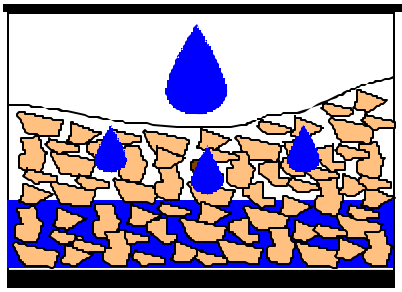

Washington State Interagency Ground Water Committee

Ground Water in Washington State

March 1997
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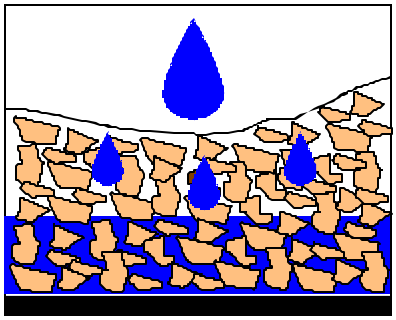

Washington State Interagency Ground Water Committee

Ground Water in Washington State

Prepared By:

Washington State Department of Ecology
In Cooperation With The
Washington State Interagency Ground Water Committee

March 1997
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Document Coordinators:

Diane T. Dent-White
Donna Lynch

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Preface

This report on Washington's ground water includes a summary of who uses Washington's ground water, what practices can potentially affect ground water, and what measures are being used to reduce the probability of contamination reaching the ground water. The report is not intended to provide a comprehensive or technical analysis of the condition of Washington's ground water.

Many people provided the information for this report. Thanks go to the staff of the following agencies, as well as the staff in many local governments, tribes and public interest groups who work to protect one of Washington State's greatest resources:

The Washington Department of Ecology's Spill Response Team (Central Programs), Toxics Cleanup Program, Hazardous Waste Program, Administrative Services Division/Information Services, Education and Public Information Office, Shorelands and Water Resources Program, and Water Quality Program; Washington Department of Health's Drinking Water and Environmental Health Sections; Washington Conservation Commission; Washington Department of Agriculture; Washington State University Cooperative Extension; United States Geological Survey; and U.S. Environmental Protection Agency.

Diane T. Dent-White
Washington Department of Ecology
Interagency Ground Water Committee

Introduction

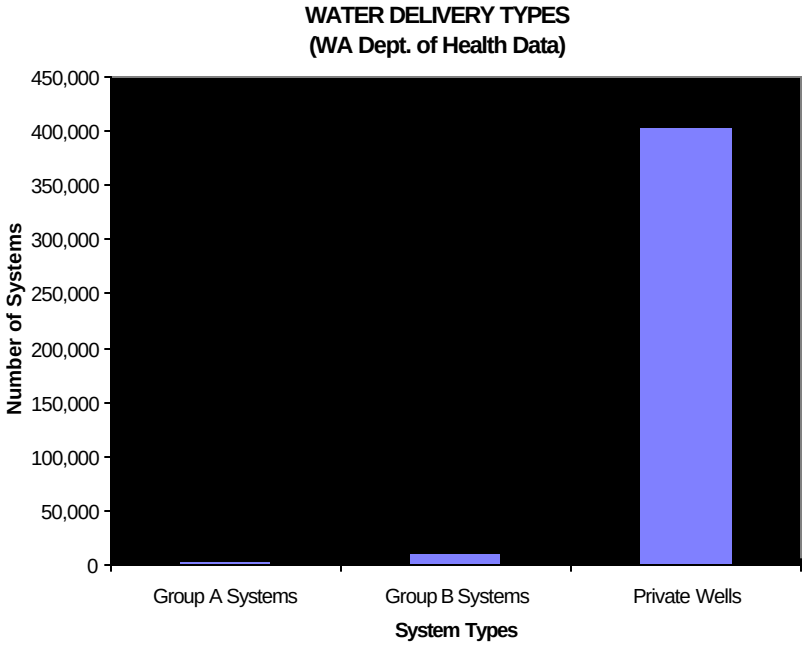
Ground water is any water that is *underground*. The ground water referred to in this document, however, is not an underground lake, river, or stream. It is the water found in the spaces between the grains of rock, or "interstices," within rock layers that lie between the surface layers and bedrock. Hydrogeologists call this layer the **saturated zone**. An **aquifer** is a layer of rock whose interstices contain water (a "water-bearing" layer) in a sufficient quantity for use.

Percolation of water from the land surface, through the upper layers, to the saturated zone replenishes the ground water ("recharge"). Without recharge any water system dependent upon ground water would soon run out. When the water moves through the surface layers to the saturated zone, it can carry excess nutrients, pesticides, petroleum and other contaminants from the surface and overlying layers. Once these materials reach the saturated zone, ground water contamination occurs. Once contamination occurs it is difficult, as well as expensive, to remedy.

Washington State's **antidegradation policy** promotes protection of the state's ground waters and the natural environment. The policy is based on the water pollution control act (Chapter 90.48 of the Revised Code of Washington [RCW]) and the Water Resources Act (Chapter 90.54 RCW). It is implemented in the ground water quality standards (Chapter 173-200 of the Washington Administrative Code, or WAC). The purpose of the antidegradation policy is to maintain and protect ground water quality for existing and future beneficial uses. The policy preserves background water quality (the quality of the water before human influence), and prevents ground water quality from being degraded past certain levels, or **criteria**. Criteria are concentration levels of contamination in the state's ground waters which cannot be exceeded.

Proper protection and management will keep good, useable ground water available to the citizens of Washington State for years to come.

Who Uses Ground Water?



Ground water is the primary drinking water source of many communities around the state of Washington. More than 60 percent of the state's population uses ground water. Approximately 95 percent of public water supply systems use ground water as their source.

Public water supply:

A **public water supply** system (PWS) is a system providing piped water for human consumption. It includes any collection or pre-treatment facilities used in water delivery. The federal Safe Drinking Water Act (SDWA) standards require that a PWS have a minimum of 15 service connections or regularly serve at least 25 people. Washington State classifies its PWS systems according to the population served and size [WAC 246-290-020 (3)].

Group A systems are those serving 25 or more people, 15 or more connections, for 60 or more days per year. Washington further sub-divides its group a systems according to the type of groups served:

