can Do to Protect Your Well Water**
Moderately difficult to do			
Difficult to do			

Implementation Exercise

6. Discuss completion of the matrix.
 - » Are there any BMPs that are “easy to do” that would have a “High” impact?
 - » Are there any BMPs that are “difficult to do” that would have a “Low” impact?
 - » Which BMPs would you try to implement first? Which ones last or not at all?
7. Post Class Implementation: Repeat the exercise above for the remaining PCSs listed in the Source Water Assessment and after the PCSs have been addressed and BMPs implemented (that means provided to the owner of the PCS and used by the owner of the PCS), please send a completed copy of the Checklist to OHA (see example below and included in the handouts).

Address to:
Russell Kazmierczak
Drinking Water Program
444 A Street
Springfield, OR 97477

Implementation Exercise

Example Checklist

CHECKLIST: PLEASE RETURN TO OHA

Public Water System #4100416

PWS: MCKAY ACRES IMPROVEMENT DISTRICT

Please trifold (see other side) and return to OHA upon completion of any actions

Land Use Type	Recommended Actions for Drinking Water Protection (check off any strategies you have completed)	Date Completed
Rural Homes and Septic Systems	<p><input checked="" type="checkbox"/> Notify residents that they are located within the Drinking Water Source Area and send appropriate fact sheets as suggested on page 2 of example letter to customers.</p> <p><input checked="" type="checkbox"/> Ongoing education program on household hazardous waste and disposal of pharmaceuticals.</p> <p><input type="checkbox"/> For residents with horses, send "Managing Small-acreage Horse Farms" fact sheet.</p> <p><input checked="" type="checkbox"/> Work with local government to require septic inspections when property is transferred</p>	<p>Initials and Date Completed</p>
Wells - Abandoned	<p><input type="checkbox"/> Notify the well owners of proper well abandonment procedures and send the Water Resources Department's brochure: "A consumer's guide to Water Well Construction, Maintenance, And Abandonment."</p> <p><input type="checkbox"/> Provide financial incentives for permanent well abandonment according to the Water Resources Department's "A consumer's guide to Water Well Construction, Maintenance, And Abandonment."</p> <p><input type="checkbox"/> Verify proper well abandonment. Provided well construction is adequate, temporary abandonment will be protective of groundwater. Contact OHA Staff for assistance, and provide well log</p>	

Eastern Region Geologist

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OHA Drinking Water Program

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