YAKIMA COUNTY

YAKIMA COUNTY **WASHINGTON**

UPPER YAKIMA VALLEY REGIONAL WELLHEAD PROTECTION PLAN

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EXECUTIVE SUMMARY

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The purpose of the Upper Yakima Valley Regional Wellhead Protection Plan (WHPP) is to identify potential sources of contamination near the member purveyors' groundwater supplies, implement management strategies to prevent contamination of those supplies, and develop a contingency plan for the contamination mitigation in the event that groundwater does become contaminated. The scope of this WHPP consists of individual WHPPs for each of the eight municipal water purveyors in the Upper Yakima Valley and a Regional Wellhead Protection Management Plan that coordinates the implementation and collective long-term goals of the purveyors.

The Upper Yakima Valley member purveyors are known collectively as the Regional Wellhead Protection Committee and are comprised of the following purveyors:

- City of Moxee
- Town of Naches
- Nob Hill Water Association
- City of Selah
- Town of Tieton
- City of Union Gap
- Yakima County
- City of Yakima

This WHPP has been prepared in accordance with Department of Health requirements detailed in WAC 246-290-135. Each member purveyor's WHPP consists of 1) this Regional Management Plan detailing the regional management goals of the study and 2) an individual WHPP that describes the purveyor's specific physical and regulatory setting and defines the implementation of its local management efforts. Each purveyor's individual WHPP is divided into the following five sections:

- Water System Summary--This section was developed in accordance with each purveyor's DOH-approved water system plan and includes any updated information supplied by the water system since adoption of the plan.
- Wellhead Protection Area (WHPA) Delineations-- WHPA delineations were developed using a simple analytical model for each purveyor's projected 2018 water production. Additionally, because the databases obtained from the Department of Ecology (DOE) are still being refined with respect to the accuracy of the site locations, the RWPC included an additional 150 foot buffer outside the 10-year WHPA in which to target management strategies.
- Inventory of Potential Contamination Sources--The inventory of potential contamination sources was developed using DOE databases and a windshield survey of high risk businesses. This inventory was compiled into a Geographical Information System (GIS) database maintained by Yakima County.

- Contingency Plan--Each purveyor's contingency plan includes an analysis of source capacity, reliability, and water rights, short- and long-term alternate water sources, and emergency and spill response procedures.
- Local Wellhead Protection Management Plan--The management plan is the cornerstone of wellhead protection planning, detailing the management efforts designed to protect each purveyor's groundwater supplies. At an early stage in the development of this WHPP, the RWPC decided to focus regional and local management efforts on public awareness and integration of wellhead protection planning efforts into the existing regulatory framework, rather than creating an additional layer of regulations by establishing an ordinance or other regulatory guideline for the prohibition of certain activities within WHPAs. A discussion of the regional and local management efforts developed as part of this WHPP follows.

In this Regional WHPP, each member community in the RWPC plays a role in protecting the groundwater supplies of the entire area by pooling resources and management efforts to target an audience beyond that which could be reached at a local level. The following regional management strategies were developed as part of this WHPP.

- A regional contaminant source inventory maintained in GIS by the County.
- A regional water quality database maintained in GIS by the County.
- Coordination with existing regulations and regulatory agencies, including:
    - ⇒ Future coordination of inventory and water quality database updates with DOH and DOE;
    - ⇒ Identification of potential contamination sources by DOH during sanitary surveys;
    - ⇒ Prioritization of hazardous materials assistance efforts to area businesses within WHPAs;
    - ⇒ Development of a Property Disclosure Statement Addendum supported by the Washington State Association of Realtors for the purpose of gathering information on private and improperly-abandoned wells;
    - ⇒ Compilation of a database of private and improperly-abandoned wells by DOE and Yakima County;
    - ⇒ More thorough planning reviews of development within WHPAs administered by each local purveyor; and
    - ⇒ Development of a process to notify developers of wellhead protection planning efforts within WHPAs.
- An Internet site on the World Wide Web providing information on the regional WHPP.
- Wellhead protection literature, logo, posters, decals, and videos.
- Pamphlet distribution at the Central Washington State Fair.

In addition to the regional management strategies discussed above, the following local management strategies tailored to each purveyor have been developed:

- Public meetings
- Street signs designating WHPAs
- Annual school seminar program
- Development of a pollution prevention program

Within the pollution prevention program and required by WAC 246-290-135, the RWPC must notify all potential contamination sources within the WHPAs. These include the owners and operators of point source potential contaminant sources like businesses storing hazardous wastes and owners and operators of non-point sources like property owners with septic tanks and private wells. In this plan, the RWPC has made every effort to comply with this requirement and notify potential contamination sources within the WHPAs. However, because the Yakima County Assessor and DOE databases are currently being developed, some sources were not notified. Approximately 4,000 sites were notified with site information provided in Appendix N. The RWPC will continue to work with the Assessor's Office and DOE to develop accurate inventories and will include the most accurate information in each biennial update of the WHPP.

The RWPC's commitment to these wellhead protection management strategies will help ensure lasting water quality and quantity in the Upper Yakima Valley. The annual cost of maintaining this high level of commitment is estimated at $2,300 per purveyor, of which $1,800 will consist of each purveyor's internal costs and $500 will consist of an annual payment to Yakima County for administration of regional management efforts.

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APPENDICES

LIST OF ACRONYMS

1. AC =	Asbestos-Cement Pipe
2. ADD =	Average Day Demand
3. AWWA =	American Water Works Association
4. BAT =	Best Available Technology
5. CAA =	Clean Air Act
6. CERCLA =	Comprehensive Environmental Response, Compensation, and Liability Act
7. CFR =	Calculated Fixed Radius Model
8. CFR =	Code of Federal Regulations
9. DOE =	Washington State Department of Ecology
10. DOH =	Washington State Department of Health
11. DOL =	State of Washington Department of Licensing
12. EHS =	Extremely Hazardous Substance
13. EPA =	Environmental Protection Agency
14. ESD =	Education Services District
15. GAC =	Granular Activated Carbon
16. GIS =	Geographical Information System
17. GPS =	Global Positioning System
18. HAZMAT =	Hazardous Materials
19. IOC =	Inorganic Compounds
20. IPMS =	Integrated Permit Management System
21. LEPC =	Local Emergency Management Committee
22. MCL =	Maximum Contaminant Level
23. MDD =	Maximum Day Demand
24. MSDS =	Material Safety and Data Sheet
25. MTCA =	Model Toxics Control Act
26. NAWQA =	National Water Quality Assessment
27. OSHA =	Occupational Safety and Health Administration
28. RCRA =	Resource Conservation and Recovery Act
29. RO =	Reverse Osmosis
30. RPM =	Revolutions Per Minute
31. RWPC =	Regional Wellhead Protection Committee
32. SARA =	Superfund Amendments and Reauthorization Act
33. SDWA =	Safe Drinking Water Act
34. SOC =	Synthetic Organic Compound
35. SOQ =	Statement of Qualifications
36. TPQ =	Threshold Planning Quantity
37. TRI =	Toxics Release Inventory
38. USGS =	United States Geologic Survey
39. VOC =	Volatile Organic Compound
40. WAC =	Washington Administrative Code
41. WHPA =	Wellhead Protection Area
42. WHPP =	Wellhead Protection Plan
43. WSP =	Water System Plan

REGIONAL WELLHEAD PROTECTION MANAGEMENT PLAN

REGIONAL WELLHEAD PROTECTION MANAGEMENT PLAN

INTRODUCTION

The following sections provide a discussion of the purpose and scope of the Upper Yakima Valley Regional Wellhead Protection Plan (WHPP), a regulatory overview of the statutory requirements for the development of plan, and background for the development of this regional effort among the eight major purveyors in the Upper Yakima Valley.

PURPOSE AND SCOPE

The purpose of the Upper Yakima Valley Regional WHPP is to prevent contamination of groundwater supplies in the Upper Yakima Valley. The scope of the Upper Yakima Valley Regional WHPP includes the delineation of wellhead protection areas, the identification of potential sources of contamination near the member purveyors' groundwater supplies, the implementation of management strategies to prevent contamination of those supplies, and the development of a contingency plan for contamination mitigation in the event that groundwater does become contaminated. In this Regional WHPP, each member community in the Upper Yakima Valley plays a role in protecting the groundwater supplies of the entire area by pooling resources and management efforts to target an audience beyond that which could be reached at a local level.

The scope of this WHPP consists of individual WHPPs for each of the eight major water purveyors in the Upper Yakima Valley and a Regional Wellhead Protection Management Plan that coordinates the implementation and collective long-term goals of the purveyors. The Upper Yakima Valley member purveyors include the following:

- City of Moxee
- Town of Naches
- Nob Hill Water Association
- City of Selah
- Town of Tieton
- City of Union Gap
- Yakima County
- City of Yakima

Each member purveyor's WHPP consists of 1) this Regional Management Plan detailing the regional management goals of the study and 2) an individual WHPP that describes the purveyor's specific physical and regulatory setting and defines the implementation of its local management efforts. Each purveyor's individual WHPP is divided into the following five sections:

- Water System Summary
- Wellhead Protection Area Delineations
- Inventory of Potential Contamination Sources
- Contingency Plan
- Local Wellhead Protection Management Plan

REGULATORY OVERVIEW

The 1986 Amendments to the federal Safe Drinking Water Act (SDWA) mandated that every state develop a wellhead protection program. Under the program, the SDWA requires that all federally defined public water systems using groundwater as their source develop and implement a Wellhead Protection Plan. Public water systems (Group A in Washington State) are defined both federally and in the State of Washington as those systems that serve 25 or more people or 15 or more connections for more than 60 days/year.

In Washington, the Department of Health (DOH) was assigned the task by the Governor of developing and administering the program. Sections of the Washington Administrative Code (WAC) addressing Group A water system requirements (WAC 246-290) were amended to include mandatory wellhead protection measures. According to WAC 246-290-135, the wellhead protection requirements for Group A water systems are:

I. Purveyors of water systems using groundwater or spring sources shall develop and implement a wellhead protection program.

II. The wellhead protection program shall be part of the Water System Plan (WSP) required under WAC 246-290-100 and WAC 246-290-410.

III. Wellhead protection programs shall contain, at a minimum, the following:

   A. A susceptibility assessment;

   B. Wellhead Protection Area (WHPA) delineations for each well using approved DOH guidelines;

   C. A list of all actual and potential groundwater contamination sources located within the defined WHPAs and the list shall be updated biennially;

   D. Documentation of the purveyor's notification to all owners of actual and potential contamination sources within the WHPAs;

   E. Documentation of the purveyor's notification to regulatory agencies and local governments of the boundaries of the WHPAs and the development of a contamination source inventory;

F. A contingency plan to ensure consumers have an adequate supply of potable water in the event that contamination results in the temporary or permanent loss of the principal source of supply; and

G. Documentation of coordination with local emergency spill responders.

The following WHPP addresses all of the requirements under WAC 246-290-135.

BACKGROUND

In the spring of 1994, the Washington State Department of Health invited representatives from the major municipal water purveyors in the Yakima area to a meeting in Yakima to discuss wellhead protection. Attending the meeting were representatives from the eight major water purveyors listed previously. At the time, none of the purveyors had prepared, or were in the process of preparing, the WHPPs that were required to be submitted to the DOH by July 1996.

The 1994 meeting generated interest in developing a regional wellhead protection plan rather than numerous individual plans. Above all, the group recognized the need to provide a coherent long-term approach to groundwater quality management in the Yakima area. The group also saw that there were economies in teaming its resources, and that a regional WHPP could provide consistency in the Yakima urban area where WHPAs were likely to cross jurisdictional boundaries.

That first meeting led to subsequent meetings where it was eventually decided that the group should form a regional wellhead protection committee. The committee's first action was to submit an application to the Washington State Department of Ecology (DOE) for Centennial Clean Water funding in February 1995. This initial application was unsuccessful. However, the committee met again in the fall of 1995 and found that the interests and needs that initially brought the committee together were still there, and submitted a second application for a Centennial Clean Water grant in February 1996. The DOE approved the application and the Centennial Clean Water grant was awarded in the summer of 1996. Yakima County was designated as the lead agency for coordinating both the short-term and long-term efforts of the wellhead protection program.

In the fall of 1996, the committee signed an interlocal agreement officially creating the Regional Wellhead Protection Committee (RWPC). A copy of this agreement is presented in Appendix A. It was recognized that Nob Hill Water Association was not eligible for the grant funding. However, because of the importance of including this major water purveyor in the regional wellhead protection effort, it was agreed that Nob Hill's wells would be considered to be part of Yakima County's wellhead protection responsibility in this report.

In October 1996, Yakima County requested Statements of Qualifications for engineering services for the preparation of the WHPP. In March 1997, Gray & Osborne Consulting

Engineers was selected to coordinate the development of the Upper Yakima Valley WHPP. Also in March 1997, Gray & Osborne selected the geotechnical firm Shannon & Wilson, Inc. to provide hydrogeologic services for the development of the wellhead protection area delineations.

REGIONAL MANAGEMENT PLAN

The purpose of the regional management plan is to provide a coherent, long-term approach to groundwater quality management in the Yakima area and to coordinate local management efforts. Implementation of the regional management plan includes the following regional wellhead protection management goals:

- development of a wellhead protection management team
- regional contaminant inventory monitoring
- regional water quality monitoring
- more detailed review of land use changes or development in WHPAs
- coordination with existing regulations and regulatory agencies
- public education efforts
- coordination of local management efforts

A description of each of these elements is provided in the following sections.

WELLHEAD PROTECTION MANAGEMENT TEAM

Establishing a WHPP management team is the first essential step in developing an effective wellhead protection program. The team's mission is to address the concerns of various facility groups, consider public input when evaluating the options for wellhead protection, and assist in education and implementation of the program.

The core group of the Wellhead Protection Management Team is the RWPC, consisting of representatives of each of the eight water purveyors. In addition, representatives of local government have agreed to participate in the program and appear as guests to RWPC meetings upon request. Table R-1 summarizes the Wellhead Protection Management Team representatives and their corresponding contact numbers.

The members of the Wellhead Protection Management Team have made a long-term commitment to the protection of the groundwater supplies in the Upper Yakima Valley. Within the Wellhead Protection Management Team, the members of the RWPC have signed a new interlocal agreement in 1998 that documents the requirements of each member for the administration of the WHPP and for the biennial updates of the WHPP required under WAC 246-290-135 (Appendix A). An estimate of the responsibilities, staff hours, and costs associated with the continuing maintenance of the WHPP is presented in Appendix B.

Table R-1: Upper Yakima Valley Wellhead Protection Committee

Member Representative	Representative Group	Contact Number
Mr. Joe Stump	RWPC - Yakima County	(509) 574-2300
Mr. Dave Brown	RWPC - City of Yakima	(509) 575-6204
Mr. Carl Strickland	RWPC - Town of Tieton	(509) 673-3162
Mr. Dennis Henne	RWPC - City of Union Gap	(509) 248-0432
Mr. John Elsden	RWPC - Town of Naches	(509) 653-2647
Mr. Byron Adams	RWPC - City of Moxee	(509) 575-8851
Mr. Bill Trout	RWPC - City of Selah	(509) 698-7365
Mr. Preston Shepherd	RWPC - Nob Hill Water Association	(509) 966-0272
Guest	Yakima County Planning	(509) 574-2230
Guest	Washington State Dept. of Health	(509) 456-3115
Guest	Washington State Dept. of Ecology	(509) 575-2491

As discussed in the 1998 interlocal agreement in Appendix A, a Yakima County Public Works representative is designated to be the first chair of the RWPC. The responsibilities of the chairman include coordination of the semi-annual meetings and contact with regulatory agencies over the two-year term.

REGIONAL CONTAMINANT SOURCE INVENTORY

As part of the regional wellhead protection management plan, Yakima County plans to store and maintain the regional contaminant source inventory on its Geographic Information System (GIS). The GIS links contaminant inventory and water quality database information to regional mapping for easy storage, retrieval, and analysis of the data. Correlation of these inventory sources with the water quality database discussed in the next section may reveal trends that can be targeted in management efforts.

Per the requirements of WAC 246-290-135, biennial updates of this inventory will be required. Every two years, Yakima County Public Works will obtain updated databases from regulatory agencies to update this database. Additionally, each RWPC member will review its WHPA contaminant inventories, in particular the High Risk Business inventory, for changes or updates and provide Yakima County with a current local inventory. Table R-2 summarizes the available databases that will be updated every two years and the contact personnel that maintain the individual databases.

Additionally, the LUST, UST, and CSCS list can be downloaded from the Internet at the following site:

http://www.wa.gov/ECOLOGY/tcp/cleanup.html

Table R-2: Contaminant Inventory Database Contacts

Contact	Phone	Database
Idell Hansen, DOE Community Right-To-Know	(360) 407-6727	Hazardous Materials Toxic Release Inventory
Ed Bentley, Hazardous Waste Program	(360) 407-6466	RCRA Businesses
DOE Toxics Cleanup Program	(360) 407-7170	USTs and LUSTs
DOE Toxics Cleanup Program	(360) 407-7170	Confirmed or Suspected Contamination Sites (CSCS)
John Storman, DOE, Solid Waste Division	(360) 454-7293	Solid Waste Facilities or Landfills
DOE Water Resources	(509) 575-2491	Improperly Decomissioned Wells
Yakima County Health District	(509) 575-4040	Private Wells / Septic Tanks

REGIONAL WATER QUALITY MONITORING DATABASE

As part of the regional wellhead protection management plan, Yakima County plans to store and maintain the regional water quality database. This database, which will be integrated into the County's GIS, will provide the members of the Wellhead Protection Management Team with the ability to track water quality contaminants on a regional basis and to monitor the effectiveness of its management efforts. The scope of these data includes the following water quality parameters from both Group A and Group B community water systems in the Upper Yakima Valley:

- inorganic chemical and physical constituents (IOCs)
- volatile organic compounds (VOCs)
- synthetic organic compounds (SOCs)
- nitrates
- trihalomethanes
- radon

This database will serve as an early warning system of contamination migration in the subsurface. By converting the contaminant source inventory and water quality database to GIS, contaminants and their sources can be mapped geographically, which will better enable the RWPC to assess the threat to groundwater within the WHPAs. This database will be updated biennially by Yakima County Public Works..

The contact for future updates is:

Ms. Ginny Stern
Washington State Department of Health
PO Box 47822, Olympia, WA 98504
1-360-236-3134

REGIONAL COORDINATION

There is a fundamental need for regional coordination of this wellhead protection plan because the majority of the wellhead protection area delineations lie both in city and county jurisdiction. Only the City of Yakima and the City of Union Gap have WHPAs that currently lie completely within its city limits. However, because 1) future wells drilled by these purveyors may have WHPAs that extend into Yakima County; and 2) future revisions to existing WHPA delineations may result in portions of the WHPAs outside of purveyor city limits; and 3) because of the benefits of a regional management approach to wellhead protection planning, a discussion of Yakima County's coordination efforts is presented in the regional plan for all of the RWPC member purveyors.

As the lead agency of this WHPP, Yakima County is responsible for administering the long-term regional goals of this plan. The other member purveyors of the RWPC share in both the responsibility and the cost associated with this regional effort, as summarized in Appendix B. Table R-3 summarizes the current jurisdictions and responsibilities for the RWPC member purveyors with respect to planning review and permitting. As shown in the table, several municipalities currently contract these services with Yakima County. The RWPC will update this table if needed in its biennial WHPP update should additional wells be drilled or contract changes occur.

Yakima County's existing regulatory framework either directly impacts or will impact each member purveyor's wellhead protection planning efforts and is the cornerstone of the regional effort. The following sections present a discussion of how the wellhead protection planning efforts were incorporated into the existing county regulatory framework. Because each member purveyor's planning review processes are unique, a discussion of how each purveyor will manage its WHPAs within its corresponding jurisdiction is presented in the local management plans.

Yakima County Public Works

Yakima County Public Works will be the long-term coordinator of the regional interests of the WHPP. As the lead agency and initial chair of the RWPC, the DOH will look to Yakima County for coordination of the review and update process. Yakima County Public Works will continue to remain an integral part of the administration of the WHPP, even in years when it does not chair the RWPC, because Yakima County houses the databases used in the administration of the regional management goals. The 1998 Interlocal Agreement in Appendix A includes a discussion of the RWPC chair responsibility.

The contact for coordination of Yakima County Public Works efforts is:

Mr. Joe Stump
Yakima County Public Works
128 North 2nd Street, Room 408, Yakima WA 98901-2614
(509) 574-2300

Table R-3: Summary of City and County Jurisdictions/Responsibilities within WHPAs

RWPC Member Purveyor	Plat, Zoning, and SEPA Review Within Purveyor Limits	Plat, Zoning, and SEPA Review Outside Purveyor Limits	Building Permits Within Purveyor Limits	Building Permits Outside Purveyor Limits
Yakima County	Yakima County	Yakima County	Yakima County	Yakima County
City of Yakima [1]	City of Yakima	N.A.	City of Yakima	N.A.
Town of Tieton	Town of Tieton	Yakima County	Town of Tieton	Yakima County
City of Union Gap [1]	City of Union Gap	N.A.	City of Union Gap	N.A.
Town of Naches [2]	Town of Naches	Yakima County	Yakima County	Yakima County
City of Moxee	City of Moxee	Yakima County	City of Moxee	Yakima County
City of Selah [3]	City of Selah	Yakima County	City of Yakima	Yakima County
Nob Hill Water Association [4]	City of Yakima	Yakima County	City of Yakima	Yakima County

[1] The City of Yakima and the City of Union Gap do not currently have any WHPAs that extend into Yakima County jurisdiction. However, future wells or revisions of the existing WHPAs may require future coordination with Yakima County.
[2] The Town of Naches currently contracts building permits services with Yakima County.
[3] The City of Selah currently contracts building permits services with the City of Yakima.
[4] Because a portion of the Nob Hill Water Association WHPAs lies within both the City of Yakima's city limits and Yakima County, these purveyors are responsible for planning review and building permits within their jurisdictions.

Yakima County Permit Services

One of the fundamental regional goals of this wellhead protection plan is to provide wellhead protection information to those proposing development or changes within the WHPAs. In response to this goal, Yakima County plans to develop a tag in its integrated permit management system, Tidemark. The tag will apply to each parcel within a wellhead protection area. Any time a building permit is applied for on one of these parcels, the tag will alert County staff as to the parcels location within a WHPA. Information about the importance of wellhead protection can then be provided to those requesting the building permit.

In addition to developing the tag, Yakima County is looking at ways to allow information obtained during the building permit application process to be electronically downloaded from the Tidemark system to the contaminant source inventory. Once implemented, the Tidemark system could be used as another tool for keeping the contaminant source inventory current.

The intent of developing a tag within the Tidemark system is not to hinder or further regulate development or construction within the WHPAs, but rather to ensure that information on new development within WHPAs is incorporated into the regional WHPP database, and that new property and business owners within the WHPAs are provided with essential information on wellhead protection.

The contact for coordination with Yakima County Permit Services is:

Mr. Dave Saunders
Yakima County Permit Services
128 North 2nd Street, Room 400
Yakima WA 98901-2614
(509) 574-2360

Member Purveyors Permit Services and Planning Review

Each of the member purveyors of the RWPC performs its own plat review, zoning changes, building permits, and general planning within its city limits with the exception of 1) the Town of Naches and City of Selah, whose building permits are administered by contract with Yakima County; and 2) the Nob Hill Water Association, which is not a municipality. Applications for zoning changes, plat review, or building permits within the WHPA of a jurisdiction will trigger a more comprehensive information-gathering process. Because not all of the RWPC purveyors currently have access to the County GIS zoning overlays, this trigger will be facilitated by a parcel list and accompanying parcel map of areas enclosed by the WHPAs. It is expected that this information will eventually be available at the County's website.

RWPC members reviewing development for parcels within WHPAs will complete a planning review form. The purpose of this review form is to track additional inventory sources entering the WHPA and provide information to business and property owners about

the importance of wellhead protection planning. Information requested on the form is similar to the information collected by the County in its Tidemark system, and includes the type of business, type of utility service (i.e. water and sewer), and information about private wells on the property. Information collected on the form will be used by each RWPC member when updating their contaminant inventory. Following completion of the form, copies will be sent to DOE for its records. A copy of the form is included in Appendix O. Every two years, this information will be included in Yakima County's regional wellhead protection database and updated mapping will be sent to each RWPC member.

Yakima County Solid Waste

The Solid Waste Division of Yakima County Public Works administers the collection of household recyclables and hazardous wastes in the Upper Yakima Valley. Drop-boxes and collection facilities are open daily throughout the Valley and special hazardous waste collection days are organized and advertised several times each year.

The collection of hazardous wastes by the Solid Waste Division may be divided into four major categories: household recyclables, household hazardous wastes, used oil recycling, and small quantity generator recycling. Literature on collection times, locations, and materials are presented in Appendix M. Household recyclables include conventional household products such as aluminum, glass, and cardboard, but also motor oil and household batteries. Household hazardous wastes include paint thinner, pesticides, disinfectants, and antifreeze. The small quantity generator program applies to businesses that generate less than 1,000 kg of hazardous wastes each month and are therefore exempt from RCRA's cradle-to-grave management of hazardous wastes. This program allows businesses to dispose of these substantial amounts of hazardous waste in a safe manner.

The contact for coordination of solid waste issues is:

Ms. Teresa Eturaspe
Yakima County Solid Waste
105 East "A" Street
Yakima WA 98901
(509) 574-2454

Yakima County Geographic Information System (GIS)

Yakima County GIS will maintain the databases and mapping used in the administration of the wellhead protection plan. Both the water quality and potential contaminant source inventory will be retained and updated on GIS for use and distribution to the members of the RWPC. Additionally, GIS will implement the parcel tags in Tidemark to trigger a more thorough review of development or changes in land use within the WHPAs. Each RWPC member will summarize any changes to their respective inventories every two years, and forward those changes to Yakima County for inclusion in the regional contaminant inventory database..

The contact for coordination with Yakima County GIS is:

Mr. Mike Vachon
Yakima County GIS
128 North 2nd Street, Room 421
Yakima WA 98901
(509) 574-2990

Yakima County Planning

As discussed previously, one of the fundamental regional goals of this wellhead protection plan is to provide information on the need for wellhead protection to those proposing development or changes within the WHPAs. To help accomplish this, Yakima County Planning will complete the planning review form when reviewing requests for changes in land use or zoning within WHPAs. Copies of this form will be distributed to Yakima County Public Works and DOE. This information may also be considered under the State Environmental Policy Act review by Yakima County where appropriate. Copies of the review form are available in Appendix O.

The contact for coordination with Yakima County Planning is:

Mr. Steve Erickson
Yakima County Planning
128 North 2nd Street, Room 417
Yakima WA 98901
(509) 574-2230

Yakima County Health District

Yakima County Health District has recently begun updating its parcel-based septic tank inventory to Global Positioning System (GPS) technology and GIS as part of the Integrated Permit Management System (IPMS). Because of limited staffing, the District plans to first locate new septic tanks, followed by existing septic tanks whenever possible. Additionally, the Health District will locate any wells (active or decommissioned) present on a parcel during a site visit with GPS for inclusion in the GIS system. Yakima County GIS plans to add these inventory items every two years during inventory updates.

The contact for coordination of these inventory items is:

Mr. Gordon Kelly
Yakima County Health District
104 North 1st St.
Yakima, WA 98901
(509) 575-4040

Yakima County Information Services

Yakima County Information Services administers Yakima County's Internet service and maintains its World Wide Web site. A wellhead protection website is one of the public outreach efforts proposed in this regional management plan. Yakima County Information Services will maintain this website as a link off the Public Works home page at the following address:

http://co.yakima.wa.us/publicworks/wellhead/index.htm

During each biennial update, Yakima County Public Works will coordinate with Information Services and GIS for the update of the website to include changes to the inventory, progress of existing management strategies, and new management efforts.

The contact for coordination with Yakima County Information Services is:

Mr. Kevin Wickenhagen
Yakima County Technology Services
128 North 2nd Street, Room 200
Yakima WA 98901
(509) 574-2000

Yakima County Emergency Management

One of the most important parts of wellhead protection planning is the development of a contingency plan to ensure that proper procedures are developed to mitigate the impact of spills near wellheads. Yakima County's Local Emergency Planning Committee (LEPC) is coordinating contingency planning for a variety of spill response scenarios. One of the primary goals in these spill response procedures is the identification of critical structures that may be impacted by a spill. Hospitals, schools, and other populated structures are all examples of critical structures. As part of the regional wellhead protection planning efforts, Yakima County LEPC will help coordinate the 6-month WHPA as a critical "red zone" of high risk potential and will designate each of the wells as critical structures to be identified and protected during a spill response.

The contact for future coordination with the LEPC is:

YCEM Director
Yakima County, Office of Emergency Management
128 North 2nd Street, Room B10
Yakima, WA 98901

EXISTING REGULATIONS/REGULATORY AGENCY COORDINATION

Water quality and potential contaminant sources in Yakima County are already governed by several regulatory agencies and entities. Additionally, coordination of non-profit and service groups in Yakima County can further improve the integration of wellhead protection planning management goals into the existing regulatory framework. Coordination of the following entities has been addressed in this plan:

- Washington State Department of Health
- Washington State Department of Ecology
- Washington State Department of Transportation
- Washington Association of Realtors
- Education Services District (ESD)

These agencies or entities implement and enforce numerous regulations designed to protect the integrity of the ground and surface waters in Yakima County. These regulations include the following:

- Washington State Administrative Code, including drinking water regulations and wellhead protection planning
- Resource Conservation and Recovery Act
- Comprehensive Response, Conservation, and Recovery Act
- Superfund Amendments and Reauthorization Act

Because of the numerous existing entities and regulations designed to protect groundwater supplies, it is the intent of this plan to integrate the wellhead protection planning efforts discussed in this plan into the existing framework of regulations. The following sections discuss the regional wellhead protection management goals of this plan that have been integrated into the existing framework of government agencies and other entities.

Washington State Department of Health

The DOH maintains a state-wide water quality database of the results of drinking water monitoring required by WAC 246-290. As discussed previously, monitoring data for VOCs, SOCs, IOCs, nitrates, trihalomethanes, and radon are available to Yakima County. This database will serve as an early warning system of contamination migration in the subsurface and will be updated every two years by Yakima County.

Additionally, the DOH is responsible for verifying the sanitary control zone as well as performing sanitary surveys on existing water system facilities. Sanitary surveys are comprehensive reviews by DOH staff of a water system's facilities and operation and maintenance practices. In 1997, the DOH performed over 400 sanitary surveys statewide. In addition to the field data already being collected during sanitary surveys, DOH staff

will identify potential contamination sources within the 10-year WHPA contaminant inventory. DOH will provide this information to Yakima County GIS for inclusion in the contaminant database. The DOH will also provide parcel locations of all new source approvals and will require identification of potential contamination sources for approval of all new sources within a 10-year WHPA as discussed in the DOH coordination letter presented in Appendix O.

The contact for future coordination with the DOH is:

Ms. Michele Vazquez
Washington State Department of Health
1500 West 4th Avenue; Suite 305
Spokane, Washington 99204
(509) 456-2774

Washington State Department of Ecology

Several departments within the DOE maintain databases of potential contaminant sources around the state. These databases (specifically, UST, LUST, RCRA Businesses, Hazardous Materials, CSCSs, Toxic Release Inventory, and Solid Waste Facilities) form the foundation of the inventory of potential contamination sources in this plan. These databases enable the Wellhead Protection Management Team to prioritize its management efforts to those facilities that are the greatest risk to the WHPAs. Every two years, Yakima County will coordinate with DOE to obtain those databases and integrate them into the existing inventory.

During the development of this plan, the DOE databases were retrieved and input into Yakima County GIS. A street address search was run to locate potential contamination sites on map; a copy of inventory mapping is presented in the local plans and a summary of each communities contaminant source inventory database is presented in Appendix K. Some addresses could not be located because the specific street address provided by DOE was incompatible with the GIS search routine. This incompatibility was due to spelling errors, P.O. Box listings, or other factors. A parcel-based search was completed that located some additional addresses. Additional effort was applied to visibly check the list of rejects and correct those that were easily identifiable (i.e., State Route 12 instead of Highway 12). However, of the over 5,000 inventory items located in the database, approximately 30 percent could not be located or corrected because of the lack of data.