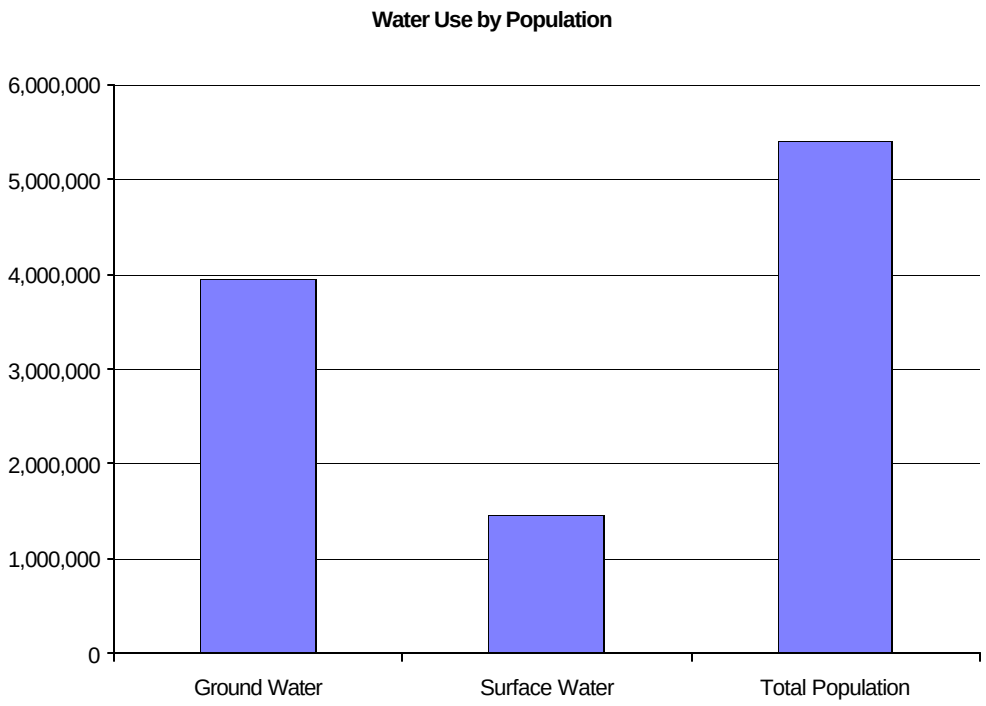
- Transient non-community (PWS is not the primary drinking water supply, e.g., RV camp ground, restaurant, motel);
- Non-transient non-community (PWS is a significant, but not primary drinking water supply, e.g., school, work place); and
- Community (PWS is the primary supply).

In Washington State, there are approximately 13,908 ground water dependent-drinking water systems:

Group A PWS systems - 3,939
** community = 2,140*
** non-transient non-community = 285*
** transient non-community = 1,514*

Group B systems - 9,969

- WA Dept. of Health data



(in reference to the above chart: some PWS have both surface and ground water sources of supply. Some PWS which have wells as their primary source also purchase water from systems that use surface water as the source water. For this report, they are included as ground water systems.)

As of August 1995 there were an estimated 404,000 single family domestic wells, serving approximately one million people.

- WA Dept. of Health data

Group B systems are smaller PWS that serve less than 25 persons or 15 connections.

Single family domestic wells provide the principal source of drinking water to approximately one million Washington residents. These wells are typically shallow and easily contaminated.

Ground water is also used for household, stock watering, industrial (e.g., non-contact cooling water), hydropower, commercial, irrigated agriculture, mining, and other purposes.

Ground water also supplies water to many streams and rivers, especially during the dry part of the year ("base flow"). Base flow is important for the preservation of wildlife, fish, scenic, aesthetic, and other environmental and navigational values in streams and rivers. Ground water may also help to regulate in-stream temperatures.

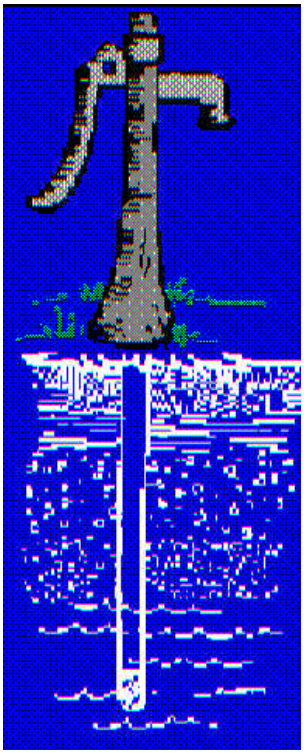
What Affects Ground Water?

What Is Being Done to Protect It?

Problem: How Wells Can Affect Ground Water

Drilling wells provides access to ground water. Wells also serve other purposes.

Establishing a well can create an open pathway from the ground's surface to the water table, if not properly constructed. Contaminants from the surface may reach the ground water from improperly sealed or improperly decommissioned (closed) wells. For example, some water wells are large, open, dug pits that are a physical danger to humans and animals who may fall into them.



Injection wells introduce fluids (any flowing matter, regardless of whether it is in a semisolid, liquid, sludge, or gaseous state) into the ground. The fluid may be beneficial (e.g. ground water recharge) or harmful (e.g. hazardous waste).

Solution: What's Being Done To Protect Ground Water From Contamination By Wells

Before construction, the Washington Department of Ecology requires notification by the property owner of intent to establish a well. Well construction regulations (Chapter 173-160 WAC, Minimum Standards For Construction and Maintenance of Wells), administered by Ecology, require wells to be sealed on the outside of the casing. Also, wells must be securely capped. This prevents contaminants from the ground's surface from reaching the ground water. There is a state-approved procedure to decommission a well when abandoned. The decommissioning procedure protects the ground water and people from hazards.

It is also important to avoid storing contaminants (such as pesticides, fertilizers, or animal waste) or siting septic systems near the well. Well regulations require a minimum of 100 feet of separation between potential contaminants and wells.

Ecology has four regional well drilling coordinators who conduct well inspections and coordinate with local government. Delegation to counties of some of the inspection responsibility began in July 1993. Currently 12 counties perform well inspections (see page 5). The Washington Department of Health administers the

Wellhead Protection Program (see page 19). The Wellhead Protection Program requires Group A water systems to inventory and report any potential contamination sources within a five-year travel time to the well (via underground flow).

The Home-A-Syst program (see page 19) helps private homeowners prevent contamination to their wells. Home-A-Syst provides education on how to inventory potential sources of contamination, and offers suggestions about what to do if a contamination source exists near the well.

Injection wells:

State statute (RCW 43.21a.445) gives oversight of its rules covering underground injection wells (Chapter 173-218 WAC) to Ecology. In addition to permitting under Chapter 173-218 WAC, underground injection wells are also governed by the Water Pollution Control Act (Chapter 90.48 RCW).

The U.S. Environmental Protection Agency (EPA) divides underground injection wells into five classes:

Class I wells (prohibited in WA) inject industrial, commercial, or municipal waste fluids beneath the lowermost formation containing water within 1/4 mile of where the well was dug.

Class II wells inject fluids brought to the surface as part of oil or natural gas exploration, recovery or production. Currently, no Class II wells are in operation in the state.

Class III wells (prohibited in WA) allow for mineral extraction, including but not limited to the injection of fluids for in-situ uranium mining, solution mining of salts or potash or sulfur mining via Frasch process.

Class IV wells (prohibited in WA) inject dangerous or hazardous waste.

Class V wells are all injection wells not included in the other classes. Examples of Class V wells are those associated with ground water heat pumps, mineral recovery, waste disposal, aquifer recharge, and barrier (to keep other materials from migrating into the wrong areas). The majority of Class V injection wells in Washington State are used for stormwater injection.

County Well Inspection Delegation

January 1997

Department of Ecology

Headquarters	Dick Szymarek	(360) 407-6648
	Kathy Charlee (Licensing)	(360) 407-6649
	Linda Pilkey-Jarvis	(360) 407-6644
Northwest Region	Rod Thompson	(206) 649-7044
Central Region	Gene Potts	(509) 575-2639
Southwest Region	Igor Vern	(360) 407-0281
Eastern Region	Dan Weis	(509) 456-4410

County Inspection Programs

County	**Contact**	**Phone Number**
Clark	Joe Hunt	(360) 695-9215
Klickitat	Darrel Flasphaler	(509) 695-3231
Skamania	Martin Auseth	(360) 695-3208
Thurston	Phil Brinker (Temp)	(360) 754-2963
Pierce	Rich Dickerson	(206) 596-2885
Mason	Carolyn Jenson	(360) 427-9670 Ext. 358
Kitsap	Bill Lum	(360) 478-5285 Ext. 7311
Snohomish	Kevin Plemel	(206) 339-5270
Whatcom	Bob Kloc (Temp)	(360) 676-6724
San Juan	Vicki Heater	(206) 378-4474
Kittitas	Holly Duncan	(509) 962-7580
Jefferson	Dave Christensen	(360) 385-9444
Spokane	To Be Announced	(509) 324-1590

Problem: How Wastewater Can Affect Ground Water

Ground water contamination can occur when water containing waste materials from industrial, commercial, or municipal sources is not properly treated or disposed of.

Waste water treatment systems cannot properly treat some dangerous wastes (for example, certain pesticides and certain toxic, corrosive, explosive, or flammable substances). When wastewater containing these types of materials goes to treatment facilities, ground water contamination sometimes occurs.

Solution: What Wastewater Permits Can Do To Protect Ground Water

Ground water protection permits issued during the State Fiscal Year (SFY) 1993 - 94 time period:

SFY 93: 22
SFY 94: 26

Total number of currently active permits: 66

- WA Dept. of Ecology data

Washington State's goal is to ensure that the quality of the waters of the state (including ground water) is maintained to the highest possible standards. Protection of human health and safety is important.

Facilities are required to use all known, available and reasonable technology (**AKART**) to control their waste discharge. Wastes sent to municipal treatment systems must not interfere with or cause damage to the operation of the system. In addition, facilities may be required to further treat their waste water if water quality standards will still not be met.

Chapter 173-216 WAC (State Waste Discharge Permit Program) allows the state to issue general and individual ground water discharge permits. In most cases, ground water monitoring is one of the permit requirements. Monitoring data checks the effectiveness of the permit, as well as the treatment technology used. If the facility is unable to meet the terms of its permit, the facility must stop discharging the waste(s) and perform clean-up and/or other corrective actions.

The facility must also notify Ecology when a contaminant discharge occurs. The facility must specify the corrective measures used and the plans to prevent future occurrences of unauthorized discharge.

Problem: How Solid Waste Can Affect Ground Water

Solid waste is all decomposable and non-decomposable liquid, solid and semisolid wastes. Examples of solid waste are garbage; industrial wastes; demolition and construction wastes; wood waste; petroleum contaminated soils; tires; asbestos; and sludge from wastewater treatment plants or septic tanks. Most solid waste in Washington State is disposed of in municipal solid waste landfills. Other types of landfills are inert/demolition, limited purpose, and wood waste landfills. Solid waste may also be burned, recycled, compacted, composted, or temporarily stored.

Examples of contaminants from solid waste are leachate from landfills and untreated or improperly treated sludge. These contaminants can migrate to and contaminate the state's ground water.

In 1994 there were 36 municipal solid waste landfills in Washington State: 29 public, 7 private.

In 1994 a total of 3,878,615 tons of waste was disposed of in the 36 municipal solid waste landfills of Washington State.

- Solid Waste in Washington State - Fourth Annual Status Report, 1996, WA Dept. of Ecology report.

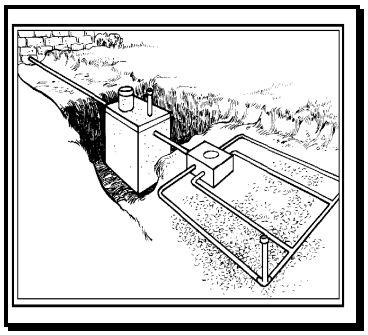
Solution: What's Being Done To Protect Ground Water From Solid Waste Contamination

Washington State's standards for solid waste cover municipal solid waste landfills (Chapter 173-351 WAC) and other landfills (Chapter 173-304 WAC). The regulations specify what kinds of wastes can be disposed of in these types of landfills. The regulations also require ground water monitoring. Regular monitoring of both public and private solid waste facilities ensures compliance with minimum functional standards in the technical (design, performance, etc.) and planning (operation, closure, etc.) areas. Routine monitoring of solid waste facilities verifies permit compliance, ground water protection, and conformance to federally defined corrective activities (where warranted).

Problem: How Septic Systems Can Affect Ground Water

A **septic** (or on-site sewage) **system** is a system designed to treat water containing human or domestic waste from homes or other facilities. The wastewater flows into a septic tank, where it separates into solid and liquid components. The clarified liquid flows to an aerobic (needs oxygen to survive) soil environment for additional treatment by bacteria in the soil. The remaining solids are "digested" by anaerobic (does not need oxygen to survive) bacteria until they are pumped out later.

An improperly sited, operated and/or maintained on-site system can adversely affect the process. For example, septage biosolids not regularly pumped from the tank may pass excessive solids into the soil. This causes clogging and surfacing of the solids and liquids. This inadequately treated effluent (waste outflow) can flow across the ground and enter poorly sealed wells.

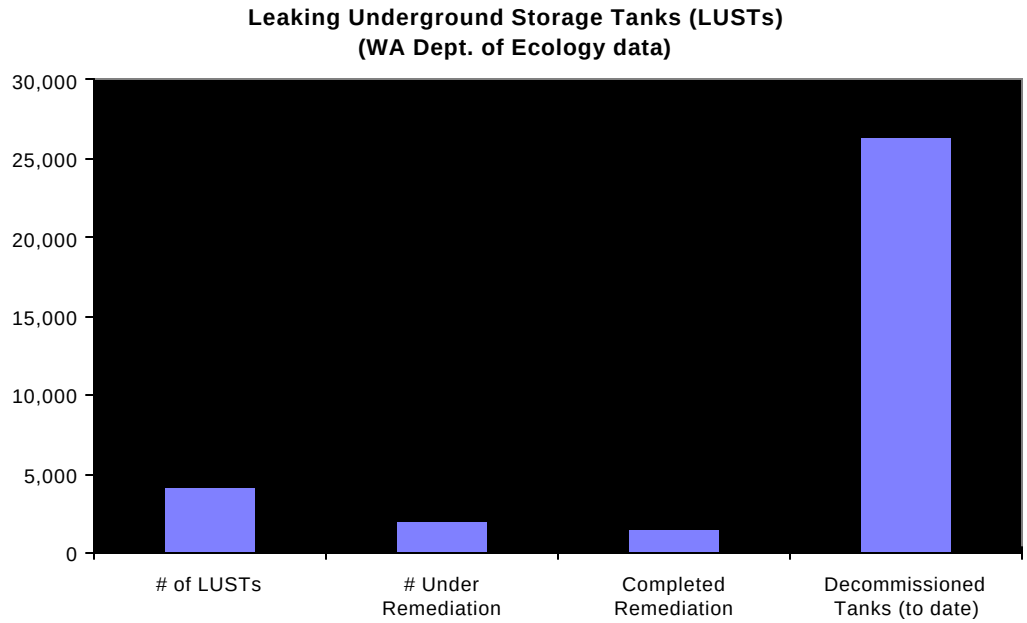


Solution: What's Being Done To Protect Ground Water From Septic System Contamination

Chapter 246-272 WAC (On-Site Sewage Systems) delegates authority for permitting large on-site systems to the Washington Department of Health, and permitting of smaller systems to local departments of health. The Department of Health publishes guidelines, reviews alternative systems, and approves products especially made for those type of systems.

Local health districts identify and require correction of failed septic systems under their jurisdictions. System permitting incorporates a performance approach by developing design requirements especially for that particular system.

The Home-A-Syst program (see page 19) provides a worksheet to educate owners on how best to operate and maintain their system. The Household Wastewater Treatment worksheet guides the owner through a survey of water usage, site characteristics, and type of treatment to extend system performance.