The DOE is aware of the problem and attributes it to property owners incorrectly inputting address information on disclosure forms. The DOE plans to move to Global Positioning System (GPS) locating of these sites in the future. Until that transition is made, future biennial updates of the inventory are likely to continue to yield sites that cannot be specifically targeted with RWPC management efforts.

Another coordination effort implemented by DOE deals with the prioritization of hazardous materials assistance visits within WHPAs. The Hazardous Waste & Toxics Reduction Program routinely perform hazardous materials assistance visits to help area businesses properly manage hazardous wastes. Businesses are targeted that fall below RCRA and SARA regulatory compliance levels (Appendix I), but who still maintain an inventory of hazardous materials. The DOE shares hazardous waste minimization, disposal, and safety information (Appendix D) and encourages business owners to manage waste responsibly. The DOE has agreed to prioritize initial and return visits on the assistance visits to businesses identified in the inventory. By integrating wellhead protection efforts into DOE hazardous materials management, the risk associated with the businesses identified in the inventory is reduced. The contacts for additional information and future coordination are:

Mr. Brian Dick, Hazardous Waste and Toxics Reduction Program, Section Manager
Mr. Jim Pearson, Hazardous Waste Technical Assistance Officer
Department of Ecology
Central Regional Office
15 W Yakima Ave, Suite 200
Yakima, WA 98902

An additional coordination effort developed as part of this plan includes the identification of private and improperly-decommissioned wells within WHPAs. Part of the more comprehensive planning review form is the required disclosure of well information (Appendix O). Submittal of the disclosure forms to DOE Water Resources will enable DOE to strengthen its database on the location of private wells and target improperly-decommissioned wells for subsequent clean-up. The contact for additional information and future coordination is:

Water Resources Program
Department of Ecology
Central Regional Office
15 W Yakima Ave, Suite 200
Yakima, WA 98902

Washington State Department of Transportation (WSDOT)

The Washington State Department of Transportation and the RWPC have coordinated wellhead protection efforts as part of this regional plan. The WSDOT will consider wellhead protection guidelines in the following activities: geotechnical drilling, new construction environmental review, stormwater treatment best management practices, rating, ranking, and retrofitting stormwater outfalls, traffic accident incident response, vegetation management practices, and winter deicing and anti-icing practices. The RWPC has provided the WSDOT with a copy of the Regional WHPP and a coordination letter from the WSDOT is provided in Appendix. O.

Washington Association of Realtors

One of the most critical potential contamination sources identified in the inventory is existing private wells that have been improperly removed from service or decommissioned. In some cases, these wells can act as conduits for the migration of surface contaminants into the groundwater and can lead to the rapid and catastrophic contamination of the water supply. While the DOE is charged with the management of these decommissioned wells, the vast majority have not been recorded or identified. Wellhead protection planning can be a vehicle for identifying these wells and minimizing their potential impact on groundwater supplies.

The Washington Association of Realtors can aid in the identification of improperly decommissioned private wells by adopting the enclosed Property Disclosure Statement Addendum (Appendix O). This addendum provides questions on the number of wells on the property, the characteristics of the wells, and the history of their use. The addendum requires mandatory notification of the property buyer from the property seller and optional notification of this information to the DOE. Optional, rather than mandatory, notification to DOE has been proposed because the existing disclosure form is a confidential disclosure between the two involved parties; and mandatory notification would require legislative action. By providing documentation on the nature and extent of decommissioned wells on all property transfers, the DOE can begin to manage these wells under the requirements of WAC 173-160-381 and reduce the potential impact of these contamination sources. This information would be submitted to DOE, and following its inclusion in DOE's GIS system (under development), it would be forwarded to County. The WAR has been contacted regarding the need for this issue and has agreed to consider the issuance of an addendum to the property disclosure statement. A draft petition letter has been developed (Appendix O) and the RWPC will work with DOE and WAR to facilitate this process.

The contact for additional information and future coordination is:

Ms. Jeannette Witham
Executive Officer
Yakima Association of Realtors and Multiple Listing Service
2707 River Road
Yakima, WA 98902

Education Services District (ESD)

The ESD provides continuing education for 22 area school districts for areas including Yakima, Selah, Toppenish, Tieton, Union Gap, Cle-Elum, Naches, Ellensburg, East Valley, West Valley, and Grandview. The ESD currently provides environmental and water-based curriculum through its high school Water Education Training (WET) Program and its K-8th Grade water curriculum. The ESD is interested in integrating wellhead protection planning efforts into the existing program ,which includes such topics as water quality, contaminant migration, wetlands issues, surface water

management, and other topics. Through the ESD, area teachers attend field trips and receive literature and laboratory setups to share with students.

The RWPC has met with the ESD to determine initial coordination efforts. The RWPC and the ESD have agreed to become partners in the dissemination of information and materials on wellhead protection to the teachers and students that the ESD mentors. The RWPC has provided the ESD with videos, literature, and a copy of the wellhead protection plan for use in their continuing education curriculum. Additionally, the RWPC will be available to coordinate an annual fieldtrip or seminar on wellhead protection. A coordination letter from the ESD has been provided in Appendix O.

The contact for additional information and future coordination is

Ms. Julie Bradley
Educational Service District 105
33 South 2nd Avenue
Yakima, WA 98902

United States Geologic Survey (USGS)

One of the goals of the USGS is to identify and establish water quality trends nationwide through the National Water Quality Assessment (NAWQA) program. The next round of funding for NAWQA studies may be funded in 1998 and the Yakima River Basin may be included in that study because Yakima County has previously been the site of a pilot study and because of continuing surface water quality problems in the area. The NAWQA study has focused on surface water issues in Yakima County in the past. However, because of the groundwater quality, water rights, and wellhead protection concerns in Yakima County, the RWPC has requested that the USGS expand the scope of the study to include groundwater issues. A copy of the coordination letter is available in Appendix O. The contact for future coordination efforts is:

Mr. Joe Rinella
United States Geologic Survey
10615 SE Cherry Blossom Drive
Portland, Oregon 097216

OTHER REGULATORY APPROACHES TO WELLHEAD PROTECTION

Wellhead protection can be accomplished by a variety of methods. Integration of wellhead protection goals into the existing regulatory framework and education of the public are the two primary management strategies adopted in this plan. However, there must be some methodology for the evaluation of the effectiveness of these management strategies in order to measure the success of the program. The RWPC will monitor the activity on the website and circulate a biannual questionnaire (Appendix O) to evaluate the public's awareness of wellhead protection issues.

In the event that these management strategies are ineffective in increasing the public's awareness of the need for wellhead protection planning or mitigating the risks posed by businesses within the WHPAs, the Wellhead Protection Management Team will consider other management strategies. Development of a wellhead protection ordinance is a regulatory management strategy that some purveyors have used to ensure protection of groundwater supplies. An ordinance may prohibit certain types of activities or businesses within the WHPAs or require additional containment and/or monitoring practices. This management strategy will be considered in the event that public awareness efforts and enforcement of existing regulations are not achieving the wellhead protection planning goals outlined in this plan.

PUBLIC EDUCATION

One of the fundamental management strategies of this wellhead protection plan is to inform the public of the need to protect groundwater supplies. In conjunction with the integration of wellhead protection goals into the existing regulatory framework of state and local agencies, education of the residents living and working within WHPAs has shown to be an effective and extremely important means of protecting groundwater from surface contamination.

Public education can be facilitated in many ways. In this WHPP, public education efforts are divided into regional public education efforts administered by Yakima County and local public education efforts promoted by the member purveyors of the RWPC.

Regional public education efforts include the following:

- an Internet site on the World Wide Web
- regional public meetings
- wellhead protection literature, logo, posters, decals, and videos
- hazardous waste clean-up days
- pamphlet distribution at the Central Washington State Fair
- development of a wellhead protection poster and decal

A discussion of the regional public education efforts is discussed in the following sections. Local public education efforts are discussed in each community's local management plan.

Internet Website

The Internet is rapidly becoming one of the most accessible and influential tools available for the dissemination of information. The development of an Internet site on the World Wide Web has the potential to become a significant public outreach tool for the Upper Yakima Valley WHPP. The website includes general information on wellhead protection, maps showing the wellhead delineations, downloadable inventories for each

WHPA and community, management tips for the general public on how to protect groundwater supplies, and links to other groundwater protection sites. Additionally, Yakima County plans to provide access to wellhead protection GIS databases late in 1998. Future updates of the website will ensure that the public has a source of comprehensive wellhead protection information. A copy of the information available in the website is presented in Appendix C. The website address is:

http://www.co.yakima.wa.us/Publicworks/wellhead/index.htm

Public Meetings

Public meetings were held throughout the development and preparation of the WHPP to provide opportunities for public comment and input. Table R-4 summarizes the regional meeting dates and forums.

Table R-4: Public Meetings

Date	Forum
March 19, 1997	League of Women Voters, Video Teleconference with Subsequent TV Coverage
Spring 2000	Sign Planting Ceremony, Press Conference, TV Coverage

Wellhead Protection Literature, Logo, Posters, Decals, and Videos

Public outreach information such as wellhead protection literature, logos, posters, decals, and videos is an important part of the RWPCs commitment to wellhead protection planning. A summary of the available literature is presented in the following sections.

Wellhead Protection Literature

Several informative pamphlets on wellhead protection, groundwater management, and hazardous waste reduction are available at no cost from the Environmental Protection Agency (EPA), State Dept. of Ecology, League of Women's Voters, the American Water Works Association (AWWA), the Groundwater Foundation, the National Drinking Water Clearinghouse, and others. A list of some of the information available is presented in each community's local WHPP and copies of pertinent documents are available in Appendix D.

Wellhead Protection Literature

The RWPC has developed a wellhead protection logo and letterhead for use in distributing notifications and provide a symbol that people will identify with wellhead protection. This logo also appears on the street signs discussed in the local management plan. A copy of the logo and letterhead is provided in Appendix F.

Wellhead Protection Poster

The RWPC is considering the development of a wellhead protection poster as an outreach tool to area businesses within WHPAs and for use with schools. Businesses in the WHPAs would be encouraged to show support for wellhead protection efforts by posting a wellhead protection poster in their business. The RWPC will consider developing this poster by the first biennial update.

Wellhead Protection Decals

A wellhead protection decal has been developed as an outreach area to area businesses within WHPAs and for use with schools. Businesses in the WHPAs and students will be encouraged to show support for wellhead protection efforts by utilizing decals. The RWPC will distribute decals on an annual basis depending on the yearly budget established as part of the Interlocal Agreement shown in Appendix A. A copy of the decal is available in Appendix F.

Wellhead Protection Videos

Several informative wellhead protection and water quality videos are available from the League of Women's Voters, the AWWA, the Groundwater Federation and others. Videos can be used as an outreach effort to area schools, to businesses, and for coordination with the ESD. A list of some of the videos available for purchase or rent include the following.

1. *Ethyl Mermaid & Tad Pole*, six video series, AWWA.
2. *Groundwater and the Ohio Wellhead Protection Program*, ODNR Video Productions, 1995.
3. *How to Host a Water Festival*, Groundwater Foundation.

Central Washington State Fair Pamphlet Circulation

In an effort to provide the public with a fundamental understanding of wellhead protection and the goals of the Upper Yakima Valley WHPP, a pamphlet was prepared with basic wellhead protection information and contact numbers for DOE, DOH, and Yakima County personnel involved in the project. The pamphlet was made available at a DOE booth throughout the course of the fair, which ran from September 19, 1997 to September 28, 1997. This pamphlet will continue to be made available in subsequent years at the fair. A copy of this pamphlet is available in Appendix E.

COORDINATION WITH LOCAL MANAGEMENT PLAN

In addition to the regional management strategies presented in the last section, individual management strategies tailored to protecting each communities groundwater have been developed. Local management plans consist of the following public education efforts:

- local public meetings
- street signs designating WHPAs
- annual school seminar program
- development of a local pollution program

Local public education efforts are discussed in each community's local management plan.

YAKIMA COUNTY WELLHEAD PROTECTION PLAN

YAKIMA COUNTY WELLHEAD PROTECTION PLAN

This Wellhead Protection Plan (WHPP) for Yakima County describes the relationship between the Yakima County WHPP and the Regional Wellhead Protection Management Plan discussed previously. Consistent with the County's DOH-approved Water System Plan, a 20-year planning period has been selected for this plan.

This plan is organized into the following major headings:

- Water System Summary
- Wellhead Protection Area Delineations
- Inventory of Potential Contamination Sources
- Contingency Plan
- Yakima County Wellhead Protection Management Plan

WATER SYSTEM SUMMARY

This section includes a brief discussion of the history of Yakima County and the characteristics of its water system components based on information provided in the draft 1997 Terrace Heights Water System Plan (1997 Water System Plan). For reference purposes, the County's DOH identification number is 06029J.

BACKGROUND

Yakima County's water system consists of the former Terraced Estates Water Company (TEWC) and the former Country Club District Water Company (CCDWC). Yakima County assumed ownership and operation of the TEWC system in 1991, and the CCDWC system in 1994. The two systems were combined in 1996 and are now called the Terrace Heights Water System. Being a County-owned facility, the Board of Yakima County Commissioners has jurisdiction over the system.

The TEWC was formed in the late 1970s to serve the Terraced Estates Subdivision, and subsequently expanded to serve the Country Meadows, Terrent Lane, and Horizon East developments. After acquiring the TEWC, the County constructed improvements to the system, which included a new well, booster station, transmission mains, reservoir and telemetry.

The CCDWC was formed to serve residential development in Terrace Heights, and has been expanded as development has occurred. After acquiring CCDWC, the County constructed improvements to the system, which included adding meters, rehabilitating well houses, adding an intertie to the TEWC, and other needed improvements.

The County's water system lies east of the Yakima River along the southern foothills of the Yakima Ridge. The Yakima River is a natural barrier that serves as a boundary

between the City of Yakima's water system and the County's water system. The Yakima Ridge to the north and the Moxee Valley to the east and south are generally undeveloped rangeland and rural agricultural land. Five irrigation canals are within the water system boundaries, the Roza Canal being the largest. Most of the former Country Club system receives irrigation water from one of the canals.

The County's system consists of six source wells, two booster pump stations, six pressure reducing stations, three reservoirs for a combined storage of approximately 1.65 MG, approximately 134,000 lineal feet of distribution pipe ranging in size from 2- to 16-inch galvanized steel, uncoated steel, cast iron and PVC, and a telemetry system. A map of the County water system components, water service area boundary, and zoning is shown on Figure YC-1.

SOURCE

The following sections provide a discussion of the characteristics, capacity, water rights, and water quality of the County's three wells.

Source Characteristics

A summary of the source characteristics of the County wells is provided in Table YC-1.

Table YC-1: Existing Domestic Source Data

Source	Parameter	Value
Well No. 1	DOH Source No.	SO1
(TEWC)	Status	Not in Use
Well No. 2	DOH Source No.	SO2
(TEWC)	Status	Primary
	Year Drilled	1978
	Total Depth	1,072 feet
	12-in casing depth	0 to 806 feet
	Open Hole	806 to 1,072 feet
	Emergency Power	None
	Flow (estimated)	230 gpm

Figure YC-1: System Components

Terrace Heights Wells

Terrace Heights 1
Terrace Heights 2
Terrace Heights 3
Terrace Heights 4
Terrace Heights 5
Terrace Heights 6
Kiwanis

- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead

Zoning

- Residential Single Family
- Residential Two Family
- Suburban Residential
- Rural Residential
- General Rural
- Local Business
- Central Business District Support
- Small Convenience Center
- Light Industrial
- Manufacturing
- Highway Commercial
- Planned Development

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October 27, 1969

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1 Inch = 2250 Feet

Table YC-1: Existing Domestic Source Data (continued)

Source	Parameter	Value
Well No. 3	DOH Source No.	SO3
	Status	Primary
	Year Drilled	1993
	Total Depth	2,421 feet
	Solid Casing Depth	0 to 1,725 feet
	10-in Perforated Casing Depth	1,725 to 2,421 feet
	Emergency Power	None
	Max. Flow (estimated)	1,500 gpm (V.F.D.)
Well No. 4	DOH Source No.	SO4
(CCDWC)	Status	Primary
	Year Drilled	1925
	Total Depth	420 feet
	8- and 10-in Solid Casing Depth	0 to 400 feet
	8-in Perforated Casing Depth	400 to 420 feet
	Pump type	Deep Well Turbine
	Pump discharge diameter	6-inch
	Motor size	15 bhp
	Emergency Power	None
	Rated Flow	200 gpm
	Max. Flow (estimated)	1,200 gpm
Well No. 5	DOH Source No.	SO5
(CCDWC)	Status	Primary
	Year Drilled	1946
	Total Depth	590 feet
	Perforated Casing Interval	544 to 568 feet
	Emergency Power	None
	Rated Flow	250 gpm
Well No. 6	DOH Source No.	SO6
(CCDWC)	Status	Primary
	Year Drilled	1983
	Total Depth	1,495 feet
	Casing Depth Screened Interval	0 to 1,495 feet Lowest is 770 feet
	Emergency Power	None
	Flow (estimated)	1,200 gpm

Water Rights

The County currently has a certified, total, primary, maximum instantaneous withdrawal water right of 6,155 gpm and a certified, total, primary, annual withdrawal water right of 4,858 acre-feet. A summary of the County's water rights is presented in Table YC-2.

In addition, the County has asserted that the 1981 water right GWC G4-27699P incorrectly asserts that the 1926 water right GWC 891-D is supplemental. The County's 1998 WSP, which is currently under review by the DOE, lists a total, primary, annual withdrawal water right of 5,020 acre-feet. Consistent with the 1998 WSP, the County's interpretation of its 5,020 acre-feet water right has been used in this WHPP.

Table YC-2: Yakima County Water Rights [1]

Source	Water Right Certificate Number	Priority Date	Maximum Instantaneous Withdrawal	Annual Withdrawal
Well No. 1	G4-25728P G4-25775P	11/9/77 3/14/78	800 gpm [P] 400 gpm [P]	741 acre-feet [P] 371 acre-feet [P],[S]
Well No. 2	G4-25648C	11/28/77	540 gpm [P]	448 acre-feet [P],[S]
Well No. 3	G4-31494P	10/14/92	2,250 gpm [P]	2,722 acre-feet [P]
Well No. 4	GWC 891-D	6/1/26	165 gpm [P]	162 acre-feet [P]
Well No 4 & No. 5	GWC 886-A	6/21/46	1,500 gpm [P]	1,210 acre-feet [P]
Well No. 6	G4-27699P	9/21/81	500 gpm [P]	376 acre-feet [S]
Totals:				
1 & 2	--	--	**1,740 gpm**	**926 acre-feet**
3	--	--	**2,250 gpm**	**2,722 acre-feet**
4, 5 & 6	--	--	**2,165 gpm**	**1,372 acre-feet**
All	--	--	**6,155 gpm**	**5,020 acre-feet**

[1] As interpreted by the County in 1997 Water System Plan.
[S] Supplemental water right, not additive.
[P] Primary water right, additive.

Water Quality

The County's sources have historically provided high quality water. Monitoring tests have been satisfactory except for a few isolated instances. In 1997, inorganic chemical analysis, turbidity, iron and manganese levels were found above the MCL in one or more of the wells. These constituents, which result primarily in aesthetic concerns, are not consistently above the MCL. In each case where a second inorganic test result was available, the constituent was below the MCL. It is believed that some of the unsatisfactory results could be from inadequate flushing of the wells prior to sampling.

The County has not recorded any volatile organic compounds (VOC) detections in routine monitoring. The County currently does not monitor synthetic organic compounds (SOC), as they applied for and received monitoring waivers for the 1996 to 1998 compliance period.

The County has had satisfactory coliform samples for the last several years. The last coliform-positive results were recorded in 1994, with three consecutive months testing positive within the Country Club system.

Additionally, samples for lead, copper, nitrates, fluoride and radio-nuclides have tested satisfactory. Hydrogen sulfide has been detected at Well No. 3, but a combination of chlorination and blending the water with one or more of the other wells seems to prevent complaints. Hardness, in the form of $CaCO_3$, varies from soft to hard.

As discussed in the Regional Wellhead Management Plan, the DOH routinely compiles all water quality data from Group A water systems into a public water quality database. The County will continue to sample its sources according to DOH requirements and will monitor any trends in water quality contaminants.

WELLHEAD PROTECTION AREA (WHPA) DELINEATIONS

The following section provides a discussion of Yakima County's WHPA delineations. A discussion of the mechanisms of groundwater contamination, methods for the delineation of WHPAs, and the decision-making process behind the development of the County WHPAs is presented in Appendix G.

The sources for the County were delineated using a simplified analytical model. A summary of the WHPA areas for each of the sources is provided in Table YC-3.

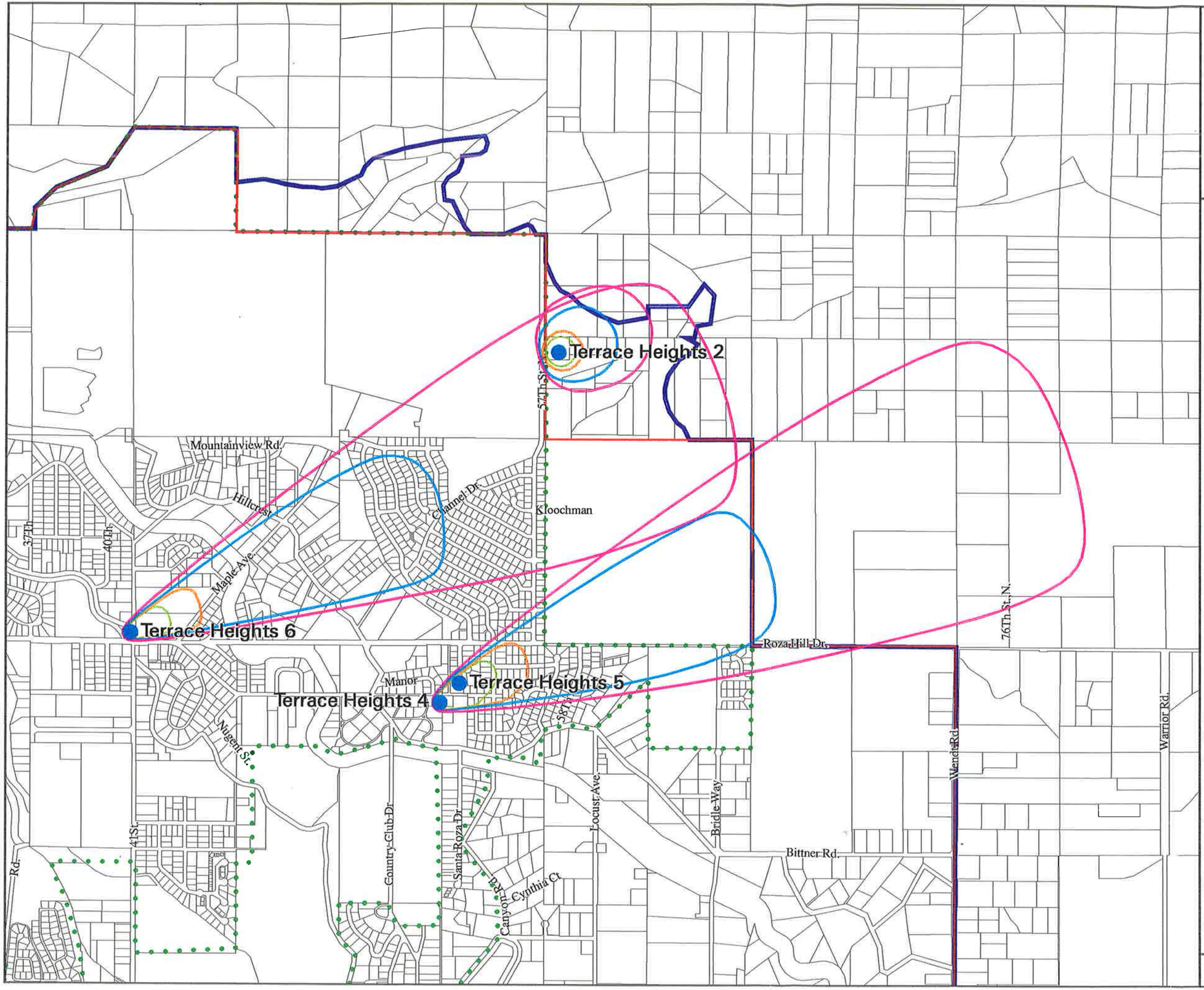
Table YC-3: WHPA Characteristics for the Simplified Analytical Model

Source	Simplified Analytical Model Area (acres)			
	6-Month	1-Year	5-Year	10-Year
Well No. 1	2.3	4.8	46.4	182.8
Well No. 2	2.7	4.7	17.4	36.0
Well No. 3	1.5	2.2	7.8	15.8
Well No. 4/5	7.1	14.5	129.6	463.3
Well No. 6	3.9	9.4	111.9	405.6

The delineated WHPAs for the Yakima County wells are shown on Figures YC-2 through YC-4. As shown in Table YC-3, the WHPA for Well No. 3, the County's largest-producing well, is smaller than other County wells with smaller rated capacities. As stated in the hydrogeologic report in Appendix H, the Well No. 3 WHPA is smaller than

Figure YC-2:
Yakima County Wellhead Protection Area Delineations

Terrace Heights Well No. 2, Well No. 4, Well No. 5 and Well No. 6



- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model

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October 26, 1999

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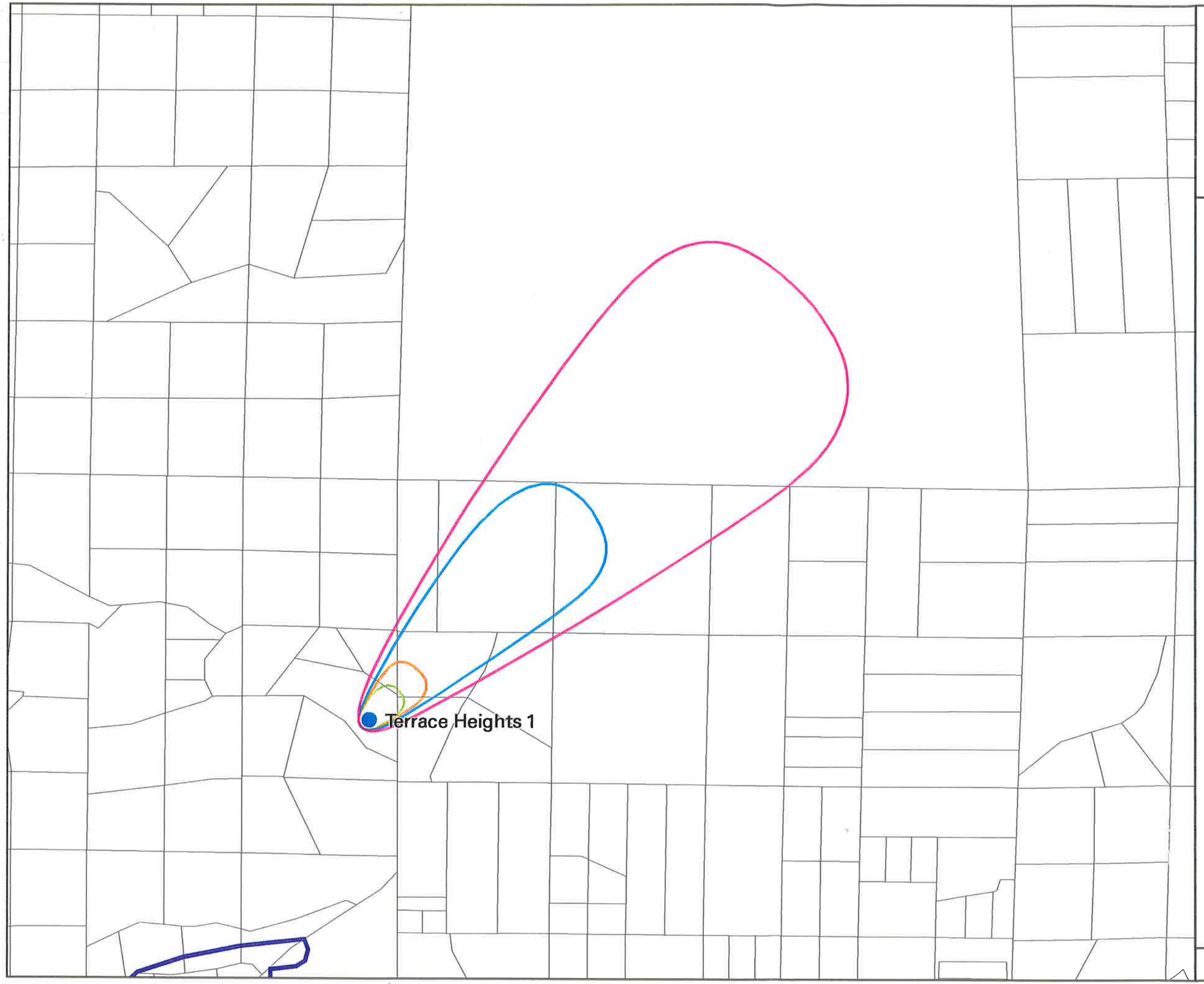
1 Inch = 1200 Feet

Figure YC-3:
Yakima County Wellhead Protection Area Delineations

Terrace Heights Well No. 1



- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model

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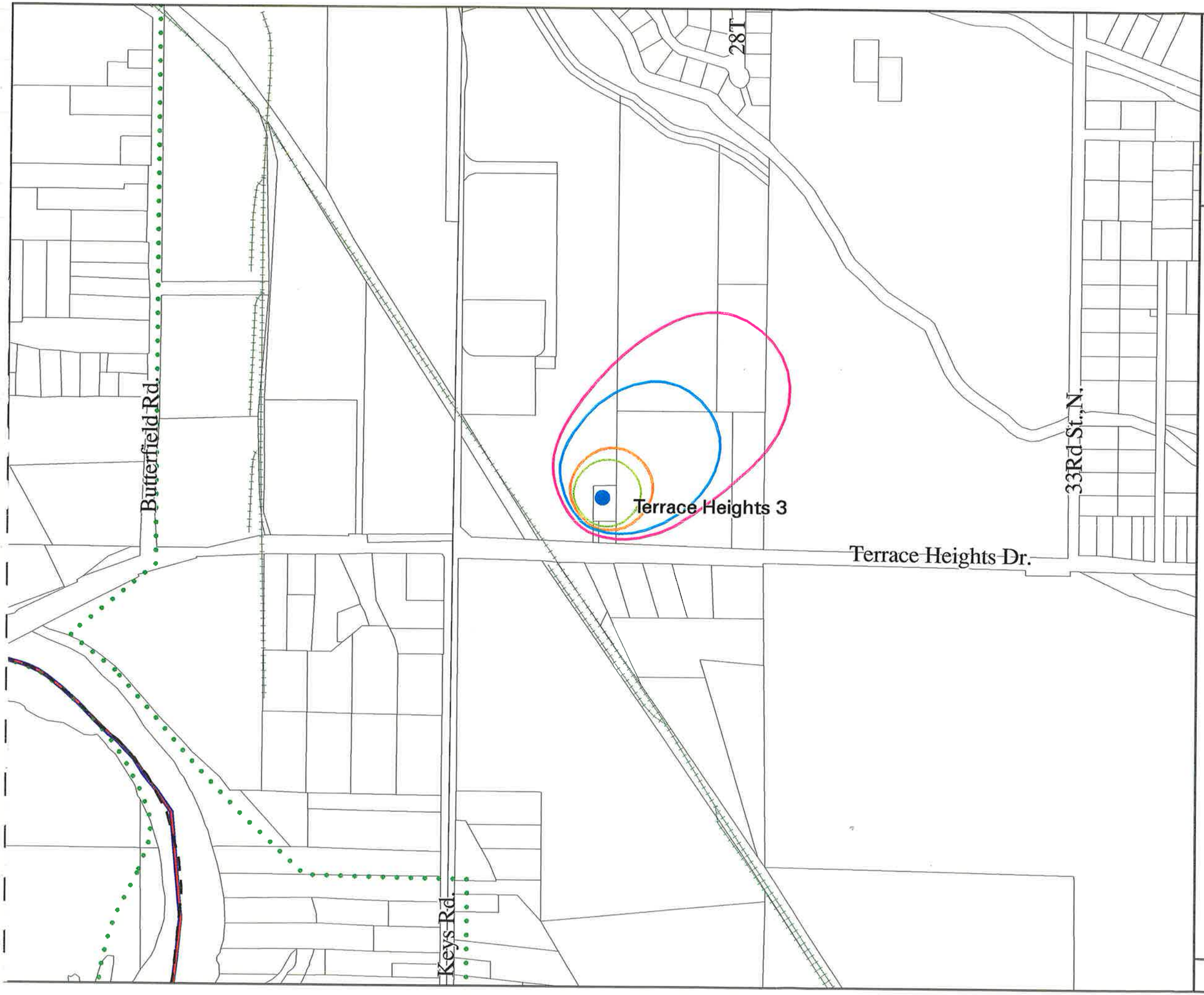
1 Inch = 800 Feet

Figure YC-4:
Yakima County Wellhead Protection Area Delineations

Terrace Heights Well No. 3



- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model

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October 28, 1999

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1 Inch = 400 Feet

the other wells because it pumps from a proportionately larger screened area. Therefore, both the groundwater velocity and the size of the WHPA is smaller.