Problem: How Underground Storage Tanks Can Affect Ground Water

An **underground storage tank** (UST) is a tank used to hold regulated substances underground, with at least 10 percent of the tank and connecting pipes underground. **Regulated substances** include any hazardous substance as listed in section 101(14) of the Comprehensive Environmental Response, Compensation, And Liability Act (CERCLA) of 1980 (also known as "superfund"). Exceptions are those substances regulated as hazardous wastes under Subtitle C of the federal Solid Waste Disposal Act, or a mixture of such hazardous waste and any other regulated substances. Commercial gasoline ("filling") stations are an example of a facility utilizing USTs. A leaking underground storage tank (or LUST) is an UST whose contents leak into the surrounding soils. Unless detected and remediated right away, contaminants from LUSTs can migrate to ground water.

Approximately 2,000 LUSTs underwent remedial action for ground water clean up as of June 1995. 1,539 sites have completed remediation activities.

- WA Dept. of Ecology data

Solution: What's Being Done To Protect Ground Water From Underground Storage Tank Contamination

USTs hold regulated materials, which are often toxic to humans. Therefore, it is important that they are kept leak-free and avoid spillage when filled. It is also vitally important to detect, rapidly confine, and clean up leaks and spills when they do happen. The owner and/or operator of a commercial UST (holding 1,000 gallons or more) must have a permit to operate it. To be eligible for a permit, the

Since 1989 (the year the UST program began keeping records), 26,382 tanks have been decommissioned (mainly closed in place).

- WA Dept. of Ecology data

owner or operator must comply with all requirements of Chapter 173-360 WAC (Underground Storage Tanks). Compliance includes regular monitoring to ensure the tank is not leaking, as well as devices to prevent over-filling of the tank.

Washington State develops standards for the design and installation of USTs. There are also standards for the removal, remediation of leakages and spills, and decommissioning (closure) of LUSTs.

Problem: How Spills Can Affect Ground Water

A **hazardous substance** is anything that poses a threat to human health or the environment if discharged into the environment. The release of a hazardous material without authorization is a **spill**. It is important that any spill be contained and cleaned up quickly, especially when the spill can potentially affect the surface or ground waters of the state.

The top 10 products found when responding to spill reports:

oil/petroleum products
paint
antifreeze
transformer liquid
batteries
mineral oil
sulfur dioxide
solvents
polychlorinated biphenyls (PCBs)
paint thinners

- Spill Management Program Prevention And Response Activities - 1994 Annual Report, WA Dept. of Ecology.

Once a hazardous substance enters the ground water it is difficult and expensive to clean up, and may threaten the continued availability of ground water for beneficial uses, such as water supply.

Solution: What Emergency Response Can Do To Protect Ground Water

Washington State established the Spill Response Management Program through the 1990 Oil and Hazardous Substance Spills Act and the 1991 Oil Spill Prevention And Response Act. Ecology's Spill Unit responds to hazardous spills anywhere in the state (see map on page 12).

During a spill and subsequent cleanup, public water supply systems must coordinate with local police and fire departments; Ecology's Spill Operations Section; the Department of Community Trade and Economic Development's Emergency Management Program; the local health department; and any local emergency planning committee. This ensures that the incident or spill response procedures adequately protect ground water within Wellhead protection areas.

Other ways spill response procedures protect ground water:

- Requiring facilities handling hazardous waste to have an emergency response plan;
- Notifying Ecology's spill response team when a spill occurs;
- Educating those who will handle hazardous materials;
- Training those handling hazardous materials in emergency spill response procedures.

If there are any suspected impacts to the ground water, Ecology's Toxic Cleanup Program has the authority to investigate and coordinate cleanup of the spill site.

From 1990-1994, Ecology's Spill Response Team answered approximately 3,430 spill reports per year state-wide. They also conducted approximately 820 field responses per year.

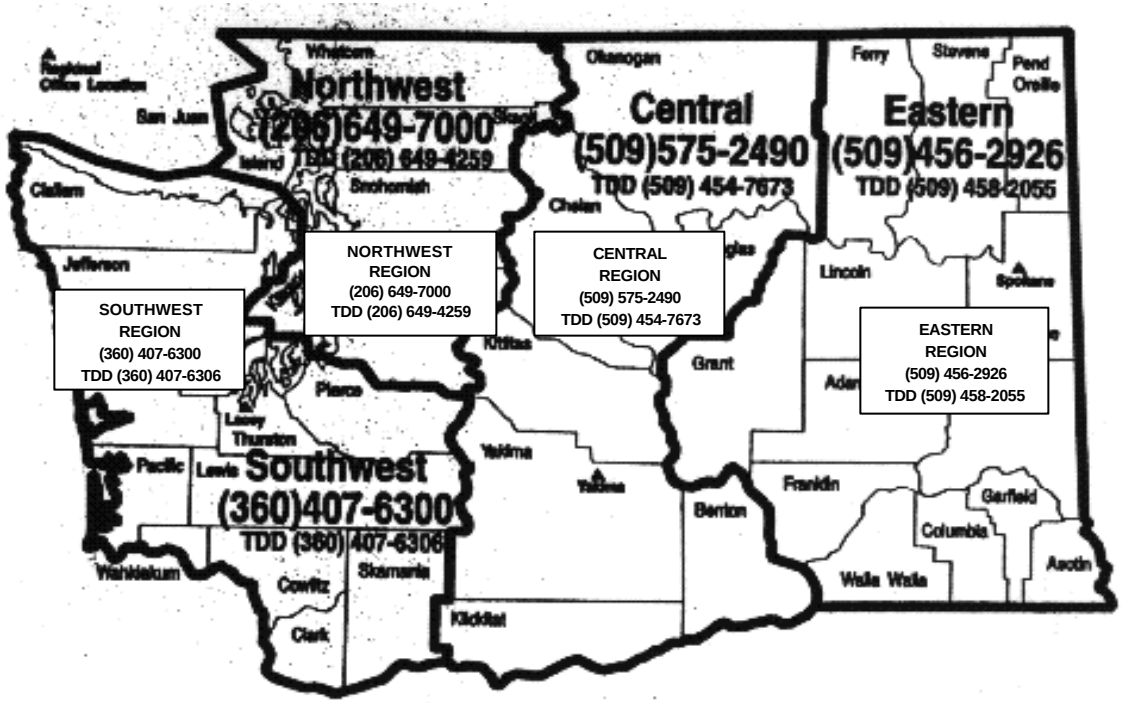
- Spill Management Program Prevention And Response Activities - 1994 Annual Report, WA Dept. of Ecology.