INVENTORY OF POTENTIAL SOURCES OF CONTAMINATION

After delineating the WHPAs associated with the County's six wells, an inventory of existing and potential sources of groundwater contamination was compiled and mapped. Inventorying potential sources of groundwater contamination serves several functions in the scope of the WHPP. The inventory provides a comprehensive source of information about types of and risks from potential sources of contamination. By ranking contamination sources in the inventory, the County can formulate strategies for the management of those sources. Also, long-term tracking of the inventory and comparison with the water quality database established in the regional management plan will help in protecting the County's future groundwater supply.

DATA COLLECTION METHODOLOGY

In order to facilitate the update of this plan according to the biennial schedule outlined in WAC 246-290-135, existing, easily-accessible databases of potential contamination sources were explored. These sources form the foundation of the inventory database in the regional management plan compiled and stored with the GIS department of Yakima County. This database was augmented with a telephone book search of high risk businesses and a windshield survey of the WHPAs. A summary of the available data used to form the potential contamination source inventory and maps of the locations of these sources within the County WHPAs is presented in Appendix I.

INDIVIDUAL WELLHEAD CONTAMINANT INVENTORIES

Following a review of the available databases, susceptibility assessments, and the windshield survey, wellhead contaminant inventories for each of the County's sources were identified. The inventory of potential contamination sources for Well No. 1, through Well No. 6 is shown on Figure YC-5 through YC-7. These data are summarized in Tables YC-4 through YC-9.

Two types of notification were distributed to property owners, businesses, and residents within the WHPAs. Owners of businesses identified in the potential contaminant source inventory received notification letters detailing the literature and programs available to help them minimize their impact on the WHPAs. Property owners within the WHPAs received a residential notification discussing "common sense" safe water practices and programs available to help home-owners reduce their impact on the WHPAs. Copies of these notifications letters and the list of those notified are presented in Appendix N.

INVENTORY RANKING DEVELOPMENT

In order to focus wellhead protection and management efforts on the contamination sources which pose the greatest threat to the wells, the contaminant sources were ranked based on their relative risk. A contaminant risk ranking method is presented in the EPA's 1994 Groundwater and Wellhead Protection Handbook. This ranking method was developed during the Cape Cod Aquifer Management Project to evaluate the pollution potential from 32 land use categories. Sixteen types of contaminants were rated based on their overall threat to human health, their mobility, and whether they may occur naturally in significant concentrations. The overall threat to the water supply was determined by the number of contaminants associated with each land use category and the potential threat posed by each contaminant. A rank of low (L), moderate (M), or high (H) threat was assigned to each potential contaminant source located within a WHPA. The potential threat posed by each land use category is illustrated in Table YC-10. The ranking of the contaminant sources compiled in the County's wellhead protection inventory are summarized in Table YC-4 through YC-9.

Table YC-4: County Well No. 1 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	0	0	0	0	0
Leaking USTs [High Risk]	0	0	0	0	0
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	0	0	0	0	0
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Sewer Pipe [Low Risk]	--	Absent	Absent	Absent	Absent
Presence/Absence of Private Wells [3] [Low Risk]	--	Present	Present	Present	Present
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.
[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.
[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.
[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

Table YC-5: County Well No. 2 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	0	0	0	0	0
Leaking USTs [High Risk]	0	0	0	0	0
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	0	0	0	0	0
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Sewer Pipe [Low Risk]	--	Absent	Absent	Absent	Absent
Presence/Absence of Private Wells [3] [Low Risk]	--	Present	Present	Present	Present
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.

[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.

[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.

[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

Table YC-6: County Well No. 3 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	1	0	0	0	12728
Leaking USTs [High Risk]	1	0	0	0	12728
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	1	0	0	0	12728
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Absent	Absent	Absent	Absent
Presence/Absence of Sewer Pipe [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Private Wells [3] [Low Risk]	--	Absent	Absent	Absent	Absent
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.

[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.

[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.

[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

Table YC-7: County Well No. 4 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	0	0	0	0	0
Leaking USTs [High Risk]	0	0	0	0	0
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	0	0	0	0	0
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Absent	Absent	Present	Present
Presence/Absence of Sewer Pipe [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Private Wells [3] [Low Risk]	--	Absent	Absent	Present	Present
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.

[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.

[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.

[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

Table YC-8: County Well No. 5 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	0	0	0	0	0
Leaking USTs [High Risk]	0	0	0	0	0
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	0	0	0	0	0
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Absent	Absent	Present	Present
Presence/Absence of Sewer Pipe [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Private Wells [3] [Low Risk]	--	Absent	Absent	Present	Present
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.

[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.

[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.

[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

Table YC-9: County Well No. 6 Contaminant Inventory

Contaminant Category and Relative Risk [2]	Total Sites [4]	Database Reference[1]			
		6-Month	1-Year	5-Year	10-Year
Hazardous Substance Handlers (SARA Title III) [High Risk]	0	0	0	0	0
Hazardous Waste Treatment, Transport, Storage, or Disposal (RCRA) [High Risk]	0	0	0	0	0
Underground Storage Tanks [High Risk]	0	0	0	0	0
Leaking USTs [High Risk]	0	0	0	0	0
Confirmed / Suspected Contamination Sites (CSCS) [High Risk]	0	0	0	0	0
Solid Waste Facilities [High Risk]	0	0	0	0	0
Moderate Risk Businesses [Moderate Risk]	0	0	0	0	0
High Risk Businesses [High Risk]	0	0	0	0	0
Presence/Absence of Septic Tanks [3] [Low Risk]	--	Absent	Absent	Absent	Present
Presence/Absence of Sewer Pipe [Low Risk]	--	Present	Present	Present	Present
Presence/Absence of Private Wells [3] [Low Risk]	--	Absent	Absent	Absent	Present
Improperly Abandoned Wells [High Risk]	0	0	0	0	0
Wastewater Treatment Lagoons [High Risk]	0	0	0	0	0
Stormwater Injection Wells and Collection Basins [Medium Risk]	0	0	0	0	0
Presence/Absence of Railroad Lines (Low Risk)	--	Absent	Absent	Absent	Absent
Population Centers [Low Risk]	Yes	Yakima County Rural and Agricultural zoning provide for greater than one house per acre where water and sewer service are available. Areas where service in not available are not likely to have high population densities unless water and sewer service are developed.			
Pesticide Application Areas [High Risk]	Yes	Specific pesticide application areas have been identified where possible and are included in the High Risk Business category. Additionally, agriculturally zoned areas are also at risk.			

[1] Inventory items listed in each delineation are cumulative.

[2] See Appendix K for complete data on the inventory items. Relative risk assessed according to the EPA criteria outlined in Table YC-10.

[3] Locations of septic systems and private wells were estimated by locating those homes within the WHPAs but outside the sewer and water service areas. The Yakima County Health District is currently working on using GPS to locate septic tanks and private wells. This information, including exact numbers of septic tanks and private wells, will be incorporated into GIS during the first biennial update.

[4] Multiple sites may be identified on one parcel and identified on mappings as one symbol.

TABLE YC-10: POTENTIAL CONTAMINANT SOURCE RISK RANKING METHODOLOGY

	POTENTIAL CONTAMINANTS																
	Acid	Base	Chloride	Fluoride	Fe/Mn	Other Metals	Nitrate	Pathogens	Pesticides/Herbicides	Petroleum Products	Phenols	Radioactivity	Sodium	Solvents	Sulfate	Surfactants (Detergents)	
Land Use Considerations																	
Overall Threat to Human Health	L-M	L-M	L	L	L	H	M	L	H	H	H	H	L	H	L	L	
Mobility	M	L	H	H	M	L-H	H	L	L-H	M	M	L-H	H	H	H	H	
Naturally Occurring	YES	NO	YES	YES	YES	YES	NO	NO	NO	NO	NO	YES	YES	NO	YES	NO	
Land Use Categories																	**Overall Threat to Water Supply**
Agriculture/Golf Courses							▒		▒								M
Airstrips/Airports						▒			▒	▒				▒		▒	M-H
Asphalt, Concrete, Coal Tar Plants										▒							L-M
Beauty Parlors		▒				▒								▒		▒	L
Boat Yards/Builders						▒				▒	▒			▒			L
Car Washes			▒			▒				▒			▒	▒		▒	L
Cemeteries/Graveyards									▒								H
Chemical Manufacturing	▒	▒	▒	▒	▒	▒	▒		▒	▒	▒	▒	▒	▒	▒	▒	H
Clandestine Dumping	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒		H
Dry Cleaning														▒			H
Furniture Stripping/Painting	▒	▒				▒								▒			M
Hazardous Materials Storage and Transfer	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	H
Industrial Lagoons and Pits	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	H
Jewelry and Metal Plating	▒	▒		▒	▒	▒				▒			▒	▒			M
Junkyards	▒				▒	▒				▒				▒	▒		L
Landfills/Burn Pits	▒		▒		▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	H
Laundromats								▒						▒		▒	L-M
Machine Shops/Metal Working	▒	▒				▒				▒				▒		▒	H
Municipal Wastewater/Sewer Lines			▒		▒	▒	▒	▒					▒	▒		▒	H
Photography Labs/Printers	▒	▒				▒								▒		▒	L-M
Railroad Tracks and Yards	▒	▒	▒	▒	▒	▒	▒		▒	▒	▒	▒	▒	▒	▒	▒	M
Research Labs/Universities/Hospitals	▒	▒		▒	▒	▒	▒	▒	▒	▒	▒	▒		▒		▒	L-M
Road and Maintenance Shops			▒						▒	▒			▒	▒			M
Sand and Gravel Mining/Washing Operations										▒				▒			L
Septage Lagoons and Sludge			▒		▒	▒	▒	▒					▒	▒		▒	H
Septic Systems, Cesspools, Water Softeners			▒		▒			▒	▒				▒	▒		▒	H
Stables, Feedlots, Kennels, Manure Pits							▒	▒					▒				M-H
Stormwater Drains/Retention Basins			▒			▒		▒	▒	▒			▒	▒			L-M
Stump Dumps					▒	▒	▒										L
Underground/Above Ground Storage Tanks									▒	▒				▒			H
Vehicular Services						▒				▒				▒		▒	H
Wood Preserving						▒				▒	▒			▒	▒	▒	L

Key:

L Ranked as a low threat based on the number of potential contaminants associated with the category and the potential threat posed by each contaminant.

M Ranked as a moderate threat based on the number of potential contaminants associated with the category and the potential threat posed by each contaminant.

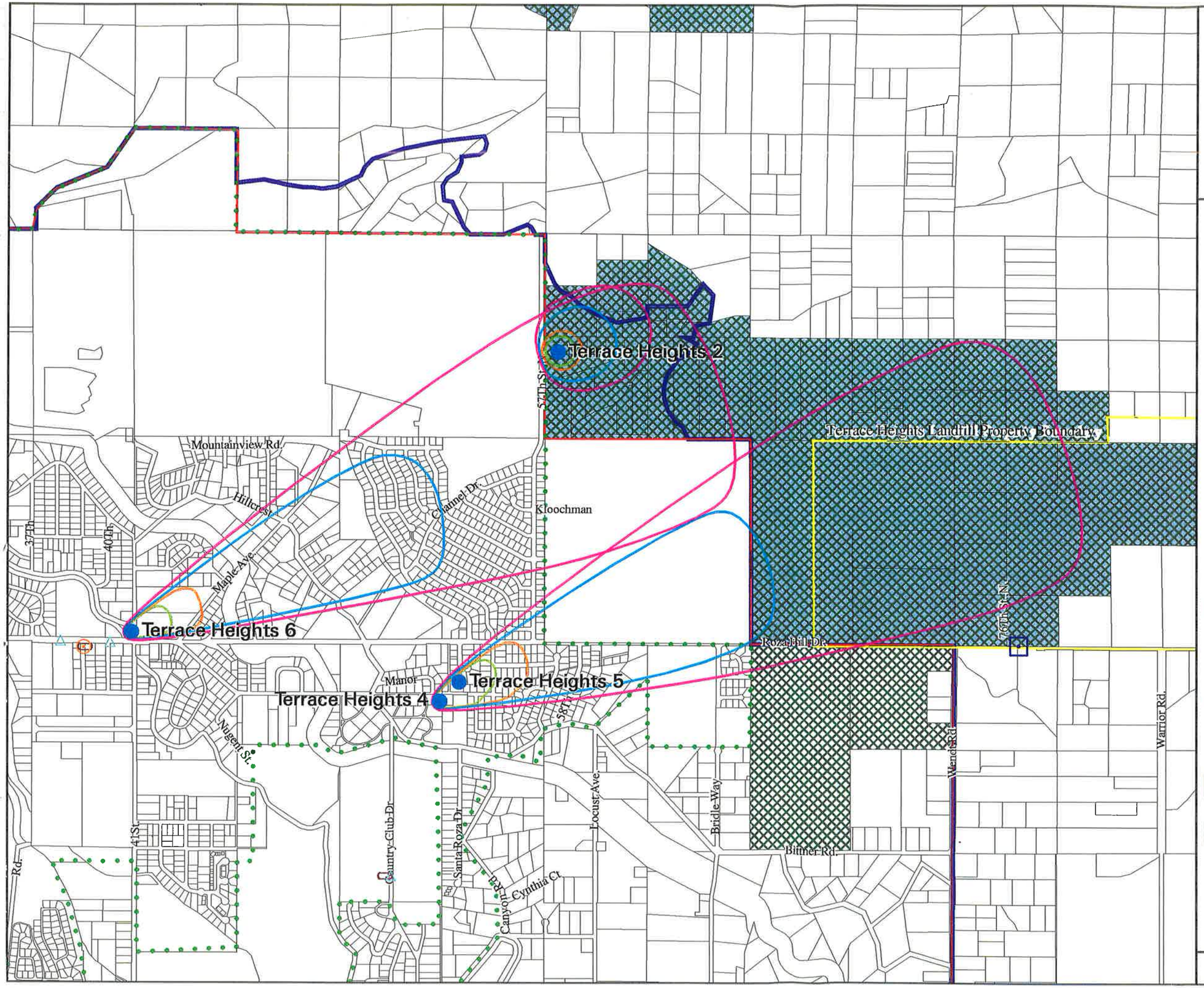
H Ranked as a high threat based on the number of potential contaminants associated with the category and the potential threat posed by each contaminant.

▒ Indicates that contaminants released from this land use category may render groundwater at a public supply well undrinkable in accordance with state and federal MCLs.

Indicates that this land use category is not generally associated with the release of the particular contaminant in quantities that would render the groundwater at a public supply well undrinkable.

Figure YC-5: Yakima County Inventory of Potential Contamination Sources

Terrace Heights Well No. 2, Well No. 4, Well No. 5 and Well No. 6



- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model
- Confirmed Or Suspected Contaminated Site
- Leaking Underground Storage Tank
- Underground Storage Tank
- EPCRA Site
- High Risk Business
- Moderate Risk Business
- RCRA Business
- Toxic Release Inventory
- Private Wells
- Septic Tanks

Yakima County GIS

October 27, 1998

N

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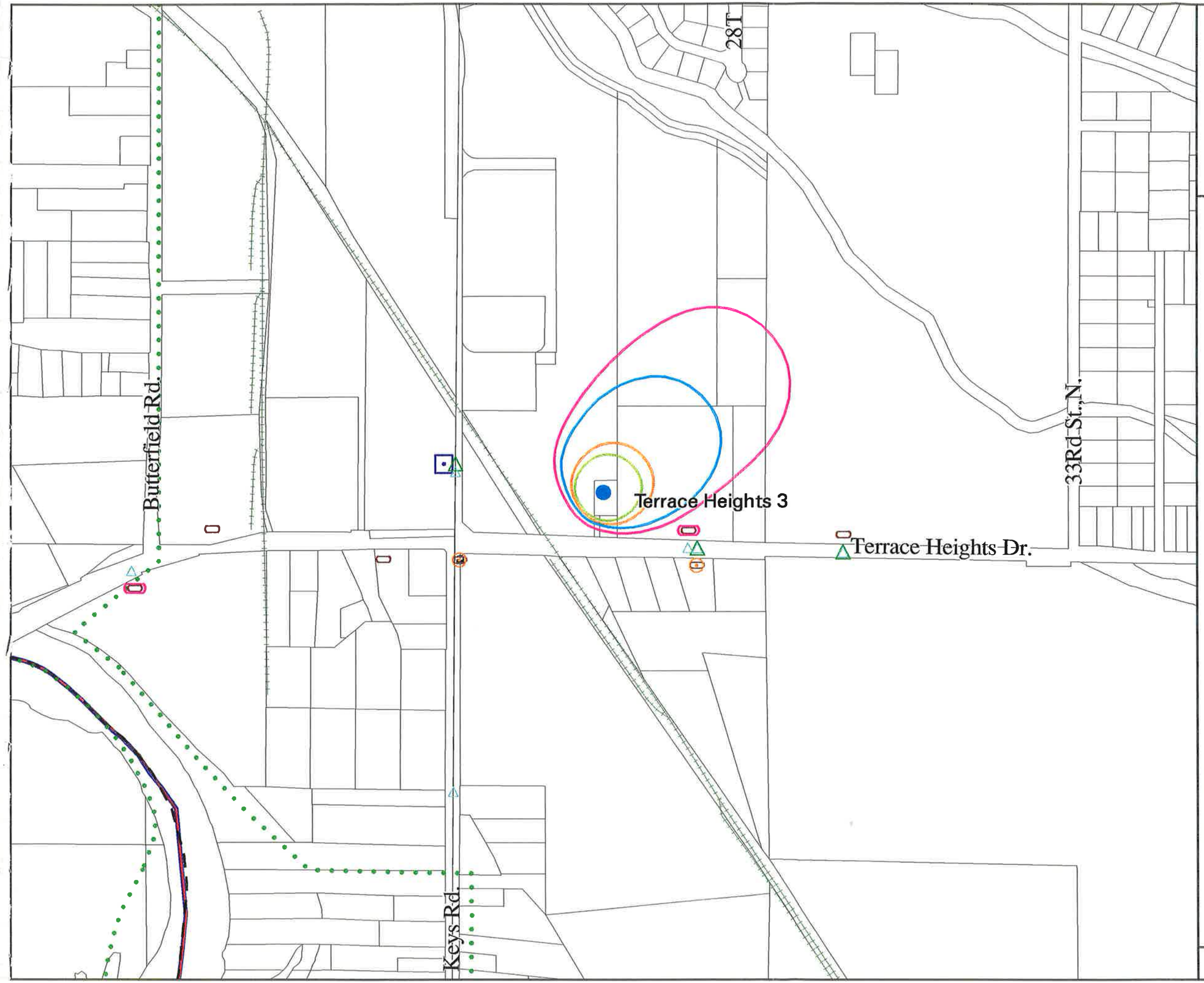
CONSULTING ENGINEERS

1 Inch = 1200 Feet

Figure YC-6: Yakima County Inventory of Potential Contamination Sources

Terrace Heights Well No. 3



- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model
- Confirmed Or Suspected Contaminated Site
- Leaking Underground Storage Tank
- Underground Storage Tank
- EPCRA Site
- High Risk Business
- Moderate Risk Business
- RCRA Business
- Toxic Release Inventory
- Private Wells
- Septic Tanks

Yakima County GIS

October 27, 1998

N

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CONSULTING ENGINEERS

1 Inch = 400 Feet

Figure YC-7: Yakima County Inventory of Potential Contamination Sources

Well No. 1

Terrace Heights 1

- Water Service Area
- Sewer Service Area
- Urban Growth Area
- City Limits
- Railroads
- Wellhead
- Ten Year Analytical Model
- Five Year Analytical Model
- One Year Analytical Model
- Six Month Analytical Model
- Confirmed Or Suspected Contaminated Site
- Leaking Underground Storage Tank
- Underground Storage Tank
- EPCRA Site
- High Risk Business
- Moderate Risk Business
- RCRA Business
- Toxic Release Inventory
- Private Wells
- Septic Tanks

Yakima County GIS

October 27, 1998

N

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1 Inch = 800 Feet

CONTINGENCY PLAN

The objectives of a wellhead protection contingency plan are to:

1. Identify the susceptibility of each groundwater source to surface contamination;
2. Identify source deficiencies that could affect the purveyor during an emergency or in the event a source becomes contaminated;
3. Identify the emergency response capabilities of the purveyor and the surrounding communities; and
4. Identify short-term and long-term contingency actions that can be followed during an emergency or in the event a source becomes contaminated.

The first element of a contingency plan is an assessment of the susceptibility of each source in the system to surface contamination. This assessment is based on several criteria that define the likelihood of contamination entering the wellhead and adversely affecting water quality. These criteria include quantity and relative risk of potential contamination sources within the WHPA, well characteristics, and aquifer characteristics.

The second element of a contingency plan is an evaluation of the ability of a purveyor to meet future demand based on existing capacity and water rights, even with the loss of a well to contamination. A comprehensive analysis of the system was done in the 1997 Water System Plan. A summary of the source evaluation is provided in the following section.

Third, in order to minimize the effect of a release of contaminants into the environment, procedures must be in place to ensure that the decision making personnel can execute the proper mitigation measures. This contingency plan contains emergency response procedures to be implemented immediately following a release of contaminants into the environment. These procedures identify the appropriate personnel to contact at the local, state, and federal levels, the appropriate equipment needed, and a structured plan of action to respond quickly to effectively mitigate environmental damage resulting from such a release.

Finally, in the event that the County's source water becomes contaminated, additional sources of drinking water, or treatment of the contaminated water, will be necessary. Both short-term and long-term alternative drinking water supplies, and treatment methods for common contaminants, are identified in this section.

SUSCEPTIBILITY TO CONTAMINATION

In 1995 the Yakima County completed susceptibility assessments for each of its wells in compliance with DOH-mandated wellhead protection planning and SOC monitoring requirements. In determining the ratings of the wells, the DOH used the data collected in the susceptibility assessments, including well characteristics and past water quality

history. Based on this information, the DOH determined that the risk of the contamination of the County's wells was low, with the exception of the moderate ranking for Well No. 4 as shown on Table YC-11.

Table YC-11: 1995 Susceptibility Rating for Yakima County

Source	Rating
Well No. 1	Low
Well No. 2	Low
Well No. 3	Low
Well No. 4	Low
Well No. 5	Moderate
Well No. 6	Low

Regardless of the susceptibility rating of the wells to contamination, it is important to provide a contingency plan that outlines emergency procedures for the mitigation of the contamination of the County's groundwater supplies. Such a plan is presented in the following sections.

SOURCE ANALYSIS

This section provides a summary of the source analysis completed in the 1997 Water System Plan.

Source Demand Projections

Source demand projections for 6-year and 20-year planning periods were completed in the 1997 Water System Plan. These projections were revised to include current projections and extrapolated to 20 years based on population projections in the 1997 Water System Plan. Table YC-12 summarizes the average day demand (ADD) projections.

Table YC-12: Yakima County Well Production

Source	Projected Production (gpd)			Well Capacities (gpd) [4]
	1993 [1]	1998 [2]	2018 [3]	
Well No. 1	29,500	32,400	5,500	144,000
Well No. 2	158,000	189,000	198,900	331,200
Well No. 3	41,000	48,600	198,900	2,160,000
Well No. 4	49,000	59,400	198,900	288,000
Well No. 5	45,000	54,000	198,900	360,000
Well No. 6	133,000	156,600	198,900	576,000
Total	**456,000**	**540,000**	**1,000,000**	**3,859,200**

[1] Source: Susceptibility Assessments.
[2] Source: Yakima County. Projected production based on growth according to the Yakima County high series projected growth rate of 1.73%.
[3] Based on rated pumping capacities of each well, pumping 24-hours per day.

The Maximum Day Demand (MDD) peaking factor as calculated from data in the 1997 Water System Plan is 2.7. The MDD peaking factor is defined as the ratio of the maximum day production to the average day production. Based on this peaking factor, the 1998 and 2018 MDDs are approximately 1,458,000 gpd and 2,700,000 gpd, respectively.

Source Capacity Evaluation

The DOH design criteria require that the total quantity of water available at the source be sufficient to meet the MDD, and the quantity of water available with the largest well out of service be sufficient to meet the ADD. An evaluation of the County's ability to meet these design criteria is shown in Table YC-13.

Table YC-13: Source Capacity Analysis

Year	ADD (gpd)	Source Capacity (gpd) [1]	Surplus (+) / Deficit (-)
1998	540,000	1,699,200	+ 1,159,200
2018	1,000,000	1,699,200	+ 699,200
Year	**MDD (gpd)**	**Source Capacity (gpd) [2]**	**Surplus (+) / Deficit (-)**
1998	1,593,000	3,859,200	+ 2,266,200
2018	2,950,000	3,859,200	+ 909,200

[1] Source capacity assumes that Well No. 3, the largest well is out of service.
[2] Source capacity assumes all wells in service.

As shown in Table YC-13, the County is able to meet the required source capacity design criteria through the 20-year planning period. However, this design criteria is intended for short-term well unavailability, as in the case of pump replacement or minor rehabilitation.

In wellhead contingency planning, it is necessary to assume that the contamination of a well may make it unusable for a significantly longer period of time. As such, the available source capacity must be sufficient to meet the MDD with the largest well (Well No. 3) out of service. It is unlikely that this well would become contaminated because it is sealed to a depth of 1,725 feet; however, this represents the worst case scenario to be planned for. If Well No. 3 becomes contaminated, the County can meet the 1998 MDD, but not the 2018 MDD demand condition by approximately 1,000,000 gpd. An additional short-term or long-term source would be required if Well No. 3 were removed from service due to contamination. Sources to mitigate this shortfall will be discussed in the Short-Term and Long-Term Contingency Planning sections.

Source Reliability

Source reliability criteria in the DOH *Draft Waterworks Standards* include source reliability for backup power, water rights reliability, and facilities reliability. A discussion of source capacity and water rights has been presented in the previous sections. The DOH requires all systems to be protected against loss of power through minimum power grid reliability criteria, back-up power, or standby storage. The DOH is in the process of establishing minimum power grid reliability criteria, but the industry standard is provision of power from two independent grid sources and history of infrequent extended power outages. Where backup power is required, the DOH provides the following requirements:

- Backup power shall be designed to enable the delivery of the ADD at 30 psi.
- Backup power shall be located at each source of supply.
- Backup power facilities shall be brought on-line through an automatic transfer switch.
- Backup power shall be fueled consistent with the local WHPP.

The County has provided standby storage consistent with DOH requirements and is not required to provide backup power. However, for additional reliability, the County does have backup power at Well No. 2. Furthermore, Pacific Power, the local provider of electricity, has two portable substation available to energize a power distribution grid should the normal substation fail. The portable substations can be connected in approximately 4 to 6 hours to provide back-up power.

Source Water Rights Evaluation

An evaluation of the ability of the County's water rights to meet the existing and 20-year planned production is shown in Table YC-14.

Table YC-14: Water Rights Analysis

Source	Production Instantaneous Production (gpm) [1]	Water Rights Maximum Instantaneous Withdrawal (gpm)	Surplus (+) / Deficit (-) (gpm)
Well No. 1	100	1,200	+ 1,100
Well No. 2	230	540	+ 310
Well No. 3	1,500	2,250	+ 750
Well No. 4	200	165 + 1,500 [2]	+ 0 [2]
Well No. 5	250	1,500 [2]	1,215 [2]
Well No. 6	400	500	+ 100
Source	**Annual Production (acre-feet) [3]**	**Annual Withdrawal (acre-feet)**	**Surplus (+) / Deficit (-) (acre-feet)**
1998 Total	605	5,020	+ 4,415
2015 Total	1,120	5,020	+ 3,900

[1] Based on the rated capacity of the pumps.
[2] The County holds water right GWC 886-A in the amount of 1,500 gpm for Wells No. 4 and No. 5 combined. Surplus instantaneous withdrawal can be used at either well.
[3] Based on the production values in Table YC-12 converted to acre-feet.

As shown in Table YC-14, the maximum instantaneous and annual withdrawal water rights for the County are sufficient to meet the 20-year production projections.

EMERGENCY MANAGEMENT

Contingency planning for emergency situations is important to ensure that when a crisis occurs, appropriate decision-making personnel are informed of the scope and severity of the situation and that established procedures are in place for foreseeable types of emergencies. It is not possible to plan for every type of emergency that can affect a water system. However, by having appropriate contingency planning in place for foreseeable emergencies, mitigation measures can be implemented more rapidly and the impact to the system can be reduced.

The following sections provide procedures for the coordination with Yakima County Emergency Management, an emergency call-up list for local emergency personnel, and emergency response procedures for a number of different emergency situations.

Coordination with Yakima County Emergency Management

Yakima County Local Emergency Planning Committee (LEPC) has established response procedures for the hazardous materials incidents or spills in the 1988 Emergency Response Plan for Yakima County (Annex Z-7.88 Hazardous Materials). The plan details response levels for escalating levels of hazardous material incidents, including

notification requirements, responsible officials, and documentation procedures. Critical excerpts from the 1988 Emergency Response Plan are presented in Appendix L, including notification procedures, a call-up list, and a HAZMAT Accident Notification Form.

In the event of a chemical spill or hazardous material incident, the Incident Command Agency for the jurisdiction of Terrace Heights is the Yakima Sheriff's Office. As command agency, the District will coordinate the required response procedures and notifications outlined in the 1988 Emergency Response Plan. Depending on the type of incident, the following agencies may be notified to coordinate cleanup or mitigation of the incident:

- Washington State Patrol
- Local Public Works Office
- Department of Ecology
- Department of Health
- Yakima County Clean Air Authority
- Medical Control Facility
- Mayor/County Executive
- Emergency Broadcast System

One of the key response efforts to an incident is to mitigate the impact of the incident on surrounding facilities. The LEPC has identified "critical facilities" throughout Yakima County that must be protected in the event of an incident. These facilities include local schools, hospitals, or government offices that may be attempting to respond to the incident. Part of the coordination of this WHPP with the LEPC will include the identification of the 6-Month WHPA for each of the County's wells as a critical "red zone" in which response efforts should be focused. This will help reduce the risk of the contamination of the County's drinking water supplies in the event of a hazardous materials incident.

Emergency Call-Up List

In order to make sure that appropriate decision-making personnel are notified in an emergency, an emergency call-up list has been provided in Table YC-15. This list was presented in the 1997 Water System Plan and has been updated to reflect current telephone numbers and emergency personnel.

Table YC-15: Emergency Call List

Contact	Telephone Number
Emergency, HAZMAT Incident, Fire, Police, Ambulance	911
Yakima County	
Public Works	(509) 574-2300
Emergency Management	(509) 574-1900
Fire Marshall	(509) 574-2378
Pipe/Fitting Suppliers	
Pacific Water Works Supply	1-800-422-0057
H.D. Fowler	1-800-927-5699
Western Utilities	1-800-772-6004
Testing Lab (coliform)	
Applied Sciences Labs	(509) 248-4034
Washington State Department of Ecology	
Central Regional Office - Teri Fisher	(509) 454-7843
Washington State Department of Health	
Eastern Regional Office - Tom Justus	(509) 456-2453
U.S. West Communications	
Business	1-800-603-6000
Repair	1-800-954-1211
Buried Cable Location Service	1-800-553-4344
Gray & Osborne, Inc., Consulting Engineer	(509) 453-4833

Emergency Procedures

Emergency procedures for some foreseeable types of emergencies have been provided in this section. Procedures have been presented in the form of flowcharts for the following types of emergencies:

- Chemical spill
- VOC/SOC contaminant detection
- Bacteriological detection

These flow charts are presented in Appendix L.

SHORT-TERM CONTINGENCY PLANNING

As a matter of planning priority, it is important to identify appropriate emergency and short-term options. These include the steps required for immediate provision of water for a periods of days, weeks or months. The following is a list of short-term and emergency options that could be implemented at Yakima County following the short-term loss of a well.

Bottled Water

In an emergency situation which requires one or more wells to be shut off, bottled water is one alternative supply of drinking water. In many cases, sufficient supply is immediately available in either stores or a bottling facility. Since the County water system is located geographically adjacent to the City of Yakima and a short distance from neighboring communities, it is feasible that enough bottled water could be supplied for a short term using available sources from other communities.

Tanker Trucks

If adequate water cannot be supplied to the County customers during an emergency, the County may consider using an outside contractor to transport water in tanker trunks.. Careful attention must be given to disinfecting the tanks to avoid bacterial contamination. If the tanker trucks assigned to haul the water are potable water hauling vehicles only, then the water need only be disinfected using a standard chlorine residual concentration. However, if the tanker trucks have been used to haul nonpotable water or the hauling status of the tanker truck(s) is not known, then the tank must be superchlorinated with a concentration of a least 50 mg/L for a period of 24 hours. After the 24 hour period, the superchlorinated water shall be discarded, the tank filled with fresh chlorinated water, and a bacteriological test taken to determine if the water is suitable for drinking. If this option is selected, a source of sanitary containers would be identified and supplied so that personnel are not required to use receptacles that could possibly be contaminated.

Water Conservation

Yakima County has an approved water conservation plan completed as part of the 1997 Water System Plan. The conservation measures required for the County by the DOH include program promotion, source meter readings, evaluation of the costs and benefits of service meters and conservation pricing, and evaluation of water reuse alternatives. Additionally, the following recommended water conservation program components are provided by Yakima County:

- customer technical assistance
- bills showing consumption history
- service meters

In an emergency situation, more aggressive water conservation measures may be required than those adopted in the 1997 Water System Plan. In an emergency situation that requires the complete or partial shutoff of the County's wells, non-essential water uses must be restricted. The County may be forced to implement significant water conservation measures, which may include water restrictions for activities such as landscape watering, laundry, vehicle washing, or bathing. Water conservation measures may also be used with other short-term supply options.

Groundwater Treatment

Treatment of contaminated water can be accomplished through *in situ* or *ex situ* methods. *In situ*, or in place treatment, involves the remediation of an aquifer by introducing chemical, physical, or biological agents into the subsurface which reduce contamination levels. *Ex situ*, or pump-and-treat technologies involve the removal of contaminated groundwater from the subsurface and subsequent treatment at the source. Examples of *in situ* remediation include bioremediation and soil vapor extraction, while examples of *ex situ* treatment include reverse osmosis (RO), granular activated carbon (GAC), and air stripping. All of these treatment methods can be extremely expensive. The capital investment for the treatment equipment along with cost of operating and chemical costs amount to a significant expenditure which may be difficult to implement in a short period of time.

Extensive research into water treatment methods over the past several decades has resulted in the identification of numerous effective treatment methods for different contaminants. Selection of a treatment method depends upon a number of factors, including the chemical characteristics of the contaminants, the extent and severity of the contamination, the treatment removal objective, and the financial resources available. Based on numerous case studies, the EPA has assembled a list of Best Available Technologies (BATs) in 40 CFR 141.61-62 to be used for contaminated groundwater. These BATs are summarized in Table YC-16.

Identification of Existing and Potential Interties

The County does not have any existing interties with any other communities, although it may be possible to construct an emergency intertie in the future with the City of Yakima. Both the City and County have 16-inch waterlines in Terrace Heights Drive, on respective sides of the Yakima River, about 1/2-mile apart. Because the City's hydraulic grade line is lower than the County's, water could not flow from the City to the County without either a booster pump station or low reservoir levels in the County's Zone No. 1. The potential for local interties with neighboring communities make this an attractive alternative in short-term contingency planning.

APPENDIX A

INTERLOCAL AGREEMENTS

APPENDIX A

2000 INTERLOCAL AGREEMENT

INTERLOCAL AGREEMENT

This agreement is made and entered into between Yakima County, hereinafter referred to as the COUNTY, and the following jurisdictions: the City of Moxee, the Town of Naches, the City of Selah, the Town of Tieton, the City of Yakima, the City of Union Gap, and the Nob Hill Water Association.

The purpose of the agreement is to establish responsibilities for the maintenance of the regional Wellhead Protection Plan developed by the aforementioned water purveyors under an Interlocal Agreement established in 1997 and funded by a Washington State Department of Ecology Centennial Clean Water Fund grant.

WHEREAS, the Washington State Legislature has provided for the formation of interlocal agreements, as established in Chapter 39.34, RCW; and,

WHEREAS, Section 1428 of the 1986 Amendments to the federal Safe Drinking Water Act mandates that every state develop a wellhead protection program, and that the state Drinking Water Act requires that all *Group A* water systems using ground water as their source implement a Wellhead Protection Program; and,

WHEREAS, these water purveyors prepared a Regional Wellhead Protection Plan in 1998 financed by a 75 percent grant from the Washington State Department of Ecology (DOE) Centennial Clean Water Fund; and,

WHEREAS, the County, Moxee, Naches, Selah, Tieton, Yakima, Union Gap, and Nob Hill are individually and collectively concerned with responsible wellhead protection in their communities, and in particular fulfilling continuing Wellhead Protection plan maintenance requirements by the Washington State Department of Health (DOH) detailed in WAC 246-290-135; and,

WHEREAS, the County has been requested by these seven water purveyors in Yakima County to act on their behalf to coordinate the regional efforts detailed in the plan;

NOW, THEREFORE, in consideration of the mutual benefits to be derived from this agreement, the County and the seven water purveyors, the undersigned entities, agree as follows:

1. DEFINITIONS

A. "Regional Wellhead Protection Committee (RWPC)" means the committee consisting of one member from the County and one member from each of the seven water purveyors selected to represent their jurisdiction during the development of the plan.

B. "Upper Yakima Valley" means that part of the Yakima Valley lying north of Ahtanum Ridge and the Rattlesnake Hills and south of South Umptanum Ridge.

C. "Participants" mean Yakima County, the City of Moxee, the Town of Naches, the City of Selah, the Town of Tieton, the City of Yakima, the City of Union Gap, and the Nob Hill Water Association.

D. "The County" means Yakima County Public Works, Planning, Geographical Information Services, Information Services, Health District, Local Emergency Planning Committee and any other pertinent divisions discussed herein. Additionally, Yakima County exists both as the regional coordinator and as a local participant in the RWPC.

E. "Wellhead Protection Plan (WHPP)" means the Upper Yakima Valley Wellhead Protection Plan developed under a 1997 Department of Ecology Centennial Clean Water grant.

F. "Wellhead Protection Area (WHPA)" means the delineated zone within which lie potential contamination sources that must be managed in order to protect the groundwater supplies.

2. RESPONSIBILITIES

A. Each jurisdiction shall support the County as lead agency, and coordinator for the plan maintenance process, by authorization of the legislative body to enter into this agreement.

B. Each jurisdiction agrees to provide a proportional share of the local match as defined in Article 3.

C. Each jurisdiction shall designate, in writing, an RWPC member to represent their jurisdiction for the continuing maintenance and evolution of the Plan. Each jurisdiction shall notify the County, in writing, upon any change in the appointment of its Committee member.

D. The RWPC shall biannually elect by majority vote a Committee Chairperson, the term of which shall extend two calendar years from January 1 to December 31. The Chairperson shall be responsible for the following:

1. Coordination and development of semi-annual meeting times and locations with RWPC members and guests;
2. Development of a meeting agenda, including status of the plan and any new management strategies that should be discussed;
3. Chairmanship of meetings including opening and closing addresses and discussion coordination; and

4. Dissemination of meeting minutes following each meeting.

The County shall assume the Committee Chairmanship for the first biennial period (2000-2001).

E. The County will execute and coordinate the regional management efforts detailed in the WHPP, including, but not limited to, the following:

1. Coordination and perpetuation of the regional water quality and potential contaminant source inventory at least biennially, including updates of local inventories to be provided by each community;
2. Incorporation of GPS-located wells and septic tanks supplied by Yakima County Health District into the GIS database at least biennially;
3. Incorporation of Washington State Department of Health sanitary survey information into the GIS database at least biennially;
4. Incorporation of Washington State Department of Ecology hazardous materials assistance sweep information into the GIS database at least biennially;
5. Development of a zoning overlay of the WHPAs to be used as a planning trigger for more thorough information-gathering during review of building permits, plat and zoning changes, and other planning efforts within the purview of Yakima County as detailed in the plan;
6. Maintenance of a WHPP internet website by Yakima County Information Services;
7. Coordination of contingency planning efforts with the Local Emergency Planning Committee;
8. Attendance and participation in semi-annual meetings;
9. Assumption of interim chairperson status for the 2000-2001 term;
10. Coordination with the Educational Services District, Yakima River Watershed Council, and other agencies, entities, and service groups for the dissemination of wellhead protection literature, videos, and other public education paraphernalia;
11. Maintenance of wellhead protection area signs within County jurisdiction, and maintenance of wellhead protection signs within other RWPC community jurisdictions on request, and at a cost agreed to by both parties;
12. Dissemination of notification to all potential contamination sources at least biennially;
13. Coordination of all state agency, local agency, and consultant participation that may be needed throughout the perpetuation of the plan; and
14. Other lead agency activities that may be required to ensure compliance with WAC 246-290-135.

F. The local jurisdictions will execute and coordinate the local management efforts detailed in the Regional Wellhead Protection Management Plan and will coordinate with Yakima County all regional efforts discussed in the plan, including, but not limited to, the following:

1. Attendance and active participation at RWPC meetings;
2. Dissemination of information on the status of the wellhead protection planning efforts of the RWPC to their respective legislative bodies;
3. Development of a zoning overlay of the WHPAs to be used as a planning trigger for more thorough information-gathering during review of building permits, plat and zoning changes, and other planning efforts within the purview of the jurisdiction as detailed in the plan;
4. Maintenance of a local potential contaminant inventory to be distributed to Yakima County at each semi-annual RWPC meeting for storage and update into the regional database at least biennially;
5. Presentation of an annual seminar to at least one grade, middle, or high school in the Upper Yakima Valley on wellhead protection planning efforts;
6. Dissemination of notification to all local potential contamination sources within the WHPAs; and
7. Maintenance of wellhead protection area signs within each community's local jurisdiction.

3. LOCAL MATCH

Each participant understands that the regional efforts administered by Yakima County will be funded through proportionate local matches by each community on an annual basis for the tasks described previously. Annual costs for each biennial reporting period shall be developed by the County and approved by a majority of the RWPC.

4. TERMINATION

Any participant may terminate its obligation herein by providing written notice to the County.

5. LIMITATIONS OF COUNTY ADMINISTRATION

From the time of termination of this agreement, the implementation, administration, and amendment of each participant's portion of the plan shall be the sole responsibility of that participant.

6. EFFECTIVE DATE AND DURATION OF AGREEMENT

This agreement shall be effective upon the date the plan is approved by DOE and DOH.

This agreement shall be in effect indefinitely or until amended or duly terminated.

In Witness Whereof, this agreement is hereby executed, on behalf of their respective jurisdictions, by the below signed individuals, who are so authorized to encumber their jurisdictions.

City of Moxee

Greg LaBree — 10-13-00

Mayor Greg Labree — Date

Town of Naches

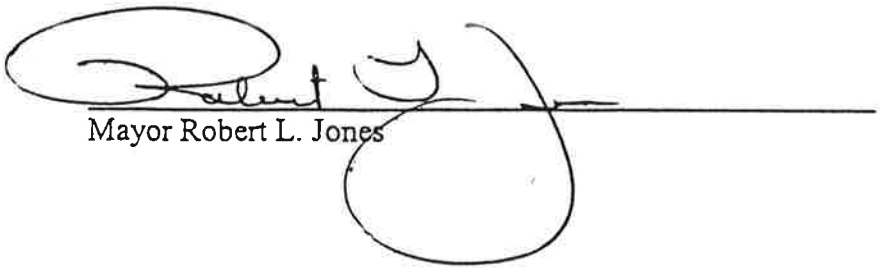
C B Ross

Mayor Charles Ross

October 10, 2000

Date

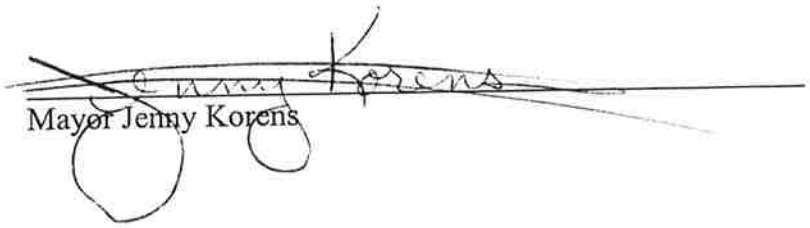
City of Selah



Mayor Robert L. Jones

11/14/00
Date

Town of Tieton



Mayor Jenny Korens

10-16-07

Date

City of Yakima

Richard A. Zais, Jr., City Manager

November 8, 2000
Date

Attest:

Karen S Roberts
City Clerk

November 8, 2000
Date

City Contract No. 2000-89
Resolution No. R-2000-139

City of Union Gap

Aubrey C. Reeves Jr. Mayor
Mayor Aubrey C. Reeves, Jr.

11-3-00
Date

Nob Hill Water Association

Melvin H. Carlson, President, Board of Directors

10-10-00
Date

Yakima County Board of Commissioners

Excused
Jesse S. Palacios, Chairman

October 17, 2000
Date

Bettie Ingham
Bettie Ingham, County Commissioner

October 17, 2000
Date

James M Lewis
James M. Lewis, County Commissioner

October 17, 2000
Date

Approved as to Form

Ron Zikle, Deputy Prosecuting Attorney

10/13/00
Date

BOARD OF YAKIMA COUNTY COMMISSIONERS STATE OF WASHINGTON SEAL OF THE

Attest: Sylvia E. Hinojosa

Sylvia E. Hinojosa
Clerk of the Board

October 17, 2000
Date

1996 INTERLOCAL AGREEMENT

INTERLOCAL AGREEMENT

This agreement is made and entered into between Yakima County, hereinafter referred to as the COUNTY, and the following jurisdictions: the City of Moxee, the Town of Naches, the City of Selah, the Town of Tieton, the City of Yakima, and the City of Union Gap.

The purpose of the agreement is to establish responsibilities for preparing a regional Wellhead Protection Plan for the water purveyors in the Upper Yakima Valley.

WHEREAS, the Washington State Legislature has provided for the formation of interlocal agreements, as established in Chapter 39.34, RCW; and,

WHEREAS, Section 1428 of the 1986 Amendments to the federal Safe Drinking Water Act mandates that every state develop a wellhead protection program, and that the state Drinking Water Act requires that all *Group A* water systems using ground water as their source implement a Wellhead Protection Program; and,

WHEREAS, the Washington State Department of Ecology (DOE) has offered a Centennial Clean Water Fund grant to finance 75 percent of the cost of preparing a regional Wellhead Protection Plan; and,

WHEREAS, the County, Moxee, Naches, Selah, Tieton, Yakima, and Union Gap are individually and collectively concerned with responsible wellhead protection in their communities, and in particular fulfilling Wellhead Protection requirements by the Washington State Department of Health (DOH); and,

WHEREAS, the County has been requested by these six water purveyors in Yakima County to act on their behalf to administer the grant being offered by the Department of Ecology;

NOW, THEREFORE, in consideration of the mutual benefits to be derived from this agreement, the County and the six water purveyors, the undersigned entities, agree as follows:

1. DEFINITIONS

A. "Regional Wellhead Protection Committee (RWPC)" means the committee consisting of one member from the County and one member from each of the six water purveyors selected to represent their jurisdiction during the development of the plan.

B. "Upper Yakima Valley" means that part of the Yakima Valley lying north of Ahtanum Ridge and the Rattlesnake Hills.

C. "Participants" mean Yakima County, the City of Moxee, the Town of Naches, the City of Selah, the Town of Tieton, the City of Yakima, and the City of Union Gap.

2. RESPONSIBILITIES

A. Each jurisdiction shall support the County as lead agency, and coordinator for the plan development process, by authorization of the legislative body to enter into this agreement.

B. Each jurisdiction agrees to provide a proportional share of the local match required for the State grant as defined in Article 3.B.

C. Each jurisdiction shall designate, in writing, an RWPC member to represent their jurisdiction throughout the development of the Plan.

D. The County will execute and administer a grant agreement with DOE, in accordance with DOE's rules and procedures.

E. Upon grant execution, the County will coordinate state, local and consultant participation toward the preparation of the regional Wellhead Protection Plan.

F. The RWPC will select a qualified consultant to do specified functions within the context of the Wellhead Protection Plan. Prospective consultants will be solicited through a request for proposal (RFP) process. The RFP will be prepared and the consultant selected at the direction of the RWPC.

G. The County, as the lead agency, will enter into a contract with the consultant selected by the RWPC.

H. The County will schedule all meetings necessary for plan development, prepare agendas and packets, disperse grant funds, prepare grantee reports, as well as other administrative duties, as required, to fulfill grant obligations.

I. Each jurisdiction shall attend and actively participate at RWPC meetings.

J. Each jurisdiction will cooperate with the RWPC by providing information and plan element review and comment in a timely fashion.

K. Each RWPC member shall keep their legislative body informed of RWPC activities and progress.

3. LOCAL MATCH

Each participant understands that the state grant will fund 75 percent of the project and that the remaining 25 percent must be funded by a local match from the participants.

A. The estimated project cost is $150,000, and the estimated local match is $37,000. No more than half of the local match shall be matched in-kind. The remaining half shall consist of cash payments, salaries, wages and benefits paid by the participants for

work done on the project.

B. Each participant's share of the local match shall be calculated using the following formula:

1. One-half of the local match will be divided evenly among the seven participants. This portion of the match provides for the development of the management plan, grant administration, and other equally shared project costs.

2. One-half of the local match will be prorated for each participant based on the total area within the ten-year Calculated Fixed Radius time of travel boundaries for all its wells. This portion of the match provides for delineating wellhead protection boundaries, inventorying contaminant sources, and developing site-specific wellhead protection strategies and activities that vary according to the size and number of wells in each jurisdiction. The amount for this portion will be determined by the County prior to executing a grant contract with DOE.

4. LIMITATIONS OF COUNTY ADMINISTRATION

From the time of termination of this agreement, the implementation, administration, and amendment of each jurisdiction's portion of the plan shall be the responsibility of that jurisdiction.

5. TERMINATION

Any jurisdiction may terminate its obligation herein by providing written notice to the County prior to the date a contract is executed with the DOE, for plan preparation. For purposes of this agreement, such notice shall be physically received by the County prior to the date of contract execution.

6. EFFECTIVE DATE AND DURATION OF AGREEMENT

This agreement shall be effective upon the date a contract is executed between the County and the DOE, to coordinate the preparation of the Wellhead Protection Plan.

This agreement shall be in effect until all contractual obligations covered by this agreement have been fulfilled or when the grant contract with DOE has been terminated, whichever is earlier.

In Witness Whereof, this agreement is hereby executed, on behalf of their respective jurisdictions, by the below signed individuals, who are so authorized to encumber their jurisdictions.

City of Moxee

Mayor David L. Bolm

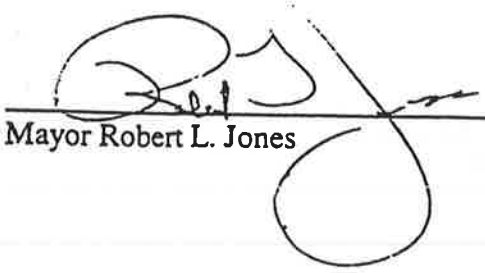
10/22/96
Date

Town of Naches

Doug MacNeil — 10-17-96

Mayor Doug MacNeil — Date

City of Selah



Mayor Robert L. Jones

11-12-96
Date

Town of Tieton

James Parsley
Mayor James Parsley

10/17/96
Date

City of Yakima

By: _____ 12/5/96
R.A. Zais, Jr., City Manager — Date

Attest:

Karen S Roberts
City Clerk

CITY CONTRACT NO: 96-103

RESOLUTION NO: R-96-148

INTERLOCAL AGREEMENT - Regional Wellhead Protection Program

DATED this 28th day of October, 1996.

City of Union Gap

Dan C. Olson
Mayor

Yakima County Board of Commissioners

William H. Flower, Chairman — 02-11-97 Date

Bettie Ingham, Commissioner — 02-11-97 Date

James M. Lewis, Commissioner — 02-11-97 Date

Approved as to Form

Ron Zirkle, Deputy Prosecuting Attorney

Attest: Sylvia E. Hinojosa

Sylvia E. Hinojosa
Clerk of the Board

BOARD OF COUNTY COMMISSIONERS * SEAL OF THE STATE OF WASHINGTON

APPENDIX B

WELLHEAD PROTECTION PLAN
RESPONSIBLITIES, HOURS, AND COSTS

Table B-1: Estimated Costs, Labor, and Responsibilities of WHPP Updates

Task	Frequency	Member Responsible	Total Commitment					
			Total Member Hours	Total Regional Hours [1]	Total Labor Cost [2]	Total Direct Cost	Total Cost	Annual Cost Per Member [3]
Obtain Regional Inventory Updates	Biennial	Yakima County		16	$800		$800	$50
Update Inventory Database	Biennial	Yakima County		16	$800		$800	$50
Mapping	Biennial	Yakima County		32	$1,600	$1,600	$3,200	$200
Notification List	Biennial	Yakima County		24	$1,200	$400	$1,600	$100
Web Site Upgrade	Biennial	Yakima County		32	$1,600		$1,600	$100
Subtotal Regional Costs		**Yakima County [1]**			**$6,000**	**$2,000**	**$8,000**	**$500**
Obtain Local Inventory Updates	Biennial	RWPC Members	64		$3,200		$3,200	$200
Meetings	Semi-Annual	RWPC Members	32		$1,600		$1,600	$400
Sign Maintenance	Annual	RWPC Members	32		$1,600	$800	$2,400	$300
Literature Distribution	Annual	RWPC Members	64		$3,200	$800	$4,000	$500
School Seminars	Annual	RWPC Members	64		$3,200		$3,200	$400
Subtotal Local Costs		**RWPC Members**						**$1,800**
Total [4]		**RWPC Members**						**$2,300**

[1] Regional management costs are costs born by Yakima County for regional wellhead protection administration efforts and are reimbursed by the RWPC members according to the 1998 interlocal agreement (Appendix A).

[2] Labor Costs = [(Member Hours) (8 Members) + (Regional Hours)] x ($50.00/hour). Labor costs were conservatively estimated at $50 per hour. These costs are not direct costs to the purveyors, but represent opportunity costs of lost time for other projects. These costs may be partially offset by soliciting volunteers from schools and service groups.

[3] Annual Cost Per Member = (Total Cost) / (8) / (Frequency)

[4] Of the $2,300 / Member Annual Costs, $1,800 / Year are Local Management Costs and $500 / Member must be paid annually to Yakima County for Regional Wellhead Management efforts per the agreement in the 1998 Interlocal Agreement (Appendix A). Of the $2,300 / Year, $325 are direct costs and $1,975 / Year are labor costs estimated at $50 / Hour.

APPENDIX C

WEBSITE INFORMATION

Yakima County

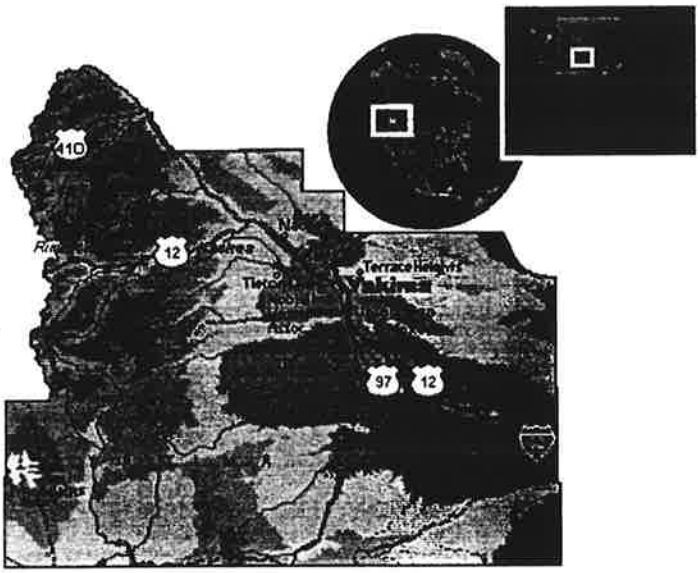
Washington

Public works

UPPER YAKIMA VALLEY REGIONAL WELLHEAD PROTECTION PLAN

!!!!Under Construction!!!!

The purpose of the Upper Yakima Valley Regional Wellhead Protection Plan (WHPP) is to identify potential sources of contamination near the member purveyors' groundwater supplies, implement management strategies to prevent contamination of those supplies, and develop a contingency plan for the contamination mitigation in the event that groundwater does become contaminated. In this Regional WHPP, each member community in the Upper Yakima Valley plays a role in protecting the groundwater supplies of the entire area by pooling resources and management efforts to target an audience beyond that which could be reached at a local level.



- Wellhead Protection Area Delineations
- Management Plan
- Water System Purveyors
- Inventory of Potential Contaminant Sources
- Contingency Plan
- Other Links

Return to Yakima County Home Page

APPENDIX D

WELLHEAD PROTECTION LITERATURE

Wellhead Protection Literature

Copies of the following literature were supplied to each RWPC member as part of this plan.

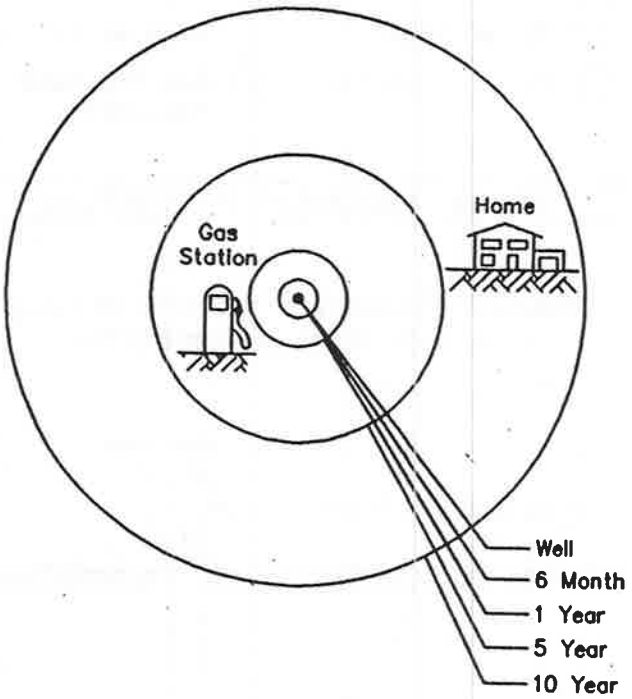
1. *Managing Hazardous Waste: A Guide for Autobody Shops*, DOE Publication #92-BR-16.
2. *Managing Hazardous Waste: A Guide for Automotive Machine Shops*, DOE Publication #92-BR-11.
3. *What's Hazardous at Home? A Guide to Safer Alternatives and Proper Disposal of Hazardous Household Products*, Yakima County Solid Waste Division.
4. *Protecting Our Groundwater*, EPA 813-F-95-002, May 1995.
5. *Old Slick Says "Recycle Use Oil" and Practice Pollution Prevention*, Yakima County Solid Waste Division, August 1997.
6. *A Guide to Yakima County's Solid Waste Disposal Facilities and Expanded Recycling Opportunities*, Yakima County Solid Waste Division.
7. *A Guide to Disposal of Household Hazardous Wastes*, Yakima County Solid Waste Division.
8. *Small Quantity Generators*, Yakima County Solid Waste Division, August 1997.
9. *It All Begins At Home: A Guide to Reducing Hazardous Household Products*, Yakima County Solid Waste Division.
10. *A Guide for Photo Processors*, DOE Publication #94-138R.
11. *A Guide for Auto Body Shops*, DOE Publication #92-BR-16.
12. *Emergency Planning and Community Right-To-Know: A Guide for Businesses*, DOE Publication #93-BR-01.
13. *A Guide for Automotive Repair Shops*, DOE Publication #92-BR-12.
14. *A Guide for Service Stations*, DOE Publication #92-BR-13.
15. *A Guide for Tire Dealers*, DOE Publication #92-BR-15.
16. *A Guide for Transmission Shops*, DOE Publication #92-BR-10.
17. *A Guide for Automotive Machine Shops*, DOE Publication #92-BR-11.
18. *Water Quality Guide: Recommended Pollution Control Practices for Homeowners and Small Farm Operators*, DOE Publication #87-30.
19. *A Guide to Recycling Around the House*, DOE Publication #90-BR-6.
20. *Your Home, Your Health, and Pesticides*, DOE Publication #90-BR-17.
21. *Safer Alternatives: Reducing the Risk in the Home*, Department of Ecology.
22. *Does Your Facility Generate Industrial Wastewaters?*, EPA 570-9-91-UIC5.
23. *Empty Pesticide Container Disposal: Guidance for Growers and Commercial Applicators*, DOE Publication #92-BR-8.
24. *Hazardous Waste: Helping Small Business Understand the Law*, Department of Ecology Hazardous Substance Information Office.
25. *Frequently Asked Questions Concerning Solvent and Cleaner Disposal*, DOE Publication #96-422.
26. *Reducing and Managing Wastes from Catch Basins: A Guide for Pesticide Secondary Containment*, DOE Publication #94-186.
27. *Step by Step Fact Sheets for Hazardous Waste Generators*, DOE Publication #91-12.
28. *Waste Reduction for Vehicle Maintenance Shops*, DOE, July 1992.
29. *Pollution Prevention in the Fruit Packing and Storage Industry*, DOE Publication #94-51.

APPENDIX E

CENTRAL WASHINGTON STATE FAIR PAMPHLET

1) DELINEATION

Establishing the boundaries for each well's wellhead protection area is an essential element of a local Wellhead Protection Program. The delineated area is managed by a community to protect groundwater supplies from contamination.



)elineated areas are based upon
ıpproximate contaminant travel times.
or example, the leaking gas station
ould impact the well shown within 5 years.

2) INVENTORY

Another essential element of wellhead protection is an inventory of potential sources of groundwater contamination in the delineated wellhead protection areas. The purpose of the inventory is to identify past, present, and proposed activities that may pose a threat to the water bearing zone utilized by the well.

POTENTIAL CONTAMINANT SOURCES:

- Underground Storage Tanks
- Landfills
- Gas Stations
- Septic Tanks
- Household Hazardous Wastes (Cleaners, Motor Oil, Pesticides)
- Industrial Chemicals, Hazardous Wastes

3) MANAGEMENT STRATEGIES

With wellhead protection areas established and potential contaminant sources identified, risk reducing measures may be implemented. Municipal tools such as inspections, permitting, enforcement, and zoning are essential to regulating land use.

SEVERAL COMPONENTS TO A SUCCESSFUL MANAGEMENT STRATEGY INCLUDE:

- Multi-Jurisdictional Committee
- Public Awareness
- Pollution Prevention Program
- Community Ordinances
- Groundwater Monitoring
- Household Hazardous Waste Collection
- Property Aquisition
- Spill Reporting Requirements

4) CONTINGENCY PLANNING

Contingency planning is important for all systems because, even with careful planning, unforeseen incidents can occur.