Washington State Department of Ecology

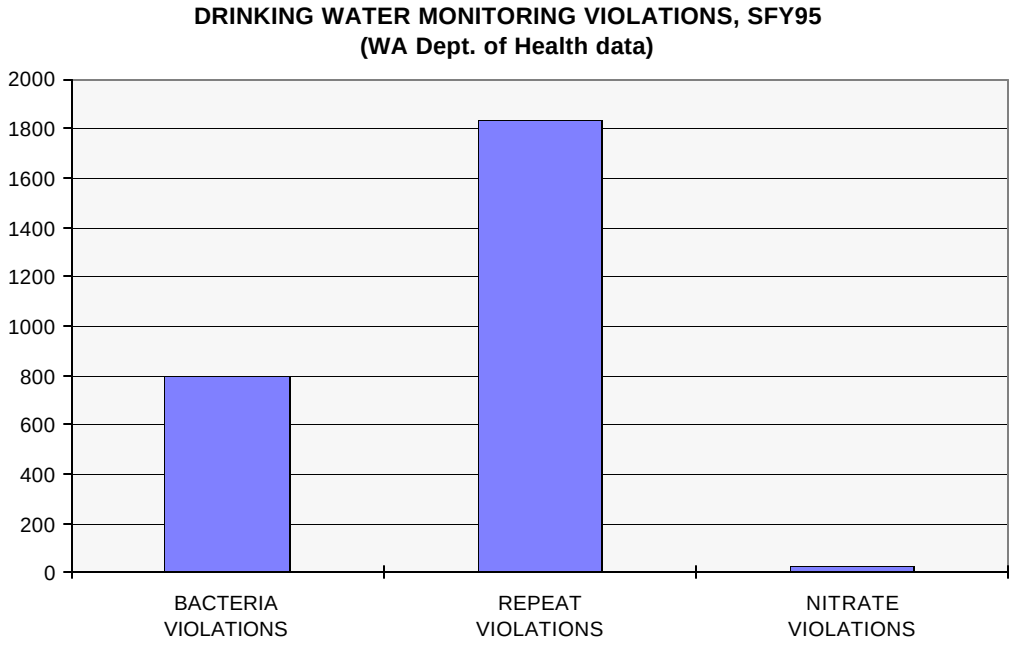
Regional office 24-hour oil and hazardous materials spill reporting numbers

Need to know:

- Reporting party
- Contact phone(s)
- Responsible party
- Material released
- Resource damages (i.e., Dead fish)
- Quantity
- Concentration
- Location
- Cleanup status



Or call:	Department Of Emergency Management 24-hour number		1-800-258-5990
	for EPA and us coast guard reporting, call National Response Center		1-800-424-8802
	Idaho:	Communications Center	(208) 327-7422
	Oregon:	Emergency Management	(503) 378-6377
	B.C.:	Provincial Emergency Program	1-800 663-3456
	EPA Region X, Seattle:		(206) 553-1263



Problem: How Fertilizers And Pesticides Can Affect Ground Water

Agricultural practices can affect ground water. Runoff from feedlots; spillage or leaks of pesticides, fertilizers, or fuels; improper sludge or wastewater disposal; drainage from raw material storage; and improperly contained manure piles may potentially infiltrate into and contaminate the ground water.

Too much fertilizer, for example, or fertilizer applied at the wrong time, may permit contaminants (e.g., nitrate) to leach into the ground water, rather than be taken up and utilized by crops.

Solution: What Best Management Practices Can Do To Protect Ground Water From Pesticides And Fertilizers

Farmers can get assistance from their local conservation districts to develop a farm plan which tailors **best management practices** (BMPs) to their farm and location. BMPs for ground water are effective and practical activities, practices, and procedures that prevent or reduce contamination in the state's ground water. Using BMPs ensure proper handling of pesticides, fertilizers, sludge, sewage, runoff, etc., so that contaminants do not enter and contaminate the ground water.

Although BMPs are especially for use by farmers and irrigators, all Washington State citizens can implement BMPs around their homes, ranchettes, and gardens.

Programs like Home-A-Syst/Farm-A-Syst (see page 19), and Master Gardeners educate the citizens of Washington State to handle fertilizers, pesticides, cleaners, lubricants, etc., so that their use does not contribute to ground water contamination.

In July 1995 the Washington State University Cooperative Extension (in conjunction with Ecology) published guidance for irrigated agriculture entitled "Irrigation Management Practices To Protect Ground Water and Surface Water Quality - State of Washington." Adopted by Ecology and the Washington Conservation Commission, it helps irrigators maximize the efficiency of their systems and avoid hazards that can lead to pollution problems in surface and ground waters.

In 1991, a total of 489 pounds of fertilizer per acre was used in the agricultural areas of Adams, Douglas, Franklin, Grant, Lincoln, and Whitman counties.

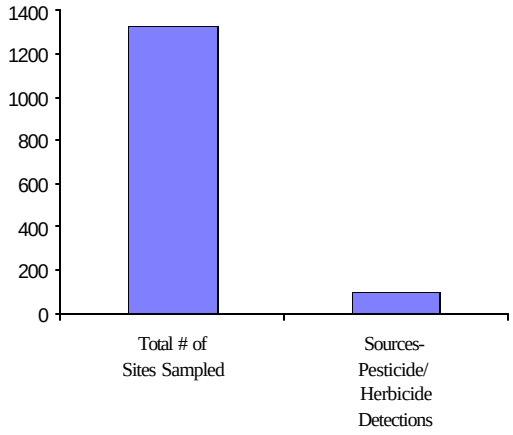
- Nitrate Concentrations In Ground Water Of The Central Columbia Plateau, USGS Open-File Report 95-445.

The manual provides background on the science of water pollution; Washington water quality issues; management and implementation practices; how to develop an on-site water quality program; and the role of government in controlling contamination. It addresses known and currently used irrigation practices.

The Ground Water Standards Guidance Document (see page 16) also encourages BMP use for general agriculture. Developing and following BMPs helps agriculture to be in compliance with the ground water standards.

In response to EPA's pesticide and ground water strategy, the Department of Agriculture wrote a generic Pesticide State Management Plan (SMP). The generic plan will be used as a template to write plans on handling specific pesticides in the state, stressing prevention over remediation.

WDOH Pesticide Detections in Drinking Water Study
(Results of the Areawide Groundwater Monitoring Project Draft, Spring 1995, WA Dept. of Health Report)



Washington Department of Agriculture rules require secondary and operational area containment for bulk pesticide and fertilizer storage facilities (Chapters 16-229 and 16-201 WAC). Chapter 16-229 WAC also requires operational area containment at permanent mixing/loading sites for pesticides. The Department of Agriculture has rules pertaining to chemigation (WAC 16-228-232) and fertigation (WAC 16-200-742). In addition to these rules (which were written primarily for ground water protection), the Department of Agriculture has other rules related to the proper use of pesticides to ensure protection of human health and the environment.

What Else Is Being Done To Protect Ground Water?

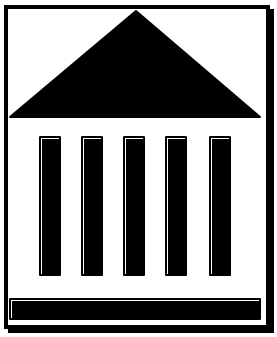
Ground Water Protection Planning

Ground water quality and quantity are important to the physical and economic health of the state. Planning is an important first step in protecting the ground water resource. The following are planning tools used to protect ground water.

Growth Management Act (Chapter 36.70a.070 RCW): Provides for the inclusion of "protection of the quality and quantity of ground water used for public water supplies" in county growth management plans.

Regulation of Public Ground Waters (Chapter 90.44 RCW): Provides for regulation, allocation and planning for ground water protection by state and local governments.

Water Pollution Control (Chapter 90.48 RCW): Specifies ground water protection priorities for the state, and indicates beneficial uses of ground water. The definition of beneficial use is "uses of waters of the state which include but are not limited to use for domestic, stock watering, industrial, commercial, agricultural, irrigation, mining, fish and wildlife maintenance and enhancement, recreation, generation of electric power and preservation of environmental and aesthetic values, and all other uses compatible with the enjoyment of the public waters of the state." [WAC 173-200-020 (4)]



The Water Resources Act Of 1971 (Chapter 90.54 RCW): Provides for comprehensive planning and management of both surface and ground waters. Provides for water resource management program development. In addition, RCW 90.54.140 allows for the protection of sole source ground water aquifers.