SOME ELEMENTS INCLUDED IN CONTINGECY PLANNING ARE:

- Alternative Drinking Water Sources
- Identify Possible Treatment Options
- Assess Water Rights/Availability
- Bottled Water
- Tank Trucks
- Water Conservation

APPENDIX F

WHPP POSTER AND DECALS

WHPA DECAL

The following decal has been developed by the RWPC as a public outreach tool for local area businesses and schools. The decal will be a static-cling window decal and will be distributed by the RWPC starting the first year of adoption of the plan.

Upper
Yakima Valley
Regional Wellhead
Protection Program

Call 911 To Report Spills

www.co.yakima.wa.us

Upper Yakima Valley Regional Wellhead Protection Program

For more information please contact:

Yakima County
(509) 574-2300

City of Yakima
(509) 575-6154

City of Union Gap
(509) 248-0432

City of Selah
(509) 698-7369

City of Moxee
(509) 575-8851

Nob Hill
Water Association
(509) 966-0272

Town of Tieton
(509) 673-3162

Town of Naches
(509) 653-2647

Department of Health
(509) 456-3115

c/o Yakima County Public Works • 128 North 2nd Street, Room 408 • Yakima, Washington 98901-2614

c/o Yakima County Public Works • 128 North 2nd Street, Room 408 • Yakima, Washington 98901-2614

APPENDIX G

WHPA DELINEATIONS

APPENDIX G

WELLHEAD PROTECTION AREA DELINEATIONS

The following sections provide a discussion of the mechanisms of groundwater contamination, WHPA delineation methods, and the development of the WHPAs.

GENERAL MECHANISMS OF GROUNDWATER CONTAMINATION

The purpose of delineating a WHPA is to provide a buffer zone around the well where potential contaminant sources can be properly managed. However, before the size and shape of the WHPA can be determined, a fundamental understanding of the mechanisms of groundwater transport and contamination is required.

Water is often called the "universal solvent" and as such is a common conduit for the transport of contaminants. Groundwater can become contaminated through interaction with contaminants in surface and atmospheric sources of water according to the hydrologic cycle shown on Figure G-1.

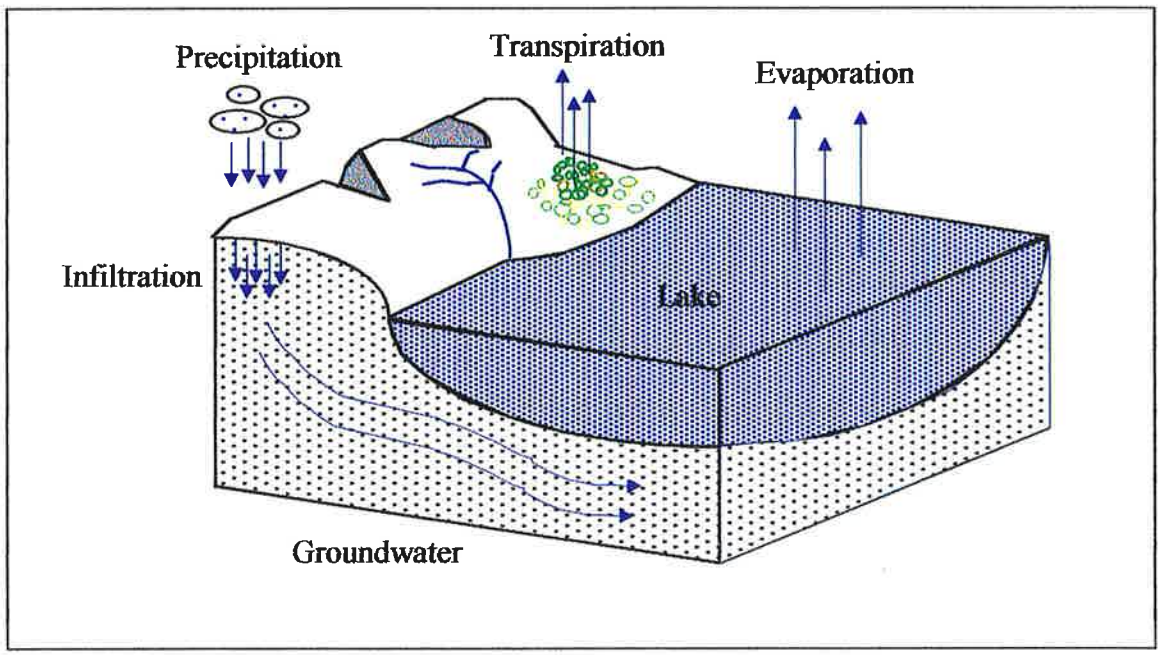


Figure G-1: The Hydrologic Cycle

In response to the monitoring and treatment of contaminated groundwater sites under the Comprehensive Response, Compensation, and Liability Act (CERCLA) of 1980, the mechanisms of groundwater contamination have been well-documented (EPA/625/R-93/002). Common mechanisms of groundwater contamination include infiltration, surface water recharge, direct migration, and interaquifer exchange, as discussed in the following sections.

INFILTRATION

Infiltration is a common mechanism of groundwater mechanism that is characterized by the transport of surface contaminants by precipitation as it infiltrates through pores in the soil matrix. Under the influence of gravity, water and contaminants percolate downward through the vadose zone of air pores in the soil until it reaches the saturated zone. In the saturated zone, contaminants spread horizontally and become influenced by the direction and rate of groundwater flow as shown in Figure G-2.

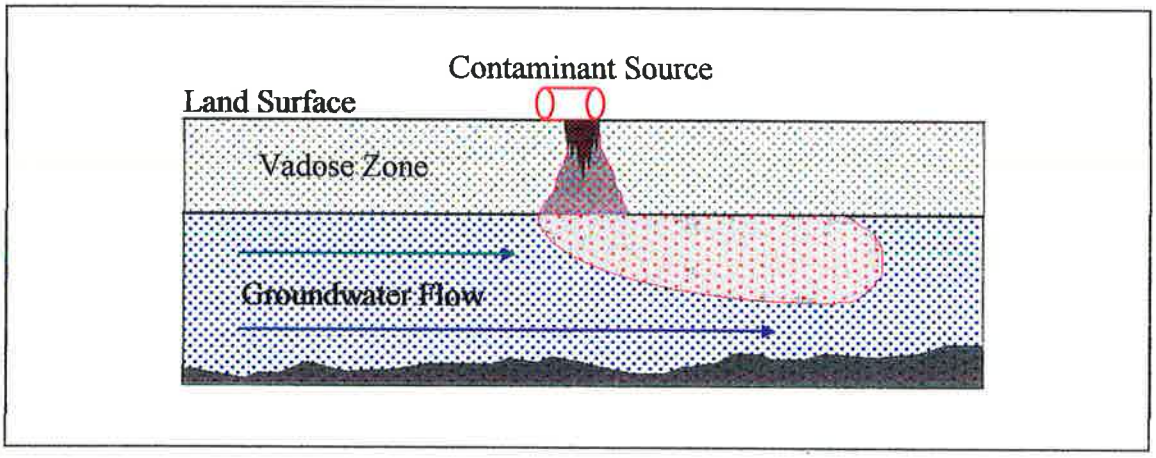


Figure G-2: Infiltration of Contaminants into Groundwater

SURFACE WATER RECHARGE

Groundwater typically flows toward surface water. However, contaminated surface water can enter groundwater if the groundwater surface level of an aquifer is below the water level of a surface source. This phenomenon is common in wells located adjacent to surface water sources which can lower the normal groundwater level when pumping (Figure G-3).

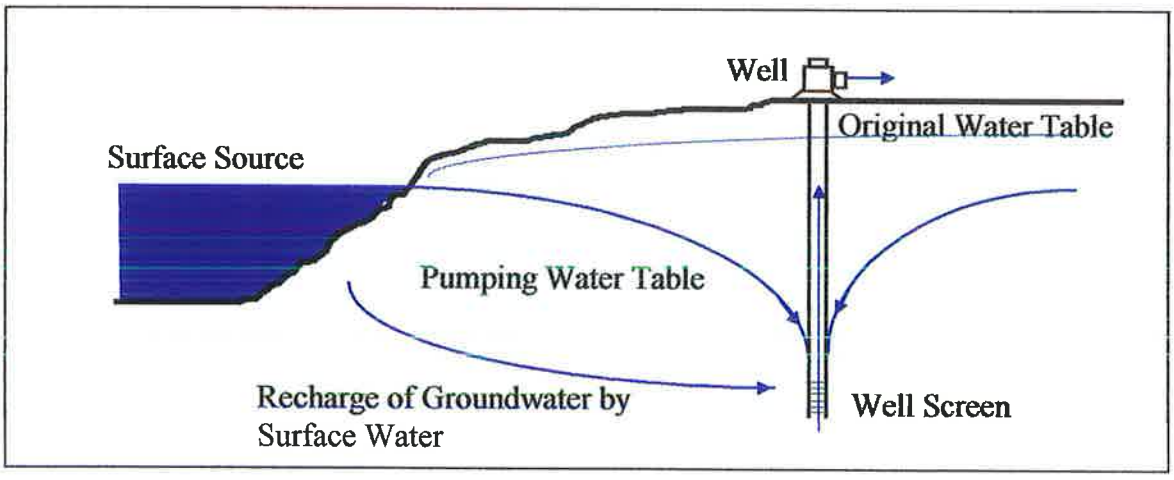


Figure G-3: Surface Water Recharge of Groundwater

DIRECT MIGRATION

Direct migration of contaminants into the subsurface often results in greater contaminant concentrations in groundwater because of the transport of contaminants is generally unobstructed by the soil matrix. Examples of direct migration include vertical intrusion of contaminants through improperly constructed well seals, improperly abandoned wells, and horizontal transport of contaminants from leaking landfills (Figure G-4).

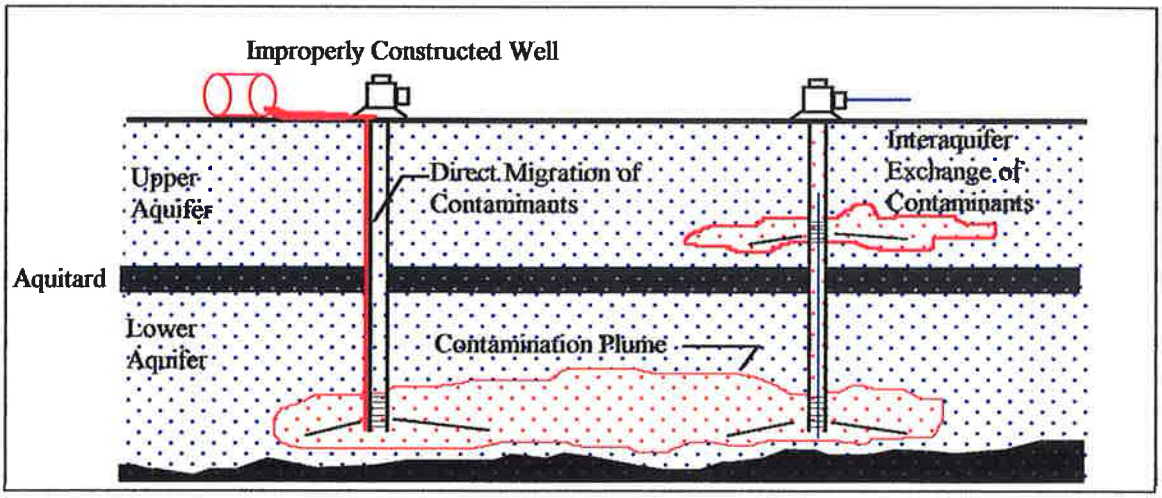


Figure G-4: Direct Migration and Interaquifer Exchange of Contaminants

INTERAQUIFER EXCHANGE

Interaquifer exchange of contaminants can occur when one contaminated aquifer is hydraulically connected to another. This transport mechanism is often facilitated by improperly constructed wells, as shown on Figure G-4.

CONTAMINANT TRANSPORT

Transport of contaminants in groundwater is a function of many physical, chemical, and biological processes. However, in general, these processes can be segregated into three main categories: advection, dispersion, and retardation. Advection is contaminant transport caused by the movement of water through the soil matrix and is typically a very slow process, measured in inches or feet per day. In advection, contaminants move in the same direction as the flow of groundwater. Dispersion of contaminants is caused by the irregular mixing of groundwater in the soil. Dispersive forces cause contaminants to move rapidly in all directions. Contaminant movement can be retarded by a variety of physical, chemical, and biological forces. Sorption of contaminants onto soil particles, chemical exchange of contaminants with minerals in the subsurface, and transformation of contaminants by biological forces can all retard contaminant migration. Based on the characteristics of known contaminant transport mechanisms, the wellhead protection delineation methods discussed in the following sections have been developed.

DEFINITION OF A WELLHEAD PROTECTION AREA

A wellhead protection area (WHPA) is defined as the surface and subsurface area surrounding a well that supplies a public water system through which contaminants are likely to pass and eventually reach the well (DOH, 1995). In Washington, WHPAs are based on time-of-travel criteria, or the theoretical distance a particle of water travels in a prescribed period of time. At a minimum, the DOH requires communities to look at the following five WHPAs:

- sanitary control area
- 6-month time-of-travel WHPA
- 1-year time-of-travel WHPA
- 5-year time-of-travel WHPA
- 10-year time-of-travel WHPA

A discussion of the WHPAs is provided in the following sections.

SANITARY CONTROL ZONE

The sanitary control area is the protective area around the wellhead as required by WAC 246-290-135. According to this statute, the minimum sanitary control area for wells is 100 feet, unless engineering justification supports a smaller area. Conversely, the DOH may require a larger sanitary control area if geological and hydrological data support such a decision. Because of the direct contamination of groundwater supplies as shown in Figure G-4, the DOH does not allow the practice of certain activities within sanitary control zones, such as operation of septic systems or storage of contaminants.

TIME-OF-TRAVEL WHPAS

The time-of-travel WHPAs are determined by estimating the travel distance of a hypothetical particle of water traveling through the aquifer to a pumping well for a selected travel time, (e.g., 1 year). The WHPAs define aquifer management regions around the well that can be used to identify and control potential sources of contamination. The management of WHPAs is often done incrementally with the most aggressive management strategies being applied in the 6-month and 1-year WHPAs.

Time-of-travel WHPAs are based on several assumptions. First, time-of-travel criteria do not consider vertical movement of water or contaminants from the land surface to the screened interval of the well. Therefore, time-of-travel zones tend to be inherently conservative. Also, it is assumed that contaminants move at the same rate as water in the subsurface, where actual contaminants may move slower or faster than water. This assumption is also typically conservative because the soil matrix, biological process, and chemical processes tend to retard the transport of contaminants in the subsurface.

Time-of-travel criteria may not be applicable in every situation. The DOH note that in some areas of the state, time-of-travel criteria may not be appropriate if the capture zone is recharged in less than 10 years, if complicated geographic features are present, or if a significant contribution to the well is from a nearby surface source. In these settings, alternate WHPA delineation criteria may be used with DOH approval. Because the County's wells do not meet these conditions, time-of-travel criteria are appropriate. A discussion of the DOH-required time-of-travel zones is provided in the following sections.

6-Month Time-of-Travel Zone

The six-month time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a six-month period. Aggressive management strategies are recommended in the six-month time-of-travel zone because of the limited time a purveyor can respond to contamination in this zone. The six-month time-of-travel zone is vulnerable to both microbial and chemical contamination. EPA literature suggests that bacteria and viruses survive less than one year in groundwater, so potential sources of microbial contamination should be monitored carefully. Similarly, limited response times for mitigation actions following chemical contamination require aggressive control of potential sources of chemical contamination within this zone.

1-Year Time-of-Travel Zone

The one-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a one-year period. As in the six month time-of-travel zone, the susceptibility of the one-year time-of-travel zone to both microbial and chemical contamination requires aggressive controls of potential contamination sources.

5-Year Time-of-Travel Zone

The five-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a five-year period. Microbial contamination in the five-year time-of-travel zone is not a major concern, because existing literature suggests that bacteria and viruses cannot survive for more than one year in groundwater. However, chemical contamination is a concern and potential sources of chemical contamination should be monitored closely. The primary difference between the five-year time-of-travel zone and the zones closer to the well is that the five-year zone provides an increased response time to mitigate the effects of chemical releases.

10-Year Time-of-Travel Zone

The ten-year time-of-travel zone represents the surface area overlying the portion of aquifer supplying water to the well within a ten-year period. The purpose of the ten-year zone is to control high risk chemical contamination sources, and to encourage long-term planning for contaminant risk reduction. Public education of contamination prevention measures is a key management tool used in protecting this zone.

representation of the WHPA. This model provides a much higher level of accuracy than the CFR method at a much more moderate cost than the standard analytical model. Additionally, the lack of sufficient hydrologic data precluded the development of some of the more comprehensive models. The shape and orientation of the simple analytical model WHPAs were determined by Shannon & Wilson, Inc. The delineation report appears in Appendix H.

APPENDIX H

HYDROGEOLOGIC STUDIES

Delineation of Wellhead Protection Areas
Upper Yakima Valley
Regional Wellhead Protection Plan
Yakima County, Washington

December 1998

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

Submitted To:
Gray & Osborne, Inc.
107 South Third Street
Yakima, Washington 98901

By:
Shannon & Wilson, Inc.
400 N. 34th Street, Suite 100
Seattle, Washington 98103

T-1741-01

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

SEATTLE
RICHLAND
FAIRBANKS
ANCHORAGE
SAINT LOUIS
BOSTON

December 7, 1998

Mr. Jeff Stevens
Gray & Osborne
107 S Third St
Yakima, WA 98901

RE: DELINEATION OF WELLHEAD PROTECTION AREAS, UPPER YAKIMA VALLEY REGIONAL WELLHEAD PROTECTION PLAN, YAKIMA COUNTY, WASHINGTON

Dear Mr. Stevens:

Enclosed is our report presenting the approach and results of hydrogeologic studies and calculations to determine capture zones used to delineate Wellhead Protection Areas (WHPA) for communities in Yakima County. This work is part of a Centennial Clean Water Fund project that Gray & Osborne is performing for eight municipal water purveyors: Moxee, Naches, Nob Hill Water Association, Selah, Tieton, Union Gap, Yakima, and Yakima County.

If you have any questions or comments regarding our findings, please contact me or Richard Martin at (206) 695-8020.

Sincerely,

SHANNON & WILSON, INC.

Scott F. Bender, C.G.W.P., R.P.G.
Associate

RJM:SFB/eet

Enclosure: Delineation of Wellhead Protection Areas, Upper Yakima Valley, Regional Wellhead Protection Plan, Yakima County, Washington

T1741-01.RPT.tml/pec/eet

400 NORTH 34TH STREET · SUITE 100
P.O. BOX 300303
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206·632·8020 FAX 206·633·6777
TDD: 1·800·833·6388

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PLATE

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APPENDIX

DELINEATION OF WELLHEAD PROTECTION AREAS
UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN
YAKIMA COUNTY, WASHINGTON

1.0 INTRODUCTION

This report presents the approach and results of hydrogeologic studies and calculations to determine capture zones used to delineate Wellhead Protection Areas (WHPA) for communities in Yakima County. This work is part of a Centennial Clean Water Fund project that Gray & Osborne is performing for the following eight municipal water purveyors: Moxee, Naches, Nob Hill Water Association, Selah, Tieton, Union Gap, Yakima, and Yakima County.

This work has evolved from our original scope of work dated March 19, 1997, which included an evaluation of the Calculated Fixed Radii (CFRs) that were originally calculated by the County, an evaluation of well susceptibility, a discussion of the regional hydrogeology, an evaluation of the hydrostratigraphic framework of the area relating to CFRs, and a review of the applicability of analytical methods for refining the capture zones. Much of the work related to the CFRs has been completed and is summarized in our report to you dated November 1997, except for the well susceptibility evaluation, which is included in this report.

After review of the revised CFRs, it was decided that a different approach should be performed to provide more realistic capture zones. We proposed a simple analytical approach to evaluate capture zones for each of the production wells based on the availability of data that could provide specific aquifer hydraulic parameters at the supply well locations. This new scope of work was outlined in our proposal to you dated February 6, 1998, and consists of the following tasks:

- Delineate capture zones based on available hydrogeologic information using an analytical method.
- Perform a sensitivity analysis on representative hydrogeologic regimes to assess the variability in the delineations.
- Provide a report describing our approach, presenting the capture zone delineations, and discussing the sensitivity analyses.

This work was authorized by you on February 27, 1998.

2.0 GENERALIZED GEOLOGY AND CONCEPTUAL HYDROGEOLOGIC MODEL

The Upper Yakima County area is located in central Washington, on the eastern foothills of the Cascade Range. The communities included in the Wellhead Protection Plan (WHPP) are located in the river valleys in the area, including the Naches, Cowiche, Selah, and Yakima River valleys. Surface elevation ranges from a low of about 300 meters (980 feet) in the valley to over 1,000 meters (3,200 feet) on the ridges surrounding the valley. The Upper Yakima County area lies within the rain shadow of the Cascade Range and is semi-arid, with annual precipitation of just over 9 inches a year. However, because of the extensive development of groundwater and surface water resources, including the diversion of surface water with canals to the east of the Yakima River, agriculture is one of the main uses of land in the area.

A conceptual hydrogeologic model of the Upper Yakima County area was developed to provide an understanding of the hydrogeologic regime that governs groundwater flow to the supply wells. The framework discussed below is a synthesis of subsurface geologic and groundwater information obtained from various reports and studies in and around the study area. A listing of the sources is provided in the Reference section (9.0) of this report.

The geologic processes that have formed and shaped the subsurface conditions that influence the groundwater flow system in this study began in the Miocene Epoch between 17 and 6 million years ago. During this time, a series of volcanic eruptions flooded large areas of the Columbia Plateau with basalt. The area may have been under water, and the interaction between the water and molten lava produced pillow basalts. Between eruptions, weathering of the basalt tops occurred, and sediments were transported from the uplands onto the basalt flows.

Tectonic activity that mildly folded the area into a series of generally east-west-trending anticlines and synclines continued well into the Pliocene. This structure is apparent in the topography of the area, with the axes of anticlines and synclines expressed as ridge tops (such as the Yakima and Ahtanum Ridges) and valleys, respectively. Faults are present in the area, the most significant of which is located along the northern edge of the City of Yakima.

As the Cascade Range rose because of tectonic activity in the west, sediments shed eastward off the slopes onto the volcanic plains. These thick accumulations of sediments consisted of sands, gravels, and fine-grained materials, as well as volcanic debris from periodic eruptions in the Cascade Range.

As the uplifting and folding continued, sediments deposited in areas of the plains that later became anticlinal ridges were eroded off, revealing the underlying basalt. The folding ended at the beginning of the Pleistocene. Since that time, sediments have continued to accumulate in the valleys formed by the synclines along streams and rivers. In other areas of the valleys, windblown deposits have accumulated.

The hydrologic cycle for the area begins high in the mountains where precipitation and snowmelt provide recharge to the upper aquifers and runoff to the local drainages. Both runoff and groundwater flow downgradient from the mountains toward the Yakima River. The local drainages and generally shallow groundwater eventually discharge to the Yakima River, which then flows southward through Union Gap and eventually discharges to the Columbia River near Richland, Washington. Groundwater in deeper aquifers may discharge to the Yakima River or may move southward toward discharge areas farther downstream.

The following sections further describe groundwater flow conditions in and then between the various aquifers in the Yakima Valley.

2.1 Surficial Material

The surficial material covering much of the Upper Yakima County area occurs as a thin veneer of loose sediments consisting of colluvium and sometimes windblown deposits. The exception is in stream and river valleys, where thicker sequences of alluvium are found consisting of sands and gravels interbedded with fine-grained materials. These accumulations can be up to several hundred feet thick (Whiteman et al., 1994). Only the Naches No. 1 and Tieton No. 1 production wells are screened within the surficial material.

2.2 Ellensburg Formation

The Ellensburg Formation underlies the surficial soils throughout much of the study area. This formation consists of a thick sequence of loose to partially consolidated clays, silts, sands, and gravels. In the center of the Yakima Valley, the Ellensburg Formation may be up to 2,000 feet thick. Three main zones are identified from well logs in the area (Foxworthy, 1962; and Converse, 1989):

- The upper portion of the Ellensburg Formation is mostly colluvium or volcanic debris flows consisting of volcanic-origin sands and gravels partially consolidated with finer-grained materials.

- An intermediate zone of the Ellensburg Formation consists of clays and silts with thin interbeds of stream-deposited sands and gravels.
- The lower zone consists of consolidated sands and silts. These materials are often described as sandstones and shales. In some areas, this lower sequence interfingers with the underlying basalts.

The thickest sequences of the Ellensburg Formation occur near the center of valleys. On flanks of the valley, the formation thins and is absent near the tops of the ridges. Most of the production wells evaluated in this project are screened within the Ellensburg Formation.

2.3 Basalt

A thick sequence of basalts, commonly referred to as the Yakima Basalt Subgroup in the study area, exists beneath the Ellensburg formation. Three major formations make up the subgroup including, from oldest to youngest, the Grande Ronde, Wanapum, and Saddle Mountain Basalts. The Wanapum and Saddle Mountain Basalts are relevant to this study; none of the wells in this study encountered the Grande Ronde Basalt. Between the major basalt formations are sedimentary interbeds, which include the Selah Interbed between the Wanapum and Saddle Mountain Basalts. Additional sedimentary interbeds are common within each of the basalt units.

Throughout most of the Yakima Valley, the Saddle Mountain Basalt underlies the Ellensburg Formation. This unit can be up to 400 feet thick in the Yakima Valley area. However, the unit is absent over much of the study area, particularly in areas of uplift where it was not deposited or has been eroded (Converse, 1989). Only Yakima County Well No. 3 draws water from this formation.

Underlying the Saddle Mountain Basalt is the Selah Interbed. This unit consists primarily of unconsolidated to semi-consolidated, fine-grained materials with occasional sands and gravels (Whiteman et al., 1994). The unit is up to 120 feet thick. Two production wells, Selah Nos. 5 and 6, are screened within sands and gravels of the interbed.

The oldest basalt unit encountered in this study is the Wanapum Basalt, which underlies the Selah Interbed. The Wanapum Basalt is up to 1,300 feet thick in the Yakima Valley area and is one of thickest basalt units of the Columbia Plateau. All of the production wells open to basalt are completed, at least in part, in this unit.

2.4 Groundwater Flow Conditions

Groundwater movement in the surficial materials is primarily in the thicker accumulations within stream and river valleys. Groundwater gradients likely mimic topography with groundwater flow toward local drainages. Groundwater may be confined or semi-confined, depending on the stratigraphy.

Within the Ellensburg Formation, groundwater flows downward along the slopes of the anticlines toward the axis of the synclines. Hydraulic gradients then cause water to move towards discharge points within the synclinal valleys, such as the Yakima River. Groundwater is collected from thin zones of sands and gravels primarily within the upper and lower zones of the formation (Converse, 1989). Groundwater is generally confined or semi-confined in the Ellensburg Formation.

Groundwater flow in the basalt formations is complex and is governed by numerous factors dependent upon the nature of individual flows. Flow characteristics are influenced by the topography over which the basalts flowed; the erosional processes that occurred before, during, and after extrusion; the deposition of sedimentary interbeds; tectonic activity; and diagenetic processes. Groundwater is generally collected from the more permeable flow tops of individual basalt flows, within interflow zones, or around zones of pillow basalts. Groundwater flow is generally horizontal within these zones which are separated by the less permeable and more massive entablature and colonnade. Flow is generally vertical within these zones through joints between the basalt columns and through vertical fractures.

The direction of groundwater flow within the more permeable basalt zones is dependent primarily on the dip of the beds; that is, flow is directed down the flanks of anticlines toward the center of the synclines. Exceptions to this case may occur when basalt is fractured or faulting has occurred, allowing groundwater to move laterally along the slope of the anticline. This is apparently the case for Nob Hill production well Nos. 2 and 3 based on groundwater contours by Bauer et al. (1985).

3.0 WELL SUSCEPTIBILITY

To assess the relative risk to the production wells from contamination, a well susceptibility evaluation was completed. The evaluation was based on a qualitative review of the subsurface conditions at the wellhead and the construction of the wells. This evaluation included the depth of the well, static water levels in the well, the presence of significant confining layers above the

screened or open interval that would limit the downward migration of contaminants, and the presence of a good well seal. A ranking of Low, Moderate, or High susceptibility was assigned to each well and was then compared with the well susceptibility ranking determined by the Washington State Department of Health (WSDOH).

Table 1 presents the Shannon & Wilson well susceptibility rankings along with the WSDOH rankings. In general, the well susceptibility rankings are similar. The WSDOH did not assign a ranking to the wells that are considered for emergency use only. The susceptibility rankings were different for the following production wells: Selah Nos. 3 and 5, City of Yakima Kiwanis Park, and Yakima County No. 5.

- Selah No. 3 was ranked moderate by the WSDOH because it is part of a well field with Selah No. 4. As a stand-alone well, it would be ranked low.
- Selah No. 5 and Yakima County No. 5 were assigned a low ranking because of the presence of significant confining layers. The WSDOH gave the wells a moderate ranking, however, because both well systems are chlorinated.
- The City of Yakima Kiwanis Park was assigned a moderate ranking by the WSDOH because of questions regarding the well seal. We assigned a low ranking after a review of the well log suggested that the well construction, combined with subsurface conditions, indicates a sufficient well seal.

4.0 WHPA DELINEATION APPROACH

A simple analytical model method was used to estimate the capture zone for each of the wells. With this model, input parameters are estimated based on geology, pumping performance, and regional hydrogeologic information. The model is not calibrated, and a limited sensitivity analysis was performed on the different hydrostratigraphic units encountered in the Upper Yakima County area.

This approach differs from a comprehensive analytical model, primarily in the source of input data and the testing of the model. Data input for a comprehensive model could include the results of hydraulic testing at the wellhead, detailed well logs, site-specific hydraulic gradients, detailed geologic information, and an evaluation of water level changes over time. Once the model has been constructed, the comprehensive model would be calibrated to observed data, a sensitivity analysis would be performed on each of the input parameters, and the model would be tested against an independent data set to see that the model is accurate.

The simple analytical model approach was used because of limited site-specific data. This approach will more accurately represent the hydrogeologic conditions near the wellhead and provide a more realistic capture zone than the CFR approach.

A total of 29 wells was evaluated using the simple analytical approach. The computer program Winflow (Environmental Simulations, Inc., 1995) was used to estimate the capture zones. Winflow uses the principle of superposition to add the effects of the regional hydraulic gradient and the cone of depression created by a production well to calculate the water level distribution around the well. Then, reverse particle tracking is used to estimate the distance a particle of water will have moved in a given time frame. For evaluating capture zones, 6-month and 1-, 5-, and 10-year travel times were evaluated. Finally, after a series of particles have been allowed to move, a capture zone can be drawn around the particles.

Input requirements for using Winflow include hydraulic conductivity, hydraulic gradient, saturated thickness, and porosity. Sources of input data include pumping performance of the wells, well logs, and various hydrogeologic studies of the area, including the U.S. Geological Survey (USGS) Regional Aquifer System Analysis (RASA) of the Columbia Plateau Aquifer System.

4.1 Hydraulic Conductivity

Hydraulic conductivity for the production wells was determined from specific-capacity data for each well. The specific capacity of a well is defined as the rate at which water can pumped from the well per unit drawdown. For most wells, information was available to calculate specific capacity. Where multiple sets of specific-capacity data were available for a given well, the highest calculated specific capacity was usually used in the modeling because this is thought to be most representative of the aquifer's ability to transmit water. Lower specific capacities can often reflect a lowering of the well's efficiency as a result of screen clogging over time, or through well losses. Specific capacity is related to transmissivity by the following equation (Driscoll, 1986):

$$T = Sc \times 2000$$

Where,

T = Transmissivity (gallons per day per foot), and
Sc = Specific Capacity (gallons per minute per foot of drawdown).

Hydraulic conductivity can then be calculated by dividing transmissivity by the saturated thickness of the formation contributing water to the well. The saturated thickness of a well was assumed to be equal to the screened interval or, when the well consisted of an open hole in rock, the thickness of the formation contributing groundwater to the well.

A few wells exhibited unusually high hydraulic conductivities that were not consistent with the regional characteristics of the formation. The regional hydraulic characteristics of the formations in the area are described in the USGS for the Columbia Plateau Aquifer System RASA (Whiteman et al., 1994). The resulting capture zones were very thin ellipses that were not realistic from our conceptual understanding of groundwater movement, nor did this provide a reasonable zone of protection for the water supply. For these wells, the hydraulic conductivity was decreased based on the typical ranges defined in RASA and on material descriptions provided on the well logs. The specific capacity, estimated hydraulic conductivity, and modeled hydraulic conductivity for each well are summarized in Table 2.

4.2 Hydraulic Gradient

Hydraulic gradients near the wells were based on contour maps created from water levels measured in each of the aquifers by the USGS in 1983 and 1985 for the RASA. Because of the large scale of the contour maps, the hydraulic gradients can only be viewed as an estimate of the regional groundwater conditions in the vicinity of a well. Local subsurface conditions may be different. Where there was insufficient data, the results of the groundwater model completed for the RASA study (Hansen et al., 1994) for Eastern Washington was used to estimate the magnitude and hydraulic gradients for each of the wells. The hydraulic gradients estimated for the capture zone calculations are given in Table 2.

For several wells, where the hydraulic conductivity was modified, the direction of groundwater flow was uncertain, or steep hydraulic gradients were measured, the hydraulic gradient was allowed to vary by 30 degrees around the average direction of groundwater flow. The result is a shorter, triangular-shaped capture zone that is more hydraulically realistic, yet is conservative to ensure adequate wellhead protection. The wells for which this approach was applied were Yakima County No. 1, Yakima County No. 4, Yakima County No. 5, Yakima County No. 6, Nob Hill No. 1, Naches No. 1, and Tieton No. 1.

4.3 Production Rates

Production rates for the wells were provided by Gray & Osborne, Inc., and are the projected annual rates for the year 2018. The production rates are listed in Table 2.

4.4 Porosity

Relatively little information is available regarding the porosity of hydrostratigraphic units encountered in the Upper Yakima County area. The aquifer porosity used for WHPA delineations is 0.22 and is based on WSDOH recommendations (1995).

5.0 RESULTS OF SIMPLE ANALYTICAL MODEL

The following provides a discussion of the model inputs used to delineate the capture zones for each well. The 6-month and 1-, 5-, and 10-year capture zones for each production well are shown on Plate 1.

5.1 Moxee Production Wells

Both Moxee Nos. 1 and 2 production wells are screened within the Ellensburg Formation. Moxee No. 1 is screened from 1,225 to 1,280 feet below ground surface (bgs), and Moxee No. 2 is screened 776 feet bgs. As indicated previously, no specific-capacity data was available for Moxee No. 1. Because the screened interval and geologic conditions were similar, the hydraulic conductivity of Moxee No. 1 was assumed to be the same as Moxee No. 2. A hydraulic gradient of 0.005 foot/foot to the west-southwest was estimated based on Bauer et al. (1985).

As a result of the similar hydraulic properties used for each well, the capture zones calculated for the Moxee production wells are similar in shape, elliptical to almost round (see Plate 1). The difference in the shape and size is solely a function of the different production rates for each well.

5.2 Naches Production Wells

The Naches No. 1 production well is screened in the thick surficial material of the Naches River Valley at a depth of about 100 to 190 feet bgs. The Naches No. 2 production well is open to the Ellensburg Formation at a depth of 552 to 712 feet bgs. Specific-capacity data was available for both wells and was used to estimate the hydraulic conductivities listed in Table 1. The hydraulic gradient for Naches No. 1 was estimated to be about 0.006 foot/foot based on Bauer et al. (1985) and from the gradient of the Naches River. Because the well is screened fairly shallow and is

located close to the Naches River, the direction of groundwater flow was uncertain. Therefore, we estimated the capture zone based on a 30-degree variation in direction centered near south. A hydraulic gradient of 0.006 foot/foot was estimated for Naches No. 2 based on Bauer et al. (1985). The groundwater flow direction is to the south-southeast.

The capture zone for the Naches No. 1 production well is a curvilinear triangle as a result of the variation in the direction of the hydraulic gradient. The capture zone for Naches No. 2 is a fairly narrow ellipse. Both capture zones are similar in size and are relatively small. The capture zones are depicted on Plate 1.

5.3 Nob Hill Production Wells

Nob Hill Nos. 1, 2, and 3 production wells draw groundwater from the Wanapum Basalt. Nob Hill No. 1 is uncased and open to the formation below 1,487 feet, and Nob Hill Nos. 2 and 3 are screened from 550 to 585 feet bgs and 432 to 554 feet bgs, respectively. Hydraulic conductivity estimates were obtained from specific-capacity data for the wells. The hydraulic gradients for the wells were estimated to be 0.008 foot/foot to the east-southeast based on Whiteman et al. (1994).

Nob Hill Nos. 4 and 5 production wells are screened in the Ellensburg Formation at depths of between 935 and 1,350 feet bgs and below 540 feet, respectively. The hydraulic conductivity for both wells was estimated from specific-capacity data. The hydraulic gradient was estimated to be 0.01 foot/foot for both wells. The direction of groundwater flow was to the east-southeast for Nob Hill No. 4 and to the east for Nob Hill No. 5. Hydraulic gradient information was obtained from Bauer et al. (1985).

The capture zones initially calculated for Nob Hill Nos. 1, 2, and 3 were long, extremely narrow ellipses because of the steep hydraulic gradients and the high hydraulic conductivity estimates. The hydraulic conductivity estimates were lowered to better reflect the typical values for the Wanapum Basalt observed in the RASA study. The revised values are shown in Table 1. Additionally, the hydraulic gradient for Nob Hill No. 1 was allowed to vary over 30 degrees around east-southeast to provide a more protective capture zone.

The capture zones calculated for the Nob Hill production wells are presented on Plate 1. Nob Hill No. 1 has a triangular shape as a result of the range of direction for the hydraulic gradient. Because Nob Hill Nos. 2 and 3 were screened at similar intervals, they were modeled together. The resulting capture zones are narrow ellipses, with Nob Hill No. 2 having a slight curve

because of the well interference from Nob Hill No. 3. The Nob Hill Nos. 4 and 5 capture zones are rounded ellipses as result of the lower hydraulic conductivity values estimated for these wells.

5.4 Selah Production Wells

Selah Nos. 3 and 4 production wells are screened in the Ellensburg Formation from 321 to 430 feet bgs and from 131 to 432 feet bgs, respectively. The hydraulic conductivity values for the wells were estimated from specific-capacity data. The hydraulic gradient for the wells was estimated to be 0.001 foot/foot to the south-southeast based on Bauer et al. (1985).

Selah Nos. 5 and 6 production wells are screened in the Selah Interbed at depths of from 494 to 554 feet bgs and from 554 to 918 feet bgs, respectively. Hydraulic conductivity values for the wells were estimated from specific-capacity data. Hydraulic gradients were estimated from Whiteman et al. (1994) to be 0.008 foot/foot to the south-southeast.

The Selah No. 7 production well was installed in the Wanapum Basalt and is open to the formation below 740 feet. The hydraulic conductivity was estimated from specific-capacity data. A hydraulic gradient of 0.008 foot/foot to the south-southeast was estimated based on Whiteman et al. (1994).

The capture zones are depicted on Plate 1. Selah Nos. 3 and 4 were modeled together because of the similar screened intervals. The resulting capture zones are almost circular, reflecting the low hydraulic gradients in the Ellensburg Formation at this location. The capture zones for Selah Nos. 5 and 6 are combined to reflect the similar screened intervals and the proximity of the wells. The capture zone is elliptical. Selah No. 7 has the largest capture zone, with a long elliptical shape that reflects the slightly higher hydraulic conductivity estimate for the well.

5.5 Tieton Production Wells

The three Tieton production wells are screened in different formations. Tieton No. 1 is a shallow well, screened from 108 to 121 feet bgs in the surficial material of the Cowiche Creek Valley. Tieton No. 2 is screened in the Ellensburg Formation. Unfortunately, the exact depth of the screened interval is unknown. Based on the material encountered during drilling as described on the well log, we believe that the well is screened between 275 and 370 feet bgs. Tieton No. 3 is open to the Wanapum Basalt below 500 feet to a depth of 889 feet.

Hydraulic conductivity for all three wells was based on specific-capacity data. The hydraulic gradient for Tieton No. 1 was estimated to be 0.009 foot/foot to the southeast based on the river gradients and Whiteman et al. (1994). Because of the uncertainty in the gradient and the shallow screened interval for this well, the hydraulic gradient was allowed to vary by 30 degrees around the estimated gradient. For Tieton No. 2, the hydraulic gradient was estimated to be 0.009 foot/foot to the southeast based on Bauer et al. (1985). The hydraulic gradient for Tieton No. 3 was estimated to be 0.008 foot/foot to the southeast based on Whiteman et al. (1994).

The capture zones calculated for these wells are depicted on Plate 1. The capture zone for Tieton No. 1 is triangular because of the variations in hydraulic gradient. The Tieton No. 2 capture zone is not visible because it lies within the capture zone of Tieton No. 1. Tieton No. 3 has a small, elliptical capture zone representative of the low hydraulic conductivity estimated for the well.

5.6 Union Gap Production Wells

All of the Union Gap production wells are screened in the Ellensburg Formation. Union Gap No. 1 is screened from 95 to 200 feet bgs, Union Gap No. 3 is screened from 181 to 360 feet bgs, and Union Gap No. 4 is screened from 398 to 511 feet bgs.

Because of the similar screened interval of the wells, similar values of hydraulic conductivity, and the proximity of the wells to one another, all three wells were modeled together. Specific-capacity measurements for each of the wells yielded similar hydraulic conductivity values so an average value was used for all of the wells. A hydraulic gradient of 0.009 foot/foot to the east was estimated from Bauer et al. (1985).

The capture zones for Union Gap Nos. 1 and 4 overlapped; therefore, one composite capture zone was created for these two wells. The capture zones for all of the wells show a roughly elliptical shape and are depicted on Plate 1.

5.7 City of Yakima Production Wells

The three City of Yakima production wells are all screened in the Ellensburg Formation. The Airport well is screened at a depth of 943 to 1,032 feet bgs. The Kissel well is screened from 878 to 1,163 feet bgs. The Kiwanis Park well is screened from 698 to 783 feet bgs.

The hydraulic conductivity for each well was estimated based on specific-capacity data. The Airport and Kissel wells were modeled together, and an average hydraulic conductivity was used for these wells. The hydraulic gradient for the Airport and Kissel wells was estimated to be

0.007 foot/foot to the east based on Bauer et al. (1985). The Kiwanis Park well hydraulic gradient was estimated to be 0.01 foot/foot to the east.

The capture zones calculated for the Airport and Kissel wells are narrow ellipses. The capture zone for the Kiwanis Park well is a larger and broader ellipse. The capture zones are depicted on Plate 1.

5.8 Yakima County Production Wells

Yakima County Nos. 2, 4, 5, and 6 production wells were installed in the Ellensburg Formation. Yakima County No. 2 is open to the formation from 808 to 1,072 feet bgs. Yakima County Nos. 4, 5, and 6 are screened from 400 to 420 feet bgs, 554 to 578 feet bgs, and from 440 to 770 feet bgs, respectively. Yakima County Nos. 1 and 3 were completed in the Wanapum Basalt, with Yakima County No. 1 open to the formation from 187 to 340 feet bgs and Yakima County No. 3 screened between 1,725 to 2,400 feet bgs.

Hydraulic conductivity values for each of the wells was estimated from specific-capacity data. Yakima County Nos. 4, 5, and 6 were modeled together. The hydraulic conductivity estimated for Yakima County No. 6 was used because the values for the other two wells were considerably higher than typical values for the Ellensburg Formation. To account for the uncertainty in the hydraulic conductivity of these wells, the direction of the hydraulic gradient was allowed to vary by 30 degrees around west-southwest. The magnitude of the hydraulic gradient for these wells was estimated to be 0.008 foot/foot from Bauer et al. (1985).

The Yakima County No. 1 hydraulic gradient was estimated to be 0.02 foot/foot to the southwest, from Whiteman et al. (1994). As a result of the steep gradient and very narrow delineation, the direction of the gradient was allowed to vary by 30 degrees. The hydraulic gradient for Yakima County No. 3 was estimated to be 0.014 to the southwest from Whiteman et al. (1994).

The capture zones calculated for the Yakima County wells are depicted on Plate 1. Yakima County No. 1 has a curvilinear, triangular-shaped capture zone reflecting the varying direction of the hydraulic gradient. Yakima County Nos. 2 and 3 have small, rounded capture zones reflecting the low hydraulic conductivity and production rates estimated for the wells. Yakima County Nos. 4, 5, and 6 capture zones are curvilinear triangles reflecting the varying direction of hydraulic conductivity; Nos. 4 and 5 overlap each other to form a single capture zone.

6.0 SENSITIVITY ANALYSES

Sensitivity analyses of hydraulic conductivity were conducted for the Ellensburg Formation and for the Wanupum Basalt. By varying the hydraulic conductivity over a range of values, the resulting changes to the shape of the capture zone can be compared with that used for the WHPA delineation. The area encompassed by the delineation does not change.

Based on the RASA study (Whiteman et al., 1994), the lower 25th percentile, and upper 75th percentile around the median hydraulic conductivity for the Ellensburg Formation varied by a factor of 5.3 and 4.2, respectively. The Wanapum Basalt factors were 4.7 and 5.1.

Because of the similar range in variations of hydraulic conductivity in the two units, the results of the analysis were the same. When the general shape of the delineation is slightly elliptical to circular, lowering of the hydraulic conductivity does not greatly impact the shape of the delineation. Raising the hydraulic conductivity by the factors indicated above results in a significantly longer and narrower delineation. When the starting delineation is long and narrow, the opposite results are observed. Lowering the hydraulic conductivity may result in a significantly rounder delineation, while raising the hydraulic conductivity causes only a slight lengthening and narrowing of the existing delineation.

These results, combined with the well susceptibility evaluation, may provide communities with some flexibility in assigning WHPAs.

7.0 CLOSURE AND RECOMMENDATIONS

The wellhead protection area delineations provided in this report are based on our interpretation of the hydrogeology in the Upper Yakima County. Although a simple analytical approach was used, the resulting delineations are more realistic from a hydrogeologic standpoint than the calculated fixed radius delineations.

Further work can be performed to refine the delineations if desired. The current site-specific data at most well locations are poor. Much of the data used in the analyses are based on regional hydrogeologic information that may vary from the local conditions near the wells. Because of these uncertainties, several wells were analyzed over a range of hydraulic gradients; additional data could be collected to increase our understanding of local groundwater flow conditions. Additionally, specific-capacity data provides only a rough estimate of hydraulic conductivity. Static and pumping water levels should be collected at all available wells in the area. This would

provide additional information on hydraulic gradients, groundwater flow direction, seasonal piezometric fluctuations, and aquifer conditions. Aquifer testing would provide better estimates, and the delineations could be refined to reflect the site-specific data.

8.0 LIMITATIONS

This report has been prepared for the use of Yakima County for specific application to its Wellhead Protection Plan for the municipal water systems operated by Moxee, Naches, Nob Hill Water Association, Selah, Tieton, Yakima, and Yakima County. This report has been prepared in accordance with generally accepted hydrogeologic methods. No other warranty, express or implied, is made. Shannon & Wilson, Inc., has prepared the attached "Important Information About Your Geotechnical Report" (Appendix) to assist you and others in understanding the use and limitations of our report.

The analyses and recommendations contained in this report are based on the data obtained from Yakima County, WSDOH, and various referenced sources. The hydrogeologic data obtained from these sources indicate subsurface conditions at only the specific locations and times at which the observations were made, and only to the depths penetrated. They do not necessarily reflect strata variations that may exist between such locations. The validity of the recommendations is based in part on assumptions made by our staff about the stratigraphy. Such assumptions may be confirmed only by future explorations.

If subsurface conditions different from those described are noted during future explorations, recommendations in this report may need to be reevaluated. Shannon & Wilson cannot assume responsibility or liability for the adequacy of data provided to us.

SHANNON & WILSON, INC.

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Hydrogeologist

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Associate

RJM:SFB/rjm

9.0 REFERENCES

Bauer, H.H.; Vaccaro, J.J.; and Lane R.C., 1985, Maps showing ground-water levels in the Columbia River basalt and overlying materials, spring 1983, Southeastern Washington. U.S. Geological Survey Water Resources Investigations report 84-4360.

Driscoll, F.G., 1986, Groundwater and wells. Johnson Filtration Systems Inc., St. Paul, Minn., 1089 pages.

Converse Consultants NW, 1989, Draft report: Proposed municipal well for City of Yakima: Report prepared by Converse Consultants NW, Seattle, Wash., for R.W. Beck and Associates, Seattle, Wash.

Foxworthy, B.L., 1962, Geology and ground-water resources of the Ahtanum Valley, Yakima County, Washington: U.S. Geological Survey Water-Supply Paper 1598.

Hansen, A.J.; Vaccaro, J.J.; and Bauer, H.H., 1994, Ground-water flow simulation of the Columbia Plateau regional aquifer system, Washington, Oregon, and Idaho: A contribution of the Regional Aquifer-System Analysis Program: U.S. Geological Survey Water-Resources Investigations Report 91-4187.

Washington State Department of Health, 1995, Wellhead Protection Program Guidance Document: Olympia, Washington, WSDOH Publication 331-018.

Whiteman, K.J.; Vaccaro, J.J.; Gonthier, J.B.; and Bauer, H.H., 1994, The hydrogeologic framework and geochemistry of the Columbia Plateau Aquifer System, Washington, Oregon, and Idaho: Regional Aquifer-System Analysis – Columbia Plateau, Washington-Oregon: U.S. Geological Survey Professional Paper 1413-B.

TABLE 1
WELL SUSCEPTIBILITY RANKING

Well	DOH Susceptibility	Shannon & Wilson Susceptibility
Moxee #1	Low	Low
Moxee #2	Low	Low
Naches #1	High	High
Naches #2	Low	Low
Nob Hill #1	Emergency	Low
Nob Hill #2	Moderate	Moderate
Nob Hill #3	Low	Low
Nob Hill #4	Low	Low
Nob Hill #5	Low	Low
Selah #3	Moderate [1]	Low
Selah #4	Moderate	Moderate
Selah #5	Moderate [2]	Low
Selah #6	Moderate	Moderate
Selah #7	Low	Low
Tieton #1	Emergency	High
Tieton #2	Low	Low
Tieton #3	Low	Low
Union Gap #1	Low	Low
Union Gap #3	Moderate	Moderate
Union Gap #4	Moderate	Moderate
Yakima Airport [3]	Emergency/Low	Low
Yakima Kissel [3]	Emergency/Low	Low
Yakima Kiwanis [3]	Emergency/Moderate [4]	Low
Yakima County #1	Low	Low
Yakima County #2	Low	Low
Yakima County #3	Low	Low
Yakima County #4	Low	Low
Yakima County #5	Moderate [2]	Low
Yakima County #6	Low	Low

TABLE 1 (cont.)
WELL SUSCEPTIBILITY RANKING

Notes:

(1) Selah No. 3 is ranked moderate because it is in a well field with Selah No. 4. As a stand-alone well, it would be ranked low.

(2) These wells could either be ranked low or moderate by DOH. However, becvause both wells are chlorinated, DOH has ranked them as moderate.

(3) The City of Yakima requested the DOH to rank these emergency sources.

(4) Based on the Kiwanis well log, the DOH has ranked this well as a moderate risk because of the lack of a true surface seal. However, Shannon & Wilson consideres the potential for contamiantion low because of the grout between the casing and the presence of a thick clay confining layer.

TABLE 2
HYDRAULIC PARAMETERS

Well	Hydraulic Conductivity Estimated (feet/day)	Modeled Hydraulic Conductivity (feet/day)	Well Production (gallons/day)	Hydraulic Gradient	Direction of Gradient	Formation
Moxee #1	24.4	24.4	231,200	0.005	WSW	Ellensburg
Moxee #2	24.4	24.4	346,800	0.005	WSW	Ellensburg
Naches #1	25.0	25.0	4,220	0.006	S	Surficial
Naches #2	32.4	32.4	259,000	0.006	SSE	Ellensburg
Nob Hill #1	78.3	39.1	48,000	0.008	ESE	Wanapum
Nob Hill #2	282.7	81.9	400,000	0.008	E	Wanapum
Nob Hill #3	2372.5	81.9	1,574,000	0.008	E	Wanapum
Nob Hill #4	1.9	1.9	188,000	0.01	ESE	Ellensburg
Nob Hill #5	12.6	12.6	1,280,000	0.01	E	Ellensburg
Selah #3	43.4	40.6	648,000	0.001	SSE	Ellensburg
Selah #4	37.8	40.6	648,000	0.001	SSE	Ellensburg
Selah #5	41.4	41.6	1,080,000	0.008	SSE	Selah
Selah #6	41.8	41.6	636,000	0.008	SSE	Selah
Selah #7	237.7	59.0	2,268,000	0.008	SE	Wanapum
Tieton #1	55.7	27.9	5,000	0.009	SE	Surficial
Tieton #2	21.7	21.7	66,000	0.009	SE	Ellensburg
Tieton #3	6.2	6.2	207,000	0.008	SE	Wanapum
Union Gap #1	17.7	17.4	231,000	0.009	E	Ellensburg
Union Gap #3	14.6	17.4	462,000	0.009	E	Ellensburg
Union Gap #4	19.8	17.4	924,000	0.009	E	Ellensburg
Yakima Airport	41.8	37.9	570,000	0.007	E	Ellensburg
Yakima Kissel	34.0	37.9	626,000	0.007	E	Ellensburg
Yakima Kiwanis	28.9	28.9	497,000	0.01	E	Ellensburg
Yakima County #1	14.9	14.9	5,500	0.02	SW	Wanapum
Yakima County #2	5.1	5.1	198,900	0.008	WSW	Ellensburg
Yakima County #3	2.0	2.0	198,900	0.014	SW	Saddle Mountain/ Wanapum
Yakima County #4	231.3	60.0	198,900	0.008	WSW	Ellensburg
Yakima County #5	92.5	60.0	198,900	0.008	WSW	Ellensburg
Yakima County #6	60.6	60.0	198,900	0.008	WSW	Ellensburg

APPENDIX

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL REPORT

Dated: December 7, 1998

To: Mr. Jeff Stevens
Gray & Osborne, Inc.

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

APPENDIX I

WHPA INVENTORY

APPENDIX I

WELLHEAD PROTECTION INVENTORY

AVAILABLE DATA AND DATABASES

The DOE maintains an active hazardous materials management program that manages hazardous materials in the entire State and stores data related to hazardous materials spills, transport, storage and cleanup. The following DOE databases are available:

- Businesses which handle substances that require a material safety data sheet (MSDS)
- Businesses that treat, transport, store, or dispose of hazardous wastes
- Businesses that own and operate underground storage tanks (USTs)
- Sites occupied by leaking underground storage tanks (LUSTs)
- Confirmed or suspected sites of contamination
- Solid waste facilities or landfills

Because the accuracy of the data provided by these databases is still being refined, the RWPC elected to expand its 10-year WHPA to include a 150 foot buffer area. Any sites located within this buffer are considered part of the 10-year WHPA and received the same notifications and level of management effort as those sites actually located within the site. The RWPC may remove this buffer once DOE moves to GPS located sites.

HAZARDOUS SUBSTANCE HANDLERS

The Superfund Amendments and Reauthorization Act (SARA) was signed into law in 1996. Title III of SARA is the Emergency Planning and Community Right-To-Know Act and establishes requirements for industry regarding emergency planning and the public's right for disclosure of information pertaining to hazardous substances in their community. Under Title III of SARA, industry is required to submit information to the DOE on the type and amount of hazardous substances stored, consumed, or produced on-site if it meets any one of the following threshold reporting criteria:

- Extremely Hazardous Substances (EHS) on-site in excess of the Environmental Protection Agency (EPA) Threshold Planning Quantities (TPQ) or in excess of 500 pounds, whichever is less
- Hazardous Chemicals (any chemical that is a physical or health hazard requiring a Material Safety and Data Sheet) on-site, in excess of 10,000 pounds
- The annual manufacture of 25,000 pounds or use of 10,000 pounds of a listed chemical

The DOE records separate SARA databases: a hazardous materials database (E.P.C.R.A.) and a toxic release inventory (TRI) database. Tables YC-4 through YC-9 summarize the inventory items from these databases which are present in the County's WHPAs. The contact for obtaining future updates of this database is:

Washington State Department of Ecology
Community Right-To-Know Unit
PO Box 47659
Olympia, WA 98504-7659
1-360-407-6727

HAZARDOUS WASTE TREATMENT, TRANSPORT, STORAGE, OR DISPOSAL

The promulgation of the Resource Conservation and Recovery Act (RCRA) in 1986 resulted in the implementation of "cradle-to-grave" management of hazardous wastes for the first time in the United States. Since that time, the states have passed companion regulations to RCRA to more closely manage the treatment, transport, storage, and disposal of hazardous wastes. The Washington State Department of Ecology is charge with the enforcement of WAC 173-303 Dangerous Waste Regulations, which implements the goals of RCRA.

In Washington State, a business may become subject to the Dangerous Waste Regulations under the requirements of WAC 173-303-070 to -100. Criteria for designation of a dangerous waste include:

- The waste is first defined as a solid waste under WAC 173-303-016.
- The waste is then characterized through testing or knowledge of the unit processes used in generating the waste.
- The waste is identified by characteristic or name in WAC 173-303-080 to -100.

Once a business has been determined to be a dangerous waste generator, the reporting, storage, transport, and waste management requirements depend on the amount and type of waste generated. Unless a business qualifies under one of several exception clauses, the requirements for managing the dangerous waste include:

- Designation of the waste as a Dangerous Waster or an Extremely Hazardous Waste
- Notification to DOE and assignment of an EPA/state identification number.
- Storage, treatment, transport, and disposal of the waste in accordance with the requirements of a Treatment, Storage, or Disposal (TSD) facility, unless the facility meets one of a number of exceptions identified in WAC 173-303-170.
- Preparation of a manifest for the transport of the waste consistent with the requirements in WAC 173-303-180.
- Adherence to the packaging, labeling, marking, and placarding requirements for the transport of the waste as described in WAC 173-303-190.
- Accumulation and storage of the waste in accordance with WAC 173-303-200.
- Maintenance of records in accordance with WAC 173-303-210.

A number of exclusions are described in WAC 173-303 for some or all of the above requirements, including categorical exemptions of certain types of wastes (i.e. domestic sewage), and small and medium quantify generators. For example, small quantity generators may generate up to 220 pounds of dangerous waste or up to 2.2 pounds of certain pesticides and other Extremely Hazardous Wastes per month and may accumulate up to 2,200 pounds of a dangerous waste or up to 2.2 pounds of certain pesticides and other Extremely Hazardous Wastes per month. A small quantity generator does not have to comply with all of the above criteria as described in WAC 173-303-070 (8)(b). Similarly, medium quantity generators also have reduced criteria as characterized in WAC 173-303-201 if they generate and accumulate between 220 and 2,200 pounds of dangerous waste. Large quantify generators must comply with all of the criteria discusses previously and are characterized by generation and accumulation threshold quantities of greater than 2,200 pounds.

Tables YC-4 through YC-9 summarize the inventory items from the dangerous waste generator database which are present in the County's WHPAs. The contact for obtaining future updates is:

Washington State Department of Ecology
Toxics Cleanup Program
PO Box 47659
Olympia, WA 98504-7659
1-360-407-6466

UNDERGROUND STORAGE TANKS

This section discusses the definitions, regulatory authority, and reporting requirements for underground storage tanks (USTs). A UST is defined as having at least 10 percent of its volume, including any piping, below the surface of the ground. In accordance with RCW 90.76 and WAC 174-360, all non-exempt underground storage tanks used to store regulated substances must be registered with the DOE and the Department of Licensing (DOL) by the owner of the tank. Tanks which are exempt from registration include:

- Any tank which was taken out of operation on or before January 1, 1974.
- Tanks with a capacity of 110 gallons or less.
- Farm or residential tanks with a capacity of 1100 gallons or less that are used to store motor fuel for personal or farm use.
- Tanks which store heating oil used for space or process heating if the tank is located on the same premises where the heating oil is used.
- Septic tanks.
- Other industry specific tanks, including pipeline facilities, surface impoundments, pits, or lagoons, stormwater and wastewater collection facilities, and others.

Tables YC-4 through YC-9 summarize the inventory items from this database which are present in the County's WHPAs. The contact for obtaining future updates is:

Washington State Department of Ecology
Hazardous Waste Program
PO Box 47659
Olympia, WA 98504-7659
1-360-407-6466

Additionally, the UST list can be downloaded from the internet at the following site:

http://www.wa.gov/ECOLOGY/tcp/cleanup.html

LEAKING UNDERGROUND STORAGE TANKS

The leaking underground storage tank (LUST) database represents a subset of the UST database of those tanks which have been reported to be or confirmed to be leaking. Cleanup and notification requirements for LUSTs in Washington State are detailed in the Model Toxics Control Act (MTCA). The sites are in various stages of clean-up and therefore, the threat represented by these sites also vary.

Tables YC-4 through YC-9 summarize the inventory items from this database which are present in the County's WHPAs. The contact for obtaining future updates is:

Washington State Department of Ecology
Hazardous Waste Program
PO Box 47659
Olympia, WA 98504-7659
1-360-407-6466

Additionally, the LUST list can be downloaded from the internet at the following site:

http://www.wa.gov/ECOLOGY/tcp/cleanup.html

CONFIRMED OR SUSPECTED CONTAMINATION SITES

Confirmed or Suspected Contamination Sites (CSCS) is a database maintained by the DOE of hazardous waste sites. A hazardous waste site is defined as "any report of a release or suspected presence of hazardous substances that may threaten human health or the environment." Requirements for the cleanup of these sites is administered through the DOE according to the MTCA.

Tables YC-4 through YC-9 summarize the inventory items from this database which are present in the County's WHPAs. The contact for obtaining future updates is:

Washington State Department of Ecology
Central Region Office, Hazardous Waste and Toxics Reduction Program
15 W Yakima Avenue
Yakima, WA 98902-3401
1-509-575-2490

Additionally, the CSCS list can be downloaded from the internet at the following site:

http://www.wa.gov/ECOLOGY/tcp/cleanup.html

SOLID WASTE FACILITIES

A database of solid waste facilities (dumps and recycling stations) is maintained by each local DOE office. DOE coordinates with these facilities for the recycling of hazardous material, monitoring of by-products, and compliance with local, state, and federal regulations, including the Clean Air Act (CAA), Safe Drinking Water Act (SDWA), MTCA, RCRA, and others.

Tables YC-4 through YC-9 summarize the inventory items from this database which are present in the County's WHPAs. The contact for obtaining future updates is:

Washington State Department of Ecology
Central Region Office
Hazardous Waste and Toxics Reduction Program
15 W Yakima Avenue
Yakima, WA 98902-3401
1-509-454-7293

MODERATE RISK BUSINESSES

In addition to the available DOE databases of potential contamination sources, Yakima County has compiled a list of approximately 600 moderate risk businesses based on a mail-in questionnaire conducted in 1995. These businesses were included in the mapping and potential contamination source database.

HIGH RISK BUSINESSES

In addition to the available DOE databases of potential contamination sources, a search of high risk businesses was performed based on EPA literature. Table I-1 summarizes types of businesses that may be a risk in WHPAs along with corresponding contaminant types.