Water Quality Standards for Ground Waters of the State of Washington (Chapter 173-200 WAC): Specifies ground water quality criteria that cannot be exceeded. Specifies ground water quality standards with background ground water quality as a reference point. Designates points of compliance (locations where the ground water quality enforcement limit shall not be exceeded), early warning values, and enforcement limits for potential contamination sources. Provides for the establishment of special protection areas that may require ground water protection beyond that established in the standards or contained in the criteria. Provides for implementation and enforcement of its provisions.

Public Water Supplies (Chapter 246-290 WAC): Specifies requirements for water system plans and small water system management programs. Requires the inclusion of Wellhead protection plans in water system plans or small water system management programs. Requires development and implementation of Wellhead protection programs (see page 19) by all group a water system suppliers (see page 1) using ground water or springs as their water source.

Ground Water Standards

The Water Quality Standards For Ground Waters of the State of Washington (Chapter 173-200 WAC) establish standards for ground water quality in the state of Washington. The goal of these standards is to maintain a high quality of ground water and protect existing and future beneficial uses through the reduction or elimination of contaminants discharged to the subsurface.

Eighty-six inspections of resource conservation and recovery act (RCRA) facilities were performed through 1990. The facilities were evaluated for ground water standards requirements. Forty-six violations were issued.

- WA Dept. of Ecology data.

The Implementation Guidance for the Ground Water Quality Standards, developed by Ecology, promotes consistent state-wide execution of the ground water quality standards for activities which may degrade ground water quality. The guidance document:

A. Clarifies how to determine compliance for individual permit and monitoring well activity. It outlines the Departments of Ecology and Agriculture's responsibilities, and ensures that best management practices (BMPs) are in compliance with the standards.

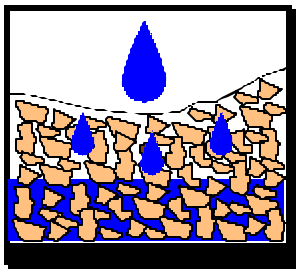
B. Clarifies enforcement limits. **Enforcement limits** represent the maximum allowable concentration of a particular contaminant in ground water, detectable at a specific point of compliance.

C. Promotes the use of all known available and reasonable technology (AKART) to protect background water quality. If AKART does not keep degradation below the upper enforcement limit, additional treatment may be required, or the facility must demonstrate an overriding public interest. **Overriding public interest** includes alleviation of a public health concern; net environmental improvement; or socio-economic benefits associated with the permitted activity. Overriding public interest includes a public comment period. After receiving public comments, the director of Ecology makes the final decision to issue or deny the permit.

D. Encourages the use of BMPs for general agriculture.

Interagency Ground Water Committee

In 1992, Washington State established an interagency group (the **Interagency Ground Water Committee**) to address those issues affecting the state's ground water.



Representatives from state, federal and local governments, tribes, and other public groups with an interest in protecting and preserving the ground water of Washington State make up the Interagency Ground Water Committee (IGWC). The IGWC promotes protection of ground water quality:

- By effective communication and coordination among agencies, programs and interested individuals and organizations that affect the state's ground water resource; and

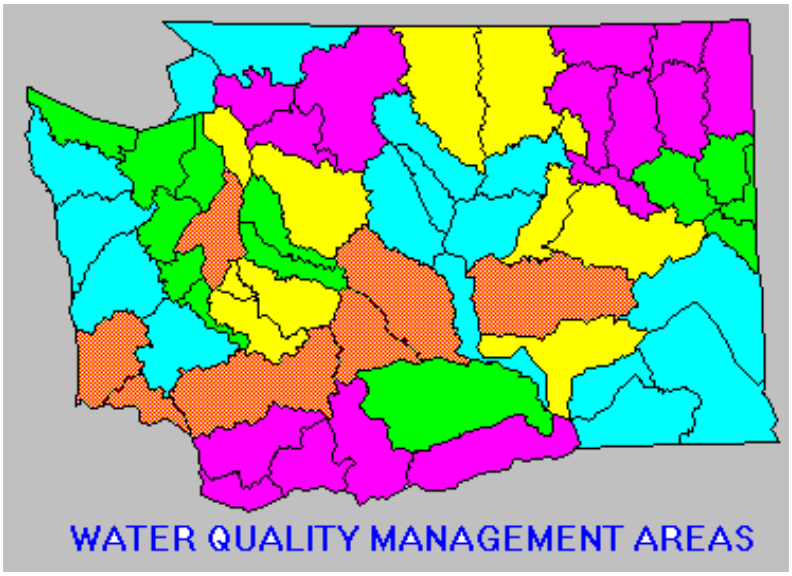
- By advancement of ground water protection priorities.

Water Quality Management Areas

A **watershed** is a geographic region that drains into a river, river system, or other body of water. In Washington State, watersheds are also known as water resource inventory areas (WRIAs) or basins.

Starting in July 1993, Ecology began a program to manage surface and ground water quality on a watershed basis. Management of water quality on a watershed basis coordinates monitoring, inspections and permitting on a geographic, rather than calendar basis. It allows prioritization of water quality concerns, so that permit writing is according to local water quality conditions. It also improves water quality and agency service delivery through improved environmental coordination, and integrates non-point source controls on agriculture, forestry, stormwater, and other sources.

The watershed approach to water quality management divides the state into 23 water quality management areas (WQMAs). The program schedule for each WQMA is a five-year, five-step process:

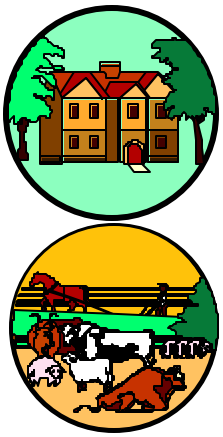


Year 1: Identify known and suspected water quality problems.
Year 2: Focus on water quality monitoring and special studies.
Year 3: Look at water quality analysis and pollution effects.
Year 4: Develop technical reports summarizing Ecology's solutions for areas of concern and its response strategies.
Year 5: Issue waste water discharge permits; implement other pollution prevention and control actions responding to prioritized water quality issues.

The cycle repeats at the end of the five years. The first set of five WQMAs (Skagit/Stillaguamish, Columbia Gorge, Horseheaven/Klickitat, Upper Columbia, and Pend Oreille) will complete the five-year cycle in 1997.

Ground water is also part of the WQMA needs assessment. Ground water staff from Ecology's environmental investigations and laboratory services (EILS) and water quality programs present ground water issues at watershed workshops, which are attended by Ecology staff and local community representatives. The watershed lead identifies and follows ground water issues, along with other important watershed issues derived from the workshops. The needs assessment includes summaries of ground water issues. The technical reports (year 4) incorporate solutions to ground water problems identified in year 1.

Home-A-Syst/Farm-A-Syst



Washington State has a protection and monitoring program for the private well owner to use. The program is the home/farm assessment system, or Home-A-Syst/Farm-A-Syst.

Home-A-Syst/Farm-A-Syst is similar to the national Home-A-Syst/Farm-A-Syst program. It helps farmers, ranchers and other residents protect their surface and ground water from contaminants like nitrate, toxic substances and microorganisms. It provides pollution risk evaluation tools and a framework for successful interagency and private sector partnerships for pollution prevention efforts.

The program (with Washington State University Cooperative Extension as the lead) consists of a series of worksheets and fact sheets. Each worksheet and fact sheet addresses a list of ground water related issues. Each worksheet provides a problem overview and risk ranking assessment tables. Corresponding fact sheets give suggestions on actions that could reduce a contamination risk. There is also a site evaluation (taking into account soil types) and a home or farm action plan worksheet.

Within the last two years (through 1995) WA's Home-A-Syst/Farm-A-Syst program was involved in water quality events/meetings, local fairs/festivals and agriculture meetings. The program was used in over 14 counties in Washington State, presenting the program to several thousand people.

- Home-A-Syst data

Home-A-Syst/Farm-A-Syst is voluntary, quick, easy, and confidential. It educates participants on ground water and the types of practices that cause contamination. The WSU Cooperative Extension Service, Natural Resource Conservation Service (NRCS), Ecology, and EPA cooperate with and support the program. Local volunteers bring the program to the participants.

Home-A-Syst/Farm-A-Syst's future plans include involvement in the W.A.T.E.R. (Water Awareness Through Education And Rethinking) project; a stronger education component; stronger partnerships; expansion into new watersheds; stronger follow-up; additional staff; new/revised assessments; and additional training materials.

Wellhead Protection Program

The state developed the **Wellhead Protection Program** (WHP) to prevent contamination of sensitive ground water sources of drinking water (wellheads). Administered by the Washington Department of Health, it applies to group a public water systems (see page 1) using ground water or springs as their supply source.

The WHP protects drinking water source supplies by requiring public water supply purveyors to develop:

- Susceptibility assessments;
- Protection area delineations based on the hydrogeology of the Wellhead area;
- Inventories of potential contaminants within the Wellhead protection area (WHPA);
- Contingency plans for substitute drinking water supplies should the current supply become contaminated;
- Notification about potential contamination sources sent to the proper regulatory agencies and the owners and/or operators of the potential sources; and
- Coordination with spill response teams on emergency response plans.

As of August 1995, approximately 1,952 PWS, or 89 percent, in the state of Washington are currently implementing a WHP for their water supplies. As new Group A PWS come on line they are required to develop a WHP.

- WA Dept. of Health data

The agencies may then use the information about potential contaminants in the WHPA to prioritize their regulatory activities.

Monitoring

A variety of state programs conduct routine ground water monitoring. Monitoring frequency depends upon program requirements, site-specific variables, and past performance (at a particular site). There is currently no state-wide network to keep a central record of monitoring data. The following are three examples of agencies who have developed or are developing ground water databases of state-wide information.

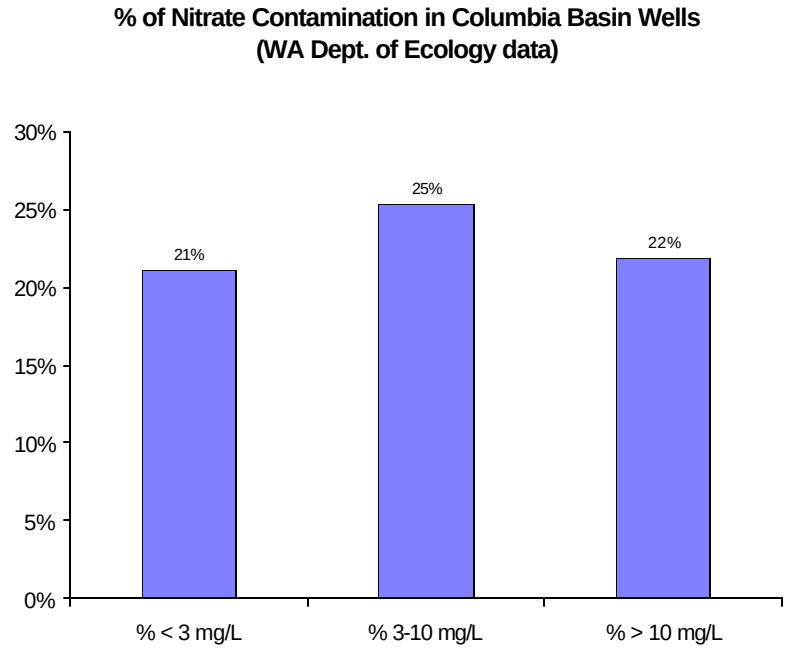
Washington Department of Health:

In the spring of 1995, the Washington Department of Health completed its draft report, "Results Of The Area-Wide Groundwater Monitoring Project." The purpose of the project was to determine the extent to which drinking water sources were, or may become, contaminated by pesticides and herbicides. Health sampled 1,326 public water supply wells for the project. They also gathered data from well logs and field data. Of the 1,326 wells sampled, approximately 7.6% tested positive for pesticides or herbicides. Roughly 3% of the total samples showed pesticides above the reporting level set by EPA.

The data gathered for this project will serve as a foundation for other ground water-related projects. The database will include data from future testing.

Washington Department of Ecology:

Ecology is currently gathering monitoring well data for its Aquifer Vulnerability Project. This project will help to determine the vulnerability of ground water in the state to pollution. Ecology is also gathering data from monitoring wells in the Columbia basin as part of a nitrate contamination study. The Departments of Ecology, Agriculture, Health, and the Washington Conservation Commission commissioned the IGWC (see page 17) to undertake the study. Data from these two projects are being collected, digitized and entered into a program database. The database will also include data from conservation districts; health districts; Health's Ground Water Monitoring Project; USGS' National Water Quality Assessment (NAWQA) project; and Ecology grant project. This database will eventually link into an agency-wide information system, making ground water data more available to all staff in Ecology and other agencies (see page 25).



For IGWC's Columbia Basin Nitrate Contamination Study, staff used existing data from approximately 965 well samples. Approximately 21% of the sampled wells show nitrate levels of less than 3 milligrams per liter (mg/L). Approximately 25% of the wells show nitrate levels of 3-10 mg/L. Approximately 22% of the wells studied show nitrate levels above 10 mg/L, the maximum contaminant level (MCL) as established by EPA.

Ecology's environmental investigations and laboratory services (EILS) program collects samples from different water wells for various projects throughout the state. Annually, the lab checks the samples for pesticides, general chemicals and nutrients, volatile organics, and metals. The table on the next page shows data for well sampling for the SFY90-SFY95 time period.

		PESTICIDES IN GROUND WATER - EILS REPORT FOR 1988-1995				
Year	1990	1991	1992	1993	1994	1995
Number of Wells Sampled	27	29	27	25	27	27
# of Wells with Nitrate 2 - 5 mg/L	23	10	12	4	8	2
% of Total Wells Sampled (Nitrate 2 - 5 mg/L)	85%	34%	44%	16%	30%	7%
# of Wells with Nitrate > 10 mg/L	0	2	1	2	7	2
% of Total Wells Sampled (nitrate > 10 mg/L)	0%	7%	4%	8%	26%	7%
Number of Wells with Detectable Pesticides	6	26	8	12	14	11
% of Total Wells Sampled (detectable pesticides)	22%	90%	30%	48%	52%	41%
Number of Wells Exceeding MCL for Pesticides	0	10	0	0	0	0
% of Total Wells Sampled (exceeding MCL for pesticides)	0%	34%	0%	0%	0%	0%
4 Most Commonly Detected Pesticides	Total Xylene; Dacthal (DCPAs).	1,2-dichloropropane; Ethylene dibromide; Dacthal (DCPAs); 1,3-dichloropropene.	Dacthal (DCPAs); Atrazine; Sinazine; Ethylene dibromide.	Atrazine; Simazine; Diuron; Bromacil.	Dacthal (DCPAs); Atrazine; Simazine; Prometon.	Dacthal (DCPAs); Atrazine; Prometon; Bromacil.