Table I-1: Potential Sources of Groundwater Contamination (EPA/625/R-93/002)

Source	Contaminants
Naturally Occurring Sources	
Rocks and soils	*Aesthetic Contaminants*: Iron and iron bacteria; manganese; calcium and magnesium (hardness) *Health and Environmental Contaminants:* Arsenic; asbestos; metals; chlorides; fluorides; sulfates; and microorganisms
Contaminated water	Excessive sodium; bacteria; viruses; low pH (acid) water
Decaying organic matter	Bacteria
Geological radioactive gas	Radionuclides (radon, etc.)
Natural hydrogeological events and formations	Salt-water/brackish water intrusion (or intrusion of other poor quality water); contamination through sink-hole infiltration in limestone terrains
Agricultural Sources	
Animal feedlots and burial areas	Livestock sewage wastes; nitrates; phosphates; chloride; chemical sprays and dips for controlling insect, bacterial, viral, and fungal pests on livestock; coliform [4] and noncoliform bacteria; viruses
Manure spreading areas and storage pits	Livestock sewage wastes; nitrates
Livestock waste disposal areas	Livestock sewage wastes; nitrates
Crop areas and irrigation sites	Pesticides [5]; fertilizers [6], gasoline, motor oils from chemical applicators
Chemical storage areas and containers	Pesticides [5]; fertilizers [6]; residues
Farm machinery areas	Automotive wastes [7]; welding wastes
Agricultural drainage wells and canals	Pesticides [5]; fertilizers [6]; bacteria; salt water (in areas where the fresh-saltwater interfaces lies at shallow depth and where the water table is lowered by channelization, pumping, or other causes)
Residential Sources	
Common household maintenance and hobbies	*Common Household Products.* [8] Household cleaners; oven cleaners; drain cleaners; toilet cleaners; disinfectants; metal polishes; jewelry cleaners; shoe polishes; synthetic detergents; bleach; laundry soil and stain removers; spot removers and dry cleaning fluid; solvents; lye or caustic soda; household pesticides [9]; photochemicals; printing ink; other common products *Wall and Furniture Treatments:* Paints; varnishes; stains; dyes; wood preservatives (creosote); paint and lacquer thinners; paint and varnish removers and deglossers; paint brush cleaners; floor and furniture strippers *Mechanical Repair and Other Maintenance Products:* Automotive wastes [9]; waste oils; diesel fuel; kerosene; #2 heating oil; grease; degreasers for garages; metal degreasers; asphalt/roofing tar; tar removers; lubricants; rustproofers; car wash detergents; car waxes/polishes; rock salt; refrigerants
Lawns and gardens	Fertilizers [5]; herbicides and other pesticides used for lawn and garden maintenance [10]
Swimming pools	Swimming pool maintenance chemicals [11]
Septic systems, cesspools, and sewer lines	Septage; coliform and noncoliform bacteria [4]; viruses; nitrates; heavy metals; synthetic detergents; cooking and motor oils; bleach; pesticides [9] [10]; paints; paint thinner; photographic chemicals; swimming pool chemicals [11]; septic tank/cesspool cleaner chemicals [12]; elevated levels of chloride, sulfate, calcium, magnesium, potassium, and phosphate
Underground storage tanks	Home heating oil
Apartments and condominiums	Swimming pool chemicals [11]; pesticides for lawn and garden maintenance and cockroach, termite, ant, rodent, and other pest control [9], [10]; wastes from onsite sewage treatment plants; household hazardous wastes [8]

Table I-1: Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Municipal Sources	
Schools and government offices and grounds	Solvents; pesticides [9] [10]; acids; alkalis; waste oils; machinery/vehicle servicing wastes; gasoline and oil from storage tanks; building wastes [13]
Park lands	Fertilizers [6]; herbicides [10]; insecticides [9]
Public and residential areas infested with mosquitoes, gypsy moths, ticks, ants, or other pests	Pesticides [5] [9]
Highways, road maintenance depots, and deicing operations	Herbicides in highway rights-of-way [5] [10]; road salt (sodium and calcium chloride); road salt anticaking additives (ferric ferrocyanide, sodium ferrocyanide); road salt anticorrosives (phosphate and chromate); automotive wastes [7]
Municipal sewage treatment plans and sewer lines	Municipal wastewater; sludge; [14] treatment chemicals [15]
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	sewage wastewater; nitrates; other liquid wastes; microbiological contaminants
Land areas applied with wastewater or wastewater byproducts	Organic matter; nitrate; inorganic salts; heavy metals; coliform and noncoliform bacteria [4]; viruses; nitrates; sludge [14]; nonhazardous wastes [16]
Storm water drains and basins	Urban runoff; gasoline; oil; other petroleum products; road salt; microbiological contaminants
Combined sewer overflows (municipal sewers and storm water drains)	Municipal wastewater; sludge [14]; treatment chemicals [15]; urban runoff; gasoline; oil; other petroleum products; road salt; microbial contaminants
Recycling/reduction facilities	residential and commercial solid waste residues
Municipal waste landfills	Leachate; organic and inorganic chemical contaminants; waste from households [8] and businesses [13]; nitrates; oils; metals
Open dumping and burning sites, closed dumps	Organic and inorganic chemicals; metals; oils; wastes from households[8] and businesses [13]
Municipal incinerators	Heavy metals; hydrocarbons; formaldehyde; methane; ethane; ethylene; acetylene; sulfur and nitrogen compounds
Water supply wells, monitoring wells, older wells, domestic and livestock wells, unsealed and abandoned wells, and test hole wells	Surface runoff; effluents from barnyards, feedlots, septic tanks, or cesspools; gasoline; used motor oil; road salt
Sumps and dry wells	Storm water runoff; spilled liquids; used oil; antifreeze; gasoline; other petroleum products; road salt; pesticides;[5] and a wide variety of other substances
Drainage wells	Pesticides [9] [10]; bacteria
Well pumping that causes interaquifer leakage, induced filtration, landward migration of sea water in coastal areas; etc.	Saltwater; excessively mineralized water
Artificial groundwater	Stormwater runoff; excess irrigation water; stream flow; cooling water; treated sewage effluent; other substances that may contain contaminants, such as nitrates, metals, detergents, synthetic organic compounds, bacteria, and viruses

Table I-1: Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Commercial Sources	
Airports, abandoned airfields	Jet fuels; deicers; diesel fuel; chlorinated solvents; automotive wastes [7]; heating oil; building wastes [13]
Auto repair shops	Waste oils; solvents; acids; paints; automotive wastes [7]; cutting oils
Barber and beauty shops	Perm solutions; dyes; miscellaneous chemicals contained in hair rinses
Boat yards and marinas	Diesel fuels; oil; septage from boat waste disposal areas; wood preservative and treatment chemicals; paints; waxes; varnishes; automotive wastes [7]
Bowling alleys	Epoxy; urethane-based floor finish
Car dealerships	Automotive wastes [7]; waste oils; solvents; miscellaneous wastes
Car washes	Soaps; detergents; waxes; miscellaneous chemicals
Campgrounds	Septage; gasoline; diesel fuel from boats; pesticides for controlling pests [5] [9], household hazardous wastes from recreational vehicles (RVs) [8]
Carpet stores	glues and other adhesives; fuel from storage tanks if forklifts are used
Cemeteries	Leachate; lawn and garden maintenance chemicals [10]
Construction trade areas and materials	Solvents; asbestos; paints; glues and other adhesives; waste insulation; lacquers; tars; sealants; epoxy waste; miscellaneous chemical wastes
Country clubs	Fertilizers [6]; herbicides [5] [10]; pesticides for controlling pests [9]; swimming pool chemicals [11]; automotive wastes
Dry cleaners	Solvents (perchloroethylene, petroleum solvents, Freon); spotting chemicals (trichloroethane, methylchloroform, ammonia, peroxides, rust removers, etc.)
Funeral services and crematories	Formaldehyde; wetting agents; fumigants; solvents
Furniture repair/finishing shops	Paints; solvents; degreasing and solvent recovery sludges
Gasoline services stations	Oils; solvents; miscellaneous wastes
Golf courses	Fertilizers [6]; herbicides [5] [10] pesticides for controlling pests [9]
Hardware/lumber/parts stores	Hazardous chemical products in inventories; heating oil and fork lift fuel from storage tanks; wood-staining and treating products such as creosote
Heating oil companies, USTs	Heating oil; wastes from truck maintenance areas [7]
Horticultural practices, garden nurseries, florists	Herbicides, insecticides, fungicides, and other pesticides [10]
Jewelry/metal plating shops	Sodium and hydrogen cyanide; metallic salts; hydrochloric acid; sulfuric acid;
Laundromats	Detergents; bleaches; fabric dyes
Medical institutions	X-ray developers [17]; infectious, radiological, and biological wastes; disinfectants; asbestos; beryllium; dental acids; miscellaneous chemicals
Office buildings	Building wastes [13]; lawn/garden maintenance chemicals [10]; gasoline; oil
Paint stores	Paints; paint thinners; lacquers; varnishes; other wood treatments
Pharmacies	Spilled and returned products
Photography shops, photo labs	Biosludges; silver sludges; cyanides; miscellaneous sludges
Print shops	Solvents; inks; dyes; oils; photographic chemicals
Railroad tracks and yards	Diesel fuel; herbicides for rights-of-way; creosote for preserving wood ties
Research laboratories	X-ray developers [17]; infectious, radiological, and biological wastes; drugs; asbestos; disinfectants; beryllium; solvents; infectious materials; disinfectants
Scrap and junk yards	Any wastes from businesses [13] and households [8]; oils
Sports and hobby shops	Gunpowder and ammunition; rocket engine fuel; model airplane glue
Above and underground tanks	Heating oil; diesel fuel; gasoline; petroleum products; commercial chemicals
Transportation services for passenger transit	Waste oil; solvents; gasoline and diesel fuel from vehicles and storage tanks; fuel oil; other automotive wastes [7]
Veterinary services	Solvents; infectious materials; vaccines; drugs; disinfectants (quaternary ammonia, peroxides, bleach); x-ray developers and fixers [17]

Table I-1: Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Industrial Sources (Presently Operated or Torn Down Facilities) [18]	
Asphalt plants	Petroleum derivatives
Communications equipment manufacturers	Nitric, hydrochloric, and sulfuric acid wastes; heavy metal sludges; copper-contaminated etchant (e.g., ammonium persulfate); cutting oil and degreasing solvent (trichloroethane, Freon, or trichloroethylene); waste oils; corrosive soldering flux; paint sludge; waste plating solution
Electric and electronic equipment manufacturers and storage facilities	Cyanides; metal sludges; caustics (chromic acid); solvents; oils; alkalis; acids; paints and paint sludges; calcium fluoride sludges; methylene chloride; perchloroethylene; trichloroethane; acetone; methanol; toluene; PCBs
Electroplaters	Boric, hydrochloric, hydrofluoric, and sulfuric acids; sodium and potassium hydroxide; chromic acid; sodium and hydrogen cyanide; metallic salts
Foundries and metal fabricators	Paint wastes; acids; heavy metals; metal sludges; plating wastes; oils; solvents; explosive wastes
Furniture/fixtures manufacturers	Paints; solvents; degreasing sludges; solvent recovery sludges
Machine and metalworking shops	Solvents; metals; miscellaneous organics; sludges; oily metal shavings; lubricant and cutting oils; degreasers (tetrachlorethylene); metal marking fluids; mold-release agents
Mining operations, underground storage mines	Mine spoils or tailings that often contain metals; acids; highly corrosive mineralized waters; metal sulfides
Unsealed abandoned mines used as waste pits	Metals, acids; minerals; sulfides; other hazardous and nonhazardous chemicals [16]
Paper mills	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals [16]; organic sludges; sodium hydroxide; chlorine; hypochlorite; chlorine dioxide; hydrogen peroxide
Petroleum production and storage companies, secondary recovery of petroleum	Hydrocarbons; oil-field brines (highly mineralized salt solutions)
Industrial pipelines	Corrosive fluids; hydrocarbons; other hazardous and nonhazardous material and wastes [16]
Photo processing laboratories	Cyanides; ;Biosludges; silver sludges; miscellaneous sludges
Plastics materials and synthetics producers	Solvents; oils; miscellaneous organics and inorganics (phenols, resins); paint wastes; cyanides; acids; alkalis; wastewater treatment sludges; cellulose esters; surfactant; glycols; phenols; formaldehyde; peroxides; etc.
Primary metal industries (blast furnaces, steel works, rolling mills)	Heavy metal wastewater treatment sludge; pickling liquor; waste oil; acid tar sludge; alkaline cleaners; degreasing solvents; slag; metal dust
Publishers, printers, and allied industries	Solvents; inks; dyes; oils; miscellaneous organics; photographic chemicals
Public utilities (phone, electric power, gas)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Public utilities (phone, electric power, gas)	PCBs from transformers and capacitors; oils; solvents; sludges; acid solution; metal plating solutions (chromium, nickel, cadmium); herbicides from utility rights-of-way
Sawmills and planers	Treated wood residue (copper quinolate, mercury, sodium bazide); tanner gas; paint sludges; solvents; creosote; coating and gluing wastes
Stone, clay, and glass manufacturers	Solvents; oils and grease; alkalis; acetic wastes; asbestos; heavy metal sludges; phenolic solids or sludges; metal finishing sludge
Welders	Oxygen, acetylene
Wood preserving facilities	wood preservatives; creosote

Table I-1: Potential Sources of Groundwater Contamination (continued)

Source	Contaminants
Industrial Sources	
Material stockpiles	Acid drainage; other hazardous and nonhazardous wastes [16]
Waste tailing ponds (commonly for the disposal of mining wastes)	Acids; metals; dissolved solids; radioactive ores; other hazardous and nonhazardous wastes [15]
Transport and transfer stations (trucking terminals and rail yards)	Fuel tanks; repair shop wastes [7]; other hazardous and nonhazardous wastes [15]
Above-ground and underground storage tanks and containers	Heating oil; diesel and gasoline fuel; other petroleum products; hazardous and nonhazardous materials and wastes [16]
Storage, treatment, and disposal ponds, lagoons, and other surface impoundments	Hazardous and nonhazardous liquid wastes [16]; septage; sludge [14]
Chemical landfills	Leachate; hazardous and nonhazardous wastes [16]; nitrates
Radioactive waste disposal sites	Radioactive wastes from medical facilities, power plants, and defense operations; radionuclides (uranium, plutonium)
Unattended wet and dry excavation sites (unregulated dumps)	A wide range of substances; solid and liquid wastes; oil-field brines; spent acids form steel mill operations; snow removal piles containing large amounts of salt
Operating and abandoned production and exploratory wells (for gas, oil, coal, geothermal, and heat recovery); test hole wells; monitoring and excavation wells	Metals; acids; minerals; sulfides; other hazardous and nonhazardous chemicals [16]
Dry wells	Saline water from wells pumped to keep them dry
Injection wells	Highly toxic wastes; hazardous and nonhazardous industrial wastes [16]; oil-field brines
Well drilling operations	Brines associates with oil and gas operations

[1] In general, groundwater contamination stems from the *misuse and improper disposal* of liquid and solid wastes; the *illegal dumping or abandonment* of household, commercial, or industrial chemicals; the *accidental spilling* of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the *improper siting, design, construction, operation, or maintenance* of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from *atmospheric pollutants,* such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed in t his table are used and managed properly, groundwater contamination is not likely to occur.

[2] Contaminants can reach groundwater from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

[3] This table lists the most common wastes, but not all potential wastes. For example, it is not possible to list all potential contaminants contained in storm water runoff or research laboratory wastes.

[4] Coliform bacteria can indicate the presence of pathogenic (disease-causing) microorganisms that may be transmitted in human feces. Diseases such as typhoid fever, hepatitis, diarrhea, and dysentery can result from sewage contamination of water supplies.

[5] Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface. An EPA survey found that the most common pesticides found in drinking water wells were DCPA (iacthal) and atrazine, which EPA classifies as *moderately toxic* (Class 3) and *slightly toxic* (Class 4) materials, respectively.

[6] The EPA National Pesticides Survey found that the use of fertilizers correlates to nitrate contamination of groundwater supplies.

[7] Automotive wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

[8] Toxic or hazardous components of common household products re noted in Table 3-2.

[9] Common household pesticides for controlling pests such as ants, termites, bees, wasps, flies, cockroaches, silverfish, mites, ticks, fleas, worms, rats, and mice can contain active ingredients including napthalene, phosphorus, xylene, chloroform, heavy metals, chlorinated hydrocarbons, arsenic, strychnine, kerosene, nitrosamines, and dioxin.

[10] Common pesticides used for lawn and garden maintenance (i.e., weed killers, and mite, grub, and aphid controls) include such chemicals as 2.4-D; chlorphyrifos; diazinon; benomyl; captan; dicofol; and methoxychlor.

[11] Swimming pool chemicals can contain free and combined chlorine; bromine; iodine; mercury-based, copper-based, and quaternary algicides; cyanuric acid; calcium or sodium hypochlorite; muriatic acid; sodium carbonate.

[12] Septic tank/cesspool cleaners include synthetic organic chemicals such a 1,1,1 trichloroethane, tetrachloroethylene, carbon tetrachloride, and methylene chloride.

[13] Common wastes from public and commercial buildings include automotive wastes; rock salt; and residues from cleaning products that may contain chemicals such as xylenols, glycol esters, isopropanol, 1,1,1 trichloroethane, sulfonates, chlorinated phenolys, and cresols.

[14] Municipal wastewater treatment sludge can contain organic matter; nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria; and viruses.

[15] Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum, carbon, and silica; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

[16] The Resource Conservation and Recovery Act (RCRA) defines a hazardous waste as a solid waste that may cause an increase in mortality or serious illness or pose a substantial threat to human health and the environment when improperly treated, stored, transported, disposed of, or otherwise managed. A waste is hazardous if it exhibits characteristics of ignitability, corrosivity, reactivity, and/or toxicity. Not covered by RCRA regulations are domestic sewage; irrigation waters or industrial discharges allowed by the Clean Water Act; certain nuclear and mining wastes; household wastes; agricultural wastes (excluding some pesticides); and small quantity hazardous wastes (i.e. less than 220 pounds per month) generated by businesses.

[17] X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, phenedone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

[18] This table lists potential groundwater contaminants from many common industries, but it does not address all industries.

The following contact is provided if future County road maintenance information is needed:

Yakima County Weed Control Board
Mr. Lee Linger
Yakima County Public Works Department Room 408
128 North Second Street
Yakima, WA 98901
(509) 574-2310

WINDSHIELD SURVEY

In May, 1998, a windshield survey of the WHPAs for Yakima County wells was conducted with County staff to identify potential sources of contamination. The telephone book search and susceptibility assessments were used as a reference of key facilities that might be of concern. Tables YC-4 through Y-9 summarize the inventory items from this database which are present in the County's WHPAs.

The survey identified urban residential areas, a small amount of agricultural land and a portion of a cemetery within the Yakima County WHPAs. No additional industries were identified during the windshield survey that would be considered high risk businesses. Considerable amounts of the Yakima County WHPAs cover undeveloped grassland.

APPENDIX J

SUSCEPTIBILITY ASSESSMENTS

7) Sanitary setback:

X < 100 ft* ___ 100-120 ft ___ 120-200 ft X > 200 ft
* if less than 100 ft describe the site conditions:

SITE IS UNIMPROVED RURAL W/ SCRUB BRUSH AND TREES. DEVELOPMENT IS VERY LIMITED.

8) Wellhead construction:

✓ wellhead enclosed in a wellhouse

___ controlled access (describe): _____

___ other uses for wellhouse (describe): NONE

___ no wellhead control

9) Surface seal:

X 18 ft

___ < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

___ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

___ > 18 ft ('> ' *means greater than*)

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

X < 10 in/yr ___ 10-25 in/yr ___ > 25 in/yr

PART IV: **Mapping Your Ground Water Resource**

1) Annual volume of water pumped: 10.8m (gallons)

How was this determined?

___ meter

X estimated: X pumping rate (_____) USED PUMPING RATE X HOURS PUMPED IN A YEAR.

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 110 (ft)

1 year ground water travel time : 160 (ft)

5 year ground water travel time: 360 (ft)

10 year ground water travel time: 510 (ft)

Information available on length of screened/open interval?

✓ YES ___ NO

Length of screened/open interval: 153 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO →			
stormwater injection wells				
other injection wells				
abandoned ground water well				
landfills, dumps, disposal areas				
known hazardous materials clean-up site				
water system(s) with known quality problems				
population density > 1 house/acre				
residences commonly have septic tanks	NO	NO	YES	
Wastewater treatment lagoons	NO →			
sites used for land application of waste	↓			

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

1 HOUSES ARE LOCATED AS SHOWN BY THE RED MARK ON THE MAP.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	X
< 2 mg/liter nitrate	X	___
2-5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	X	___
___ VOC sampling records unavailable		

C. EDB/DBCP: (EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)	YES	NO
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
X EDB/DBCP tests required but not yet completed		
EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___
___ Other SOC tests performed but none detected (list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

X YES ___ NO

Describe with references to map produced in Part IV:

THE 10 YR TIME OF TRAVEL ZONE BEGINS TO CLIMB ON THE SOUTHWEST QUADRANT OF THE CFR

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

X YES ___ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

__ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	__	X	__
6 month–1 year travel time	__	X	__
1–5 year travel time	__	X	__
5–10 year travel time	__	X	__

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	__	X	__
1–5 year travel time	__	X	__
5–10 year travel time	__	X	__

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? X YES ___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

(1) OWNER: Name [illegible] Address [illegible]

(2) LOCATION OF WELL: County YAKIMA (COYOTE SPRINGS) [illegible] Sec 10 T 13 N. R. 19 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic [X] Industrial [ ] Municipal [ ]
Irrigation [ ] Test Well [X] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
New well [X] Method: Dug [ ] Bored [ ]
Deepened [ ] Cable [ ] Driven [ ]
Reconditioned [ ] Rotary [X] Jetted [ ]

(5) DIMENSIONS: Diameter of well 10/8/6 inches.
Drilled 340 ft. Depth of completed well 340 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 10 " Diam. from 0 ft. to 18 ft.
Threaded [X] 8 " Diam. from 150 ft. to 187 ft.
Welded [X] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X] 24 - 337
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.

Screens: Yes [ ] No [X]
Manufacturer's Name
Type Model No.
Diam Slot size from ft. to ft.
Diam Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? 18 ft.
Material used in seal CEMENT
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? Depth of strata
Method of sealing strata off

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

(8) WATER LEVELS: Land-surface elevation above mean sea level 1820 ft.
Static level 96 ft. below top of well Date 12/19/75
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom?
Yield: gal/min with ft. drawdown after hrs.
" " " "
" " " "
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal/min. with ft drawdown after hrs.
Artesian flow gpm. Date
Temperature of water 68° Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG:
Formations: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
SWAMPY SOIL ER.	0	3
RED BURNED CLAY & POROUS BASALT	3	16
POROUS BASALT ANDESITIC	16	62
BLK BASALT	62	72
GRAY BASALT CREV.	72	77
POR. BASALT, GREEN & ER. CONGLOMERATE	77	80
GRAY BASALT	80	97
BRITTLE GRAY BASALT, ANDESITIC	97	108
BLK. POROUS BASALT & SHALE	108	112
BRITTLE GRAY BASALT (HD.) HD.	112	165
YELLOW CLAY & SHALE ROCK (CAVING, WTR	165	187
BLK BASALT V. HD.	187	230
CREV, ERES, BASALT (INTERFLOW, WATER	230	245
GRAY BASALT CREV. V.HD.	245	249
BLK. FAULTED SCORIA WATER	249	252
GRAY BROKEN BASALT	252	270
GRAY FRACT. & FAULTED BASALT V.HD.	270	307
BADLY FRACT. & CREV. BLK & GRAY BASALT (V.BAD 307-333) (WATER	307	340
NOTE**		
1st water 18'-62'-72'-77'- STATIC.	3'	
108'-165 to 187' (60 GPM) "	6'	
218-225 150 GP.	63'	
249 - 252 NOW 200 GPM	66'	
270 - 272 "	93	
280 - 285 - 307 - 308 -& EVERY	96'	
CRACK & CREV. TO 338' (EST. 600 GPM + @ 340')		
10" HOLE TO 187' - 8" TO 278' - 6" TO 340'		
WATER COMING IN SO FAST HAMMER WOULD NOT RUN. (MUDADRILL) & ONLY 62' OF 6" HOLE)		
WOULD LIKE TO HAVE ELECT. LOG, FLOW METER TES		
WILL HAVE TO OPEN 6" HOLE TO 8" & ROLLER CON TO GO DEEPER. (PRESSURE 150# TO KEEP WATER MO		

Work started 11/25/75 19 Completed 12/22/75 19

WELL DRILLER'S STATEMENT:

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

RIEBE WELL DRILLING
NAME (Person, firm, or corporation) (Type or print)

Address YAKIMA, WASHINGTON.

[Signed] [illegible] (Well Driller)

License No. 3601 Date 12/22/75 19

(USE ADDITIONAL SHEETS IF NECESSARY)

S. E. No. [illegible]

-3-


Well # 1
Well # 2

T. H. WELL #2

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : YAKIMA COUNTY PUBLIC WORKS

Water system name : TERRACE HEIGHTS WATER SYSTEM

County: YAKIMA

Water system number: 06029J Source number: 502

Well depth: 1072 (ft.) (*From WFI form*)

Source name: WELL #2

WA well identification tag number:___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 373 Population served: 1,045

Township: 13N Range: 19E

Section: 14 1/4 1/4 Section: SW, NW

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
___other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 4 / 15 / 78 month/day/year

last reconstruction: __ / __ / __ month/day/year

_____ information unavailable

2) Well driller: RIEBE WELL DRILLING

YAKIMA WASHINGTON

__ well driller unknown

3) Type of well:

X Drilled: X rotary __ bored __ cable (percussion) __ Dug

__ Other: __ spring(s) __ lateral collector (Ranney)

__ driven __ jetted __ other: _____

Additional comments: _____

4) Well report available? X YES (attach copy to form) __ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 250 (gallons/min)

Source of information: TOTALIZING / INSTANTANEOUS METER

If not documented, how was pumping rate determined? _____

__ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

X disinfection __ filtration __ carbon filter __ air stripper __ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

CHLORINATION EQUIPMENT IS AVAILABLE TO DISINFECT SYSTEM

SHOULD THE NEED ARISE DUE TO CONSTRUCTION ACTIVITY IN SYSTEM.

7) If source is chlorinated, is a chlorine residual maintained: __ YES X NO

Residual level: _____ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

__ < 20 ft __ 20-50 ft __ 50-100 ft __ 100-200 ft X > 200 ft

__ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

__ < 20 ft __ 20-50 ft __ 50-100 ft X > 100 ft

__ flowing well/spring (artesian)

How was water level determined?

X well log __ other: _____

__ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: __ YES __ NO

5) Wellhead elevation (height above mean sea level): 1400 (ft)

How was elevation determined? X topographic map __ Drilling/Well Log __ altimeter

__ other: _____

__ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

X evidence of a confining layer in well log

__ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the ~~top of the open interval?~~ bottom of the lowest confining layer X YES __ NO

__ information unavailable

7) Sanitary setback:

__ < 100 ft* X 100-120 ft __ 120-200 ft __ > 200 ft
* if less than 100 ft describe the site conditions:

_____

_____

_____

_____

8) Wellhead construction:

X wellhead enclosed in a wellhouse

__ controlled access (describe): _____

_____

__ other uses for wellhouse (describe): NONE

_____

__ no wellhead control

9) Surface seal:

__ 18 ft

__ < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

__ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

X > 18 ft ('> ' *means greater than*)

__ depth of seal unknown

__ no surface seal

10) Annual rainfall (inches per year):

X < 10 in/yr __ 10-25 in/yr __ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 57.6M (gallons)

How was this determined?

__ meter

✓ estimated: ✓ pumping rate (HOURS × PUMPING RATE)

__ pump capacity (_____)

__ other: _____

METER (GALLONS) WAS JUST RECENTLY INSTALLED. HOURS OPERATED HAVE BEEN RECORDED ONLY

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 250 (ft)

1 year ground water travel time : 360 (ft)

5 year ground water travel time: 800 (ft)

10 year ground water travel time: 1140 (ft)

Information available on length of screened/open interval?

X YES __ NO

Length of screened/open interval: 264 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? __ YES X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? __ YES X NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO →			
stormwater injection wells				
other injection wells				
abandoned ground water well				
landfills, dumps, disposal areas				
known hazardous materials clean-up site				
water system(s) with known quality problems				
population density > 1 house/acre				
residences commonly have septic tanks	YES	YES	YES	
Wastewater treatment lagoons	NO →			
sites used for land application of waste	↓			

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

A RESIDENCE WILL BE BUILT EVENTUALLY ON LOT A & B AND WILL HAVE A SEPTIC TANK. (SEWER MIGHT BE AVAILABLE BUT HARD TO SAY WHAT WOULD HAPPEN FIRST.)

LOT D CURRENTLY HAS A HOUSE W/ SEPTIC. LOT C IS UNDER DEVELOPMENT.

AREA EAST OF 57TH ST. CAN HAVE HOUSES BUILT AT THIS TIME ON ANY OF THE LOTS SHOWN.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions:
(Unless listed on assessment, MCLs are listed in assistance package.)

	YES	NO
A. Nitrate: (Nitrate MCL = 10 mg/l)		
Results greater than MCL	___	X
< 2 mg/liter nitrate	X	___
2-5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
___ Nitrate sampling records unavailable		

	YES	NO
B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)		
Results greater than MCL or SAL	___	X
VOCs detected at least once	___	X
VOCs never detected	X	___
___ VOC sampling records unavailable		

	YES	NO
C. EDB/DBCP:		
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
X EDB/DBCP tests required but not yet completed		
___ EDB/DBCP tests not required		

	YES	NO
D. Other SOCs (Pesticides):		
Other SOCs detected	___	___
(pesticides and other synthetic organic chemicals)		
___ Other SOC tests performed but none detected		
(list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES X NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

X YES ___ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

__ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	__	X	__
6 month–1 year travel time	__	X	__
1–5 year travel time	__	X	__
5–10 year travel time	__	X	__

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	__	X	__
1–5 year travel time	__	X	__
5–10 year travel time	__	X	__

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? X YES ___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

...rd Copy — Driller's Copy

STATE OF WASHINGTON

Permit No. 9.4[illegible]

(1) **OWNER:** Name J. E. ~~[illegible]~~ Bittner Address 33 crest circle Yak

(2) **LOCATION OF WELL:** County YAKIMA — SW ¼ NW ¼ Sec. 14 T. 13 N., R. 19 W.M. E

...and distance from section or subdivision corner

(3) **PROPOSED USE:** Domestic ☒ Industrial ☒ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one) 1
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 12 inches.
Drilled 1072 ft. Depth of completed well 1072 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 808 " Diam. from ____ ft. to ____ ft.
Threaded ☐ 12 " Diam. from +2 ft. to 806 ft.
Welded ☒ 16 " Diam. from 0 ft. to 21 ft.

Perforations: 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.

Screens: Yes ☐ No ☒
Manufacturer's Name ____
Type ____ Model No. ____
Diam. ____ Slot size ____ from ____ ft. to ____ ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ____
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 21 ft.
Material used in seal CLAY
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

(7) **PUMP:** Manufacturer's Name ____
Type: ____ H.P. ____

(8) **WATER LEVELS:** Land-surface elevation above mean sea level 1455 ft.
Static level 360 ft. below top of well Date 4/15/78
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
" " "
" " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ____
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG:**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
BROKEN ROCK & BLDRS(LGE)	0	18
SANDY CLAY, ROCK & BLDRS	18	35
SANDY CLAY	35	65
BLK BROKEN BASALT	65	85
BD. BR. CLAY	85	105
BR. CLAY, SNDSTN & GRAVEL	105	135
FRACT. BASALT & CLAY	135	190
BLK BROKEN BASALT	190	213
DEC. ROCK & BLDRS. [illegible]	213	233
SNDSTN, CLAY & GRAVEL	233	265
CEMENT GRAVEL & BLDRS	265	302
BR. CLAY & BLDRS	302	345
DEC. ROCK & BLDRS [illegible]	345	355
[illegible] BASALT	355	435
BR. SHALE & CLAY	435	450
EARLY [illegible] & CREVACED BASALT	450	454
HARD SAN[illegible] & BLDRS	454	478
EARLY C[illegible]ED GRAY BASALT	478	538
[illegible] SNDSTN, BLDRS, CL. SHALE	539	602
FINE BLK SANDSTONE (GT. WATER)	602	617
SNDSTN, GRAVEL, PINK CLAY CONG.	617	640
CLAY SHALE & BLDRS(#1500)	640	728
CLAY SHALE & SNDSTN [illegible]	728	780
[illegible] SNDSTN & GRAVEL	780	794
CLAY SHALE & SS. SNDSTN.	794	804
SNDSTN & GRAVEL BD.	804	816
SHALE, SNDSTN & GRAVEL	816	868
[illegible] GRAY SANDSTONE	868	957
BR. SNDSTN & ROCK	957	972
[illegible] & GRAY SNDSTN.	972	985
[illegible] SNDSTN [illegible] & BASALT	985	997
BLUE & GRAY SANDSTONE	997	1018
[illegible] BLUE SNDSTN, SHALE	1018	1072
[illegible] 150 [illegible] SHUT CTT @ 700-710		
SHOULD THE WELL BE BORDERLINE IT		
COULD BE PERFORATED THERE & DEVELOPED.		