As of June, 1995, there were 107 sites at the National Priority List (NPL) contamination ranking level. There were 7 Resource Conservation And Recovery Act (RCRA) listed sites: 5 with confirmed contamination, 2 suspected. There were 469 other sites needing corrective action in Washington State.

- WA Dept. of Ecology data

As of June 1995 the following sites held the following remediation status:

- *10 RCRA ground water sites in the remediation process;*
- *17 confirmed and 5 suspected Comprehensive Environmental Response, Compensation And Liability Act (CERCLA) ground water sites;*
- *85 UST sites;*
- *469 confirmed and 493 suspected Model Toxics Control Act (MTCA) sites;*
- *27 confirmed, 10 suspected remediated sites under Chapter 90.48 RCW jurisdiction.*

- WA Dept. of Ecology data

Washington Department of Transportation

Washington Department of Transportation is currently undertaking a project to collect data on sensitive ground water areas, including Wellhead Protection Areas, Critical Aquifer Recharge Areas (CARAS), and Sole Source Aquifers. The goal is to build ground water data layers within a Geographic Information System (GIS) to map these areas for the entire state of Washington. The project will also look at well locations and future road construction in areas of expected growth. When completed, the data will be available to all interested users.

Besides the agencies previously listed, data will be gathered from these types of monitoring programs:

solid waste facilities
land application of wastewater
pesticide study (state-wide EILS study)
RCRA facilities
remedial actions
water supply systems
water re-use facilities
injection wells

Remediation

Remediation is "any action...to identify, eliminate, or minimize any threat or potential threat posed by hazardous substances to human health or the environment...." [RCW 70.105d.020 (11)]. Ecology engages in remediation activities when there has been, or is the danger of a hazardous waste spill. The Toxics Cleanup Program of Ecology remediates impacts or threats to ground water (due to hazardous waste spills) through its Toxics Control Account. A site remediation project is complete when cleaned up to the level that the contamination poses no unacceptable risk to human health and the environment.

Compliance monitoring is required during all cleanup activities. The purpose of compliance monitoring is for protection, performance, and confirmation. **Protection** monitoring confirms there is sufficient protection for human health and the environment during a cleanup operation. **Performance** monitoring confirms that the cleanup action achieved cleanup and (if appropriate) other performance standards. **Confirmational** monitoring confirms the long-term effectiveness of the cleanup action after meeting cleanup standards.

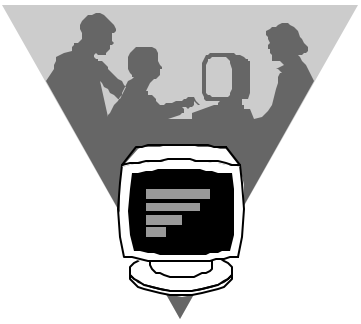
Cleanup methods depend on the type of contaminant and how the environmental factors affect the ease or difficulty of the cleanup process. Regardless of the cleanup method selected, doing confirmational monitoring proves that the method worked and remained sufficient over time. If there are still hazardous materials at a site beyond certain cleanup levels, Ecology will review the site every five years. This ensures continued protection of human health and the environment.

Data Management

As shown in the "monitoring" section (see page 21), ground water data is available in different agencies. Local conservation districts, health districts, etc., also maintain ground water information.

There is currently no state-wide system to link and manage the wealth of ground water data available in the state. There are tools available that, through interagency and inter-governmental cooperation, may soon remedy this situation.

One of these tools is the Geographic Information System (GIS). GIS develops maps that show well locations, sensitive area and species locations, and surface water bodies, for example. The ability to show this information in map form allows for better development of emergency response planning, trend analysis, enforcement violation tracking, and staff and resource deployment planning.



The state of Washington is also working towards ways to share data with those who need it. One example is Ecology's **Information Integration Project** (IIP). The IIP is a project to improve data-sharing throughout the agency by making all of Ecology's data more accessible to agency staff. The IIP is part of Ecology's information strategy plan (ISP).

Once completed, the plan will integrate data from the entire agency. Data, located in a central database, will be shared across Ecology programs. Users will identify all business areas interacting with Ecology; those involved at a particular site; and party affiliation (relationship of the person to the facility/site, e.g., attorney, billing, etc.), as well as information in other Ecology databases.

Through its efforts to encourage intra-agency, interagency and inter-governmental data-sharing activities, Washington State is making great strides towards making ground water data available to anyone who needs it for ground water protection efforts.

For Further Information....

on the following subjects, please get in touch with the contact people listed.

- Drinking Water Systems, Page 1: David Jennings, Washington Department of Health; phone (360) 586-9041; e-mail dgj0303@hub.doh.wa.gov.

- Wells, Page 3: Dick Szymarek, Washington Department of Ecology; phone (360) 407-6648; e-mail rszy461@ecy.wa.gov.

  Wastewater Permits, Page 6: Jim Krull, Washington Department of Ecology; phone (360) 407-6460; e-mail jkru461@ecy.wa.gov.

- Solid Waste, Page 7: Annette McMahan, Washington Department of Ecology; phone (360) 407-6119; e-mail amcm461@ecy.wa.gov.

- Septic Systems, Page 8: Tom Long, Washington Department of Health; phone (360) 586-8133; e-mail tel0303@hub.doh.wa.gov.

- Underground Storage Tanks, Page 9: Karen Backman, Washington Department of Ecology; phone (360) 407-7203; e-mail kbac461@ecy.wa.gov.

- Spill Response, Page 10: Rob Spath, Washington Department of Ecology; phone (360) 407-6936; e-mail rspa461@ecy.wa.gov.

- Irrigation Management Practices To Protect Ground Water And Surface Water Quality State of Washington Manual, Page 14: Ron Hermanson, PhD PE, Washington State University Cooperative Extension; phone (509) 335-2914; e-mail hermansn@wsu.edu.

- Ground Water Standards, Page 16: Kirk Cook, Washington Department of Ecology; phone (360) 407-6415; e-mail kcoo461@ecy.wa.gov.

- Interagency Ground Water Committee, Page 17: Diane Dent-White, Washington Department of Ecology/IGWC; phone (360) 407-6616; e-mail dden461@ecy.wa.gov; Internet Home Page URL http://www.wa.gov/ecology/igwc/igwchome.html.

- Water Quality Protection Areas, Page 17: Ron McBride, Washington Department of Ecology; phone (360) 407-6469; e-mail rmcb461@ecy.wa.gov.

- Home-A-Syst/Farm-A-Syst, Page 19: Karen Blyler, Washington State University Cooperative Extension; phone (206) 840-4556; e-mail blyler@coopext.cahe.wsu.edu

- Wellhead Protection Program, Page 19: David Jennings, Washington Department of Health; phone (360) 586-9041; e-mail dgj0303@hub.doh.wa.gov.

- Washington Department of Transportation Sensitive Ground Water Project, Page 24: Marie Mills, Washington Department of Transportation; phone (360) 705-7426; e-mail millsma@wsdot.wa.gov.

- Information Integration Project, Page 25: Lynn Singleton, Washington Department of Ecology; phone (360) 407-6610; e-mail lsin461@ecy.wa.gov.

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