Work started 1/3/78 19__ Completed 4/21/78 19__

WELL DRILLER'S STATEMENT:

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

NAME [illegible] WELL DRILLING (Person, firm, or corporation) (Type or print)

Address YAKIMA, WASH.

[Signed] John C. [illegible] (Well Driller)

License No. 421 Date 6/30/78, 19__

(USE ADDITIONAL SHEETS IF NECESSARY)

F. No. 7356—OS—(Rev. 8-69)—8-69.

MODEL 7 M-340
PERFORMANCE CHARACTERISTIC

BOWL — CAST IRON or NI-RESIST — DIA. 7"
IMPELLER BRONZE or NI-RESIST
DISCHARGE 4" STANDARD
K FACTOR 3.1
MAX. O.D. W/CABLE GUARD 7¼"
BEARING — CUTLESS RUBBER OR BRONZE

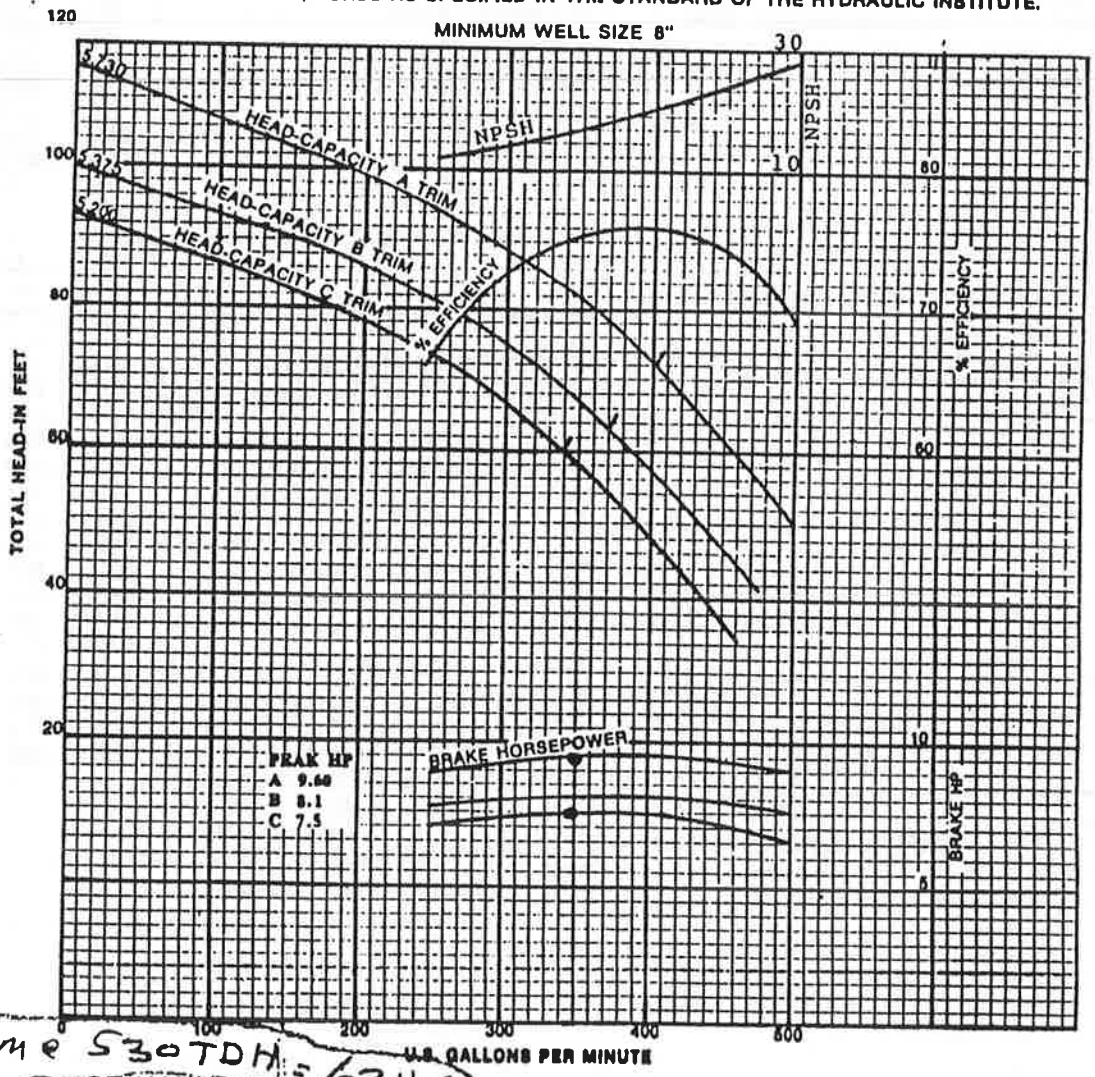
CHANGE EFFICIENCY AS FOLLOWS	
No. of Points	No. of Stages
-3	1
-2	2
-1	3
0	4

POWER: ELECTRIC
CYCLE: 60 Hz
R P M: 3450
IMPELLER TYPE: ENCLOSED
BOWL TYPE: FLANGED
CURVE SHEET NO. 1

NOTE: EFFICIENCY PERFORMANCE BASED ON CAST IRON BOWLS - POLISHED BRONZE IMPELLERS AND 6 FEET SUBMERGENCE.

THIS CHARACTERISTIC CURVE IS BASED ON FACTORY TESTS WHEN PUMPING CLEAR, FRESH, NON-AERATED WATER AT A TEMPERATURE NOT EXCEEDING 85° F. AND UNDER SUCTION CONDITIONS AS INDICATED.

PUMP PERFORMANCE RATING IS FOR THE DESIGNATED POINT ONLY AND IS SUBJECT TO TEST TOLERANCES AND PROCEDURES AS SPECIFIED IN THE STANDARD OF THE HYDRAULIC INSTITUTE.



350 GPM @ 530 TDH = 63 HP

CROWN

CROWN PUMP CORPORATION • HIGHWAY 16 & BIVAR • DE LEON, TEXAS

5 - A = 5 x 82 = 410
2 - C = 2 x 60 = 120
530

5 x 9.6 = 48
2 x 7.5 = 15 (63 HP

Flomatic's Ductile Iron Check Valve... strong enough to support large pumps

Flomatic's ductile iron check valves are designed for long service life in water wells and fluid systems. Because of their high mechanical strength they can be used to hold high loads.

A variety of applications

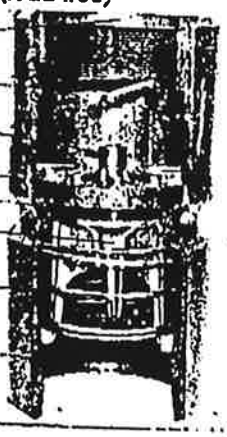
1-509-248-6553
AKLAND Pump

The Model 80DI is specifically designed for use with submersible pumps or other applications where it is necessary for the check valve to be installed in the well casing. However, it will provide excellent service in any application where a conventional check valve is required. It is recommended for use in vertical mounting. Please request Bulletin 810 for general installation instructions

Construction details and materials

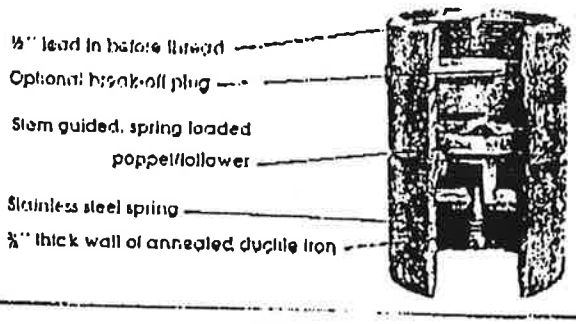
ODEL 80DI Sizes 2", 3", 4", 5", 6", 8"

dy	Ductile Iron– ASTM-A395-74
sc	Bronze–CDA 844 or Ductile Iron– ASTM-A395-74
ollower	Bronze–CDA 844
ring	18-8 Stainless Steel
ubber Disc	Buna "N" Rubber
ppel Assembly Bolt	18-8 Stainless Steel
ish	Painted (lead-free)



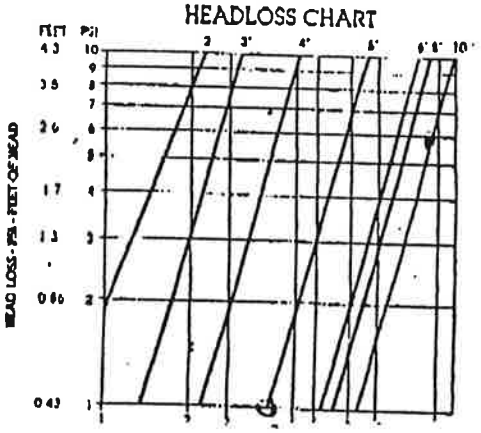
MODEL 80DIX Size 6", 10"

Body	Ductile Iron–ASTM-395-74
Disc/Follower	Ductile Iron-ASTM-A395-74
Spring	18-8 Stainless Steel
O-Ring	Buna "N" Rubber
Poppet Assembly Bolt	18-8 Stainless Steel
Finish	Painted (lead-free)



Other deep well check valves in bronze and high strength plastic also available NPT threads standard.

HEADLOSS CHART



Terraced Estates Water Co.
S14-T13N-R19E-WRIA.37
Stamp 2617213 11-8-77

[illegible] STREET
[illegible], WA 98901

Permit #C4-25648P
Certificate #C4-25648C
Dr. J.E. Bittner

4 HOUR WELL PUMP TEST RECORD

WELL OWNER Jim Lentz

MAIL ADDRESS P.O. Box 1198

Yakima, Wa. 98907

WELL LOCATION: 57th St. Terrace Hts.

LAND PARCEL ID# _____

I.D./O.D. of top 808 ft. of casing 12"

I.D./O.D. of next _____ ft. of casing _____

I.D./O.D. of next _____ ft. of casing _____

TOTAL _____ ft. of casing _____

TOTAL DEPTH OF WELL 1072'

DATA FURNISHED BY Bach Well Drilling Co.

TEST CONDUCTED BY Bach - Akland

EQUIPMENT USED Smeal 10-T

* Pulled turbine

SETTING DEPTH PUMP COLUMN 636 ft.

STATIC WATER LEVEL 375 ft.

UNUSUAL CONDITIONS OBSERVED DURING INSTALLATION OR REMOVAL OF PUMP

Water well dropped 14'.

Need to pull sub. to replace liquid end & motor. Well is very crooked.

Turbine needs check valves.

Wire was bare in three spots.

MEASUREMENTS AT 30 MIN INTERVALS UNLESS

Time		PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM	RECOVERY RATE	REMARKS: Water Condition, Temperature, Hardness, Stability, etc.
Date	Hour					
	Start				From ___ ft.	Temperature 76°
-9-91	11:00a.m.	374'	16'	80	to ___ ft.	After ½ hr. well started
	11:30	400'	-0-	80	Total ___	sucking air.
	STOP 11:30a.m.				In ___ min.	1978 - Water level 360'
					___ sec.	1991 - Water level 374'
						Water level drop 14'
						Old turbine :
						Liquid end-model 753M9
						(Berkley) serial 2485898
						Motor #VG175HP 100 amp.
						(Hitachi) M.N. G1982201
						B.M. B58591 G-78'
						Manufacture date on bowls M1975

108 N. 1ST STREET
YAKIMA, WA 98901

4 HOUR WELL PUMP TEST RECORD

WELL OWNER Terraced Estates Water Co.

MAIL ADDRESS P.O. Box 1198

Yakima, Wa. 98907

WELL LOCATION Terraced Estates

LAND PARCEL FOR SW¼,NW¼,Sec.14,T13N,R19ewm

I.D./O.D. of top 808 ft. of casing 12"

I.D./O.D. of next _____ ft. of casing _____

I.D./O.D. of next _____ ft. of casing _____

TOTAL _____ ft. of casing _____

TOTAL DEPTH OF WELL 1072'

DATA FURNISHED BY Bach Well Drilling Co.

TEST CONDUCTED BY Bach Well Drilling
Akland Irrigation

EQUIPMENT USED Smeal 10-T
Installed turbine.

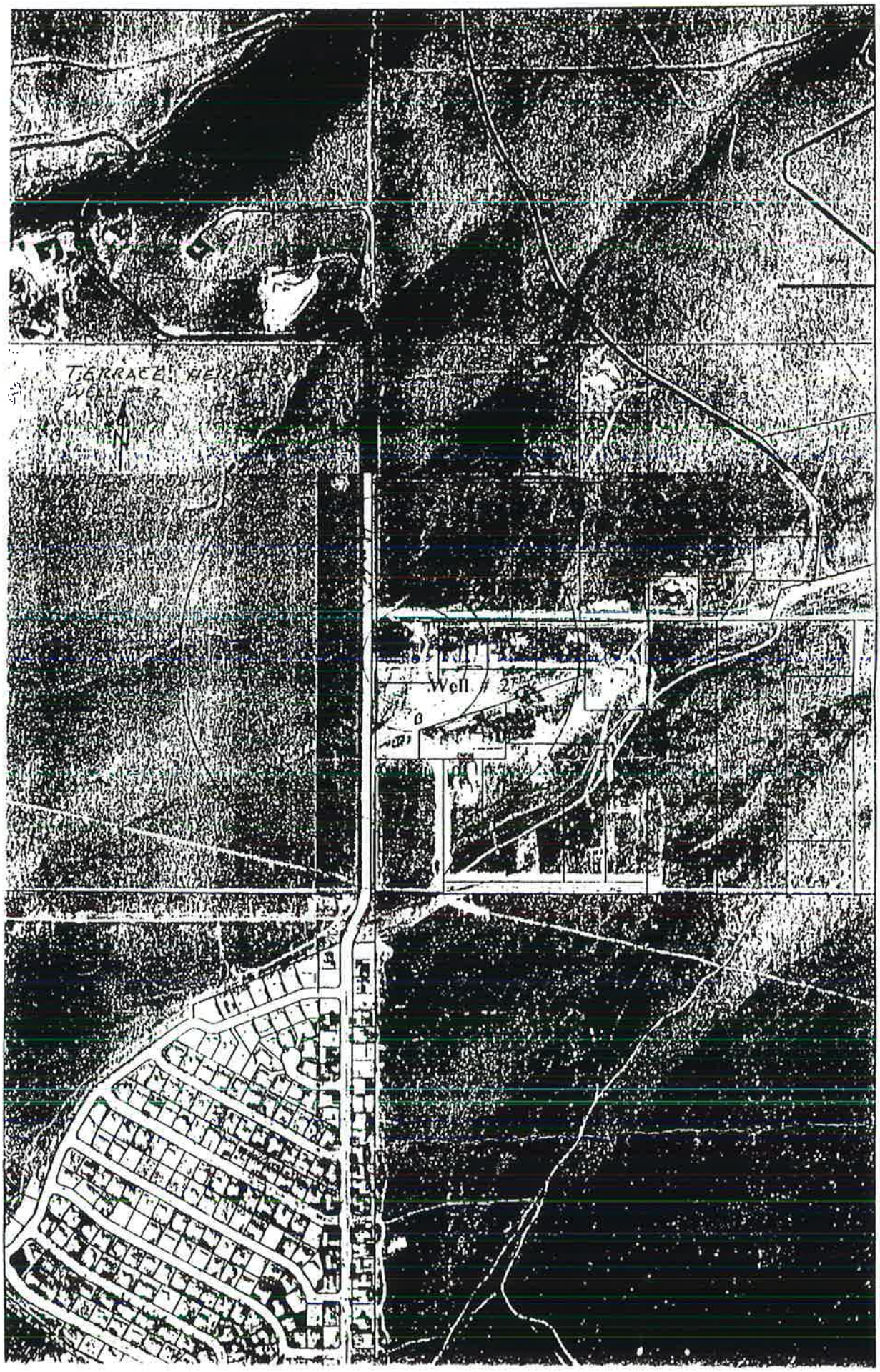
SETTING DEPTH (pump column) 615 ft.

STATIC WATER LEVEL 375 ft.

UNUSUAL CONDITIONS OBSERVED DURING INSTALLATION OR REMOVAL OF PUMP

MEASUREMENTS AT 30 MIN INTERVALS MINIMUM

Time		PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM	RECOVERY RATE	REMARKS: Water Condition, Temperature, Hardness, Stability, etc.
ate	Hour					
	Start				From 508 ft.	Temperature : 76°
-19-91	10:45a.m.	375'	133'	330	to 418 ft.	Hardness 4.5
	STOP 1:00p.m.				Total 90'	Water was clear & sandfree.
					In 5 min.	Well seemed to stabilize at
					0 sec.	515' @6:30p.m.
	START 1:05p.m.	418'	97'	326		Installed bleeder valve 6'
	Stop 6:30p.m.	515'				below 6" tee to winterize.
						New turbine :
						Crown liquid end-serial 1976-
						60 hp. Model 7M-340 stage 5A2C
						Motor (Franklin) 236-619-6015
						60 hp. Subtrol equipped 460v.
						3 phase DATE:L90 Serial 01-0007
						AMPS:80.5
						RPM 3450-2875


TERRACE HEIGHTS
WELL # 2
N
Well # 2

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : YAKIMA COUNTY PUBLIC WORKS

Water system name : TERRACE HEIGHTS WATER SYSTEM

County: YAKIMA

Water system number: 06029 J Source number: 503 NOT YET RECORDED ON WFI

Well depth: 2421 (ft.) (*From WFI form*)

Source name: WELL # 3

WA well identification tag number: A A L-5 2 9

_____ well not tagged

Number of connections: 373 Population served: 1045

Township: 13 N Range: 19

Section: 16 1/4 1/4 Section: SW SW

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 12 / 15 / 93 month/day/year

last reconstruction: __ / __ /__ month/day/year

_____ information unavailable

2) Well driller: HOLMAN DRILLING CORP.

E 3410 9TH AVE SPOKANE WA

___ well driller unknown

3) Type of well:

X Drilled: X rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

4) Well report available? X YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: _____(gallons/min)

Source of information: _____

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

___ disinfection ___ filtration ___ carbon filter ___ air stripper X other CHLORINATION

Purpose of treatment (describe materials to be removed or controlled by treatment):

FOR TASTE AND ODOR CONTROL DUE TO SULFITE

7) If source is chlorinated, is a chlorine residual maintained: ___ YES X NO

Residual level: _____ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

__ < 20 ft __ 20–50 ft __ 50–100 ft __ 100–200 ft X > 200 ft

__ information unavailable ('< ' *means less than;* '> ' *means greater than*)

2) Depth to ground water (static water level):

__ < 20 ft __ 20–50 ft __ 50–100 ft __ > 100 ft

X flowing well/spring (artesian)

How was water level determined?

__ well log __ other: _____

__ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

18 psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: __ YES X NO

5) Wellhead elevation (height above mean sea level): 1025 (ft)

How was elevation determined? X topographic map __ Drilling/Well Log __ altimeter

__ other: _____

__ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

X evidence of a confining layer in well log

__ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the ~~top of the open interval?~~ bottom of the lowest confining layer. X YES __ NO

__ information unavailable

7) Sanitary setback:

__ < 100 ft* ✓ 100–120 ft __ 120–200 ft __ > 200 ft

* if less than 100 ft describe the site conditions:

8) Wellhead construction:

X wellhead enclosed in a wellhouse

__ controlled access (describe): MASONRY BLOCK BUILDING

__ other uses for wellhouse (describe): NONE

__ no wellhead control

9) Surface seal:

__ 18 ft

__ < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

__ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

X > 18 ft 1725 FT ('> ' *means greater than*)

__ depth of seal unknown

__ no surface seal

10) Annual rainfall (inches per year):

X < 10 in/yr __ 10–25 in/yr __ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 16 M (gallons) THIS IS THE VOLUME WE EXPECT TO BE PUMPING IN SEVERAL YEARS

How was this determined?

___ meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

X other: PROJECTED

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 160 (ft)

1 year ground water travel time : 230 (ft)

5 year ground water travel time: 570 (ft)

10 year ground water travel time: 720 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/open interval: 675 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO	NO	NO	
stormwater injection wells			YES	
other injection wells				✓
abandoned ground water well				✓
landfills, dumps, disposal areas	NO	NO	NO	
known hazardous materials clean-up site	NO	NO	NO	
water system(s) with known quality problems	NO	NO	NO	
population density > 1 house/acre	NO	NO	NO	
residences commonly have septic tanks	NO	NO	NO	
Wastewater treatment lagoons	NO	NO	NO	
sites used for land application of waste		YES	YES	

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

PROCESSING WATER FROM THE FRUIT PROCESSING PLANT ACROSS THE STREET HAS BEEN APPLIED TO THE MARKED AREA

STORMWATER DRYWELLS ARE MARKED IN RED.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	___
< 2 mg/liter nitrate	X	___
2-5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
___ Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	X	___
___ VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	___	___
X EDB/DBCP tests required but not yet completed		
EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected	___	___
(pesticides and other synthetic organic chemicals)		

___ Other SOC tests performed but none detected
(list test methods in comments

X Other SOC tests not performed

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES X NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

X YES ___ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

X YES ___ NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	—	—	—
6 month–1 year travel time	—	—	—
1–5 year travel time	X	—	—
5–10 year travel time	—	—	—

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	X	—	—
1–5 year travel time	X	—	—
5–10 year travel time	X	—	—

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

b) A DRYWELL FOR THE PUMP HOUSE FLOOR DRAINS IS LOCATED W/I THE 1 YR TRAVEL ZONE. IT WILL NOT BE USED FOR ANY OTHER PURPOSE. ROAD DRYWELL AS WELL SHOWN IN RED ON MAP

a) SNOHIST HAS A WELL @ 800GPM IN THE APPROXIMATE LOCATION SHOWN ON THE DRAWING THEY ARE IN AN AQUIFER ABOVE THE ONE WE ARE USING.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES ___X___ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? ___ YES ___X___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Start Card No. W36177

UNIQUE WELL I.D. # AAL 529

Water Right Permit No. G4-31494P

WATER WELL REPORT

STATE OF WASHINGTON

The Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

(1) OWNER: Name YAKIMA COUNTY Address COUNTY COURTHOUSE YAKIMA WA

(2) LOCATION OF WELL: County YAKIMA SW 1/4 SW 1/4 Sec 16 T. 13 N. R. 19 W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) TERRACE HEIGHTS AVE

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☒ Irrigation ☐ Test Well ☐ Other ☐ DeWater ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) #3

Abandoned ☐ New well ☒ Method: Dug ☐ Bored ☐ Deepened ☐ Cable ☐ Driven ☐ Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 30X24X18 5/8 X [illegible] Drilled 2421 feet. Depth of completed well 2421 ft.

(6) CONSTRUCTION DETAILS:

Casing Installed: 18 5/8" Diam. from 0 ft. to 550 ft.
Welded ☒ 16" Diam. from +3 ft. to 996 ft.
Liner Installed ☒ 12" Diam. from 980 ft. to 1725 ft.
Threaded ☐ 10" 1703 2421

Perforations: Yes ☒ No ☐
Type of perforator used MILL CUT 12 ROWS/FT
SIZE of perforations 1/4 + 3/16 in. by 3 in.
960 perforations from 1725 ft. to 1805 ft.
1140 perforations from 1815 ft. to 1900 ft.
540 perforations from 1935 ft. to 1980 ft.
4680 perforations from 2010 ft. to 2400 ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 1725 ft.
Material used in seal NEAT CEMENT GROUT
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name N/A
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level
Static level ft. below top of well Date DEC 9/93
Artesian pressure 18 lbs. per square inch Date
Artesian water is controlled by 16" FLANGE #8 "VALVE (Cap, valve, etc.)

(9) 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: gal./min. with ft. drawdown after hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest gal./min with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water 88 Was a chemical analysis made? Yes ☒ No ☐
B.H.T. 110°

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
SAND, GRAVEL 12 MIANS	0	78
SAND, GRAVEL + CLAY	78	141
SAND, CLAY TAN	141	178
SAND COARSE	178	202
TAN CLAY / SAND + GRAVEL	202	452
TAN CLAY / BLACK SAND	452	491
TAN CLAY / SAND	491	550
GREY CLAY	550	595
GREY CLAY SANDY	595	780
GREY CLAY	780	813
SANDY CLAY / GRN + GREY	813	1452
GREY CLAY / BLK BASALT	1452	1470
CLAY / GRN + GREY	1470	1642
CLAY / RED + GRN / GREY BASALT	1642	1685
BASALT GREY	1685	1729
★ BASALT GREY FRAC.	1729	1754
BASALT GREY	1754	1808
★ BASALT BLK / GRN CLAY	1808	1874
BASALT GREY FRAC	1874	1900
CLAY GREY	1900	1934
BASALT GREY / GREY CLAY	1934	1989
★ SAND, GRAVEL / GRN CLAY	1989	2073
★ BASALT BLK / GRN CLAY	2073	2194
BASALT BLK / SILICA	2194	2208
★ BASALT BLK / GRN CLAY	2208	2302
CLAY GRN	2302	2306
★ BASALT BLK / GRN CLAY	2306	2391
BASALT GREY / GREY CLAY	2391	2421
★ INDICATES WATER ZONE		
26", 20", 16" & 12" CASINGS CEMENT FROM 1725 FT TO SURFACE (1389 cu/FT CEMENT)		

Work Started 9/6/93 19. Completed 12/15 1993

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME HOLMAN DRILLING CORP (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

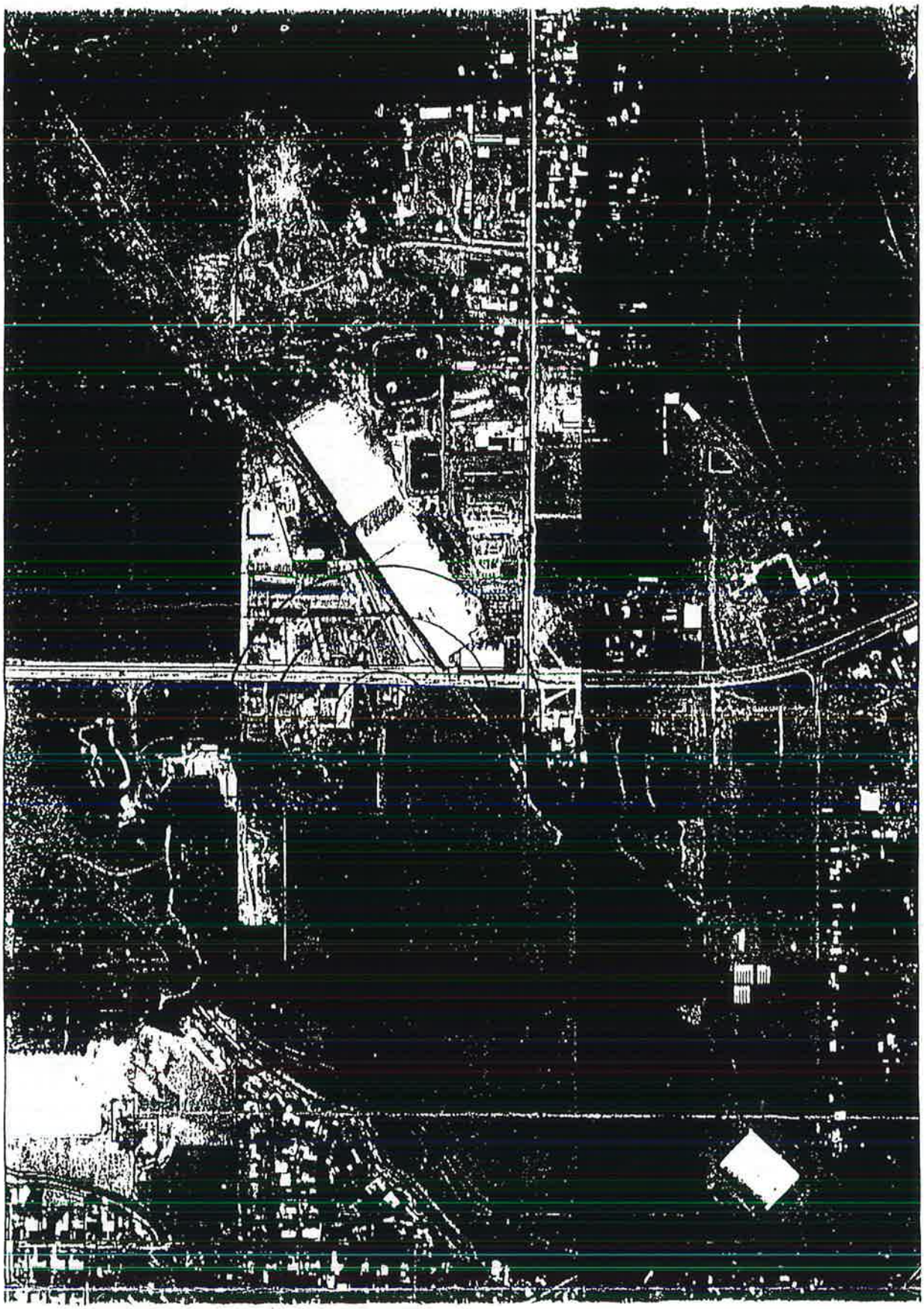
Address E3410 9TH AVE SPOKANE WA.

(Signed) Arnold E Holman (WELL DRILLER) License No. 0189

Contractor's Registration No. UBI 328044442 Date 12/29 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

CL 050-1-20 (2/93)



Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

PART I: System Information

Well owner/manager : YAKIMA COUNTY PUBLIC WORKS

Water system name : TERRACE HEIGHTS WATER SYSTEM
FORMERLY COUNTRY CLUB WATER DISTRICT

County: YAKIMA

Water system number: 155000 Source number: S01

Well depth: 500 (ft.) (*From WFI form*) 420 FT ON WELL LOG

Source name: WELL # 4

WA well identification tag number:___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 513 Population served: 2,100

Township: 13N Range: 19E

Section: 22 1/4 1/4 Section: NE / NE

Latitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 9 / __ / 25 month/day/year

last reconstruction: ___ / ___ / ___ month/day/year

_____ information unavailable

2) Well driller: N. C. JANSEN DRILLING CO.

___ well driller unknown

3) Type of well:

X Drilled: X rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

4) Well report available? X YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 165 / 200 (gallons/min)

Source of information: WELL LOG / WFI & METER

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

X disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

CHLORINATION EQUIPMENT IS AVAILABLE TO DISINFECT THIS SYSTEM IF NEEDED

7) If source is chlorinated, is a chlorine residual maintained: ___ YES X NO

Residual level: _____ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft X > 200 ft

___ information unavailable (*'< ' means less than; '> ' means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ___ 20–50 ft ___ 50–100 ft X > 100 ft

___ flowing well/spring (artesian)

How was water level determined?

X well log ___ other: _____

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 1240 (ft)

How was elevation determined? X topographic map ___ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

X evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the ~~top~~ bottom of the ~~open interval?~~ lowest confining layer X YES ___ NO

___ information unavailable

7) Sanitary setback:

X < 100 ft* ___ 100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

A RESIDENTIAL NEIGHBORHOOD SURROUNDS THIS WELL SITE. HOMES ARE SINGLE FAMILY.

8) Wellhead construction:

X wellhead enclosed in a wellhouse

___ controlled access (describe): _____

___ other uses for wellhouse (describe): _____

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) (*'<' means less than*)

___ < 18 ft (Approved by Ecology, include documentation) (*'<' means less than*)

___ > 18 ft (*'>' means greater than*)

X depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

X < 10 in/yr ___ 10–25 in/yr ___ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 18 m (gallons)

How was this determined?

X meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 280 (ft)

1 year ground water travel time : 390 (ft)

5 year ground water travel time: 880 (ft)

10 year ground water travel time: 1240 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/open interval: 20 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO			
stormwater injection wells	NO	NO	YES	
other injection wells				✓
abandoned ground water well			✓	✓
landfills, dumps, disposal areas	NO			
known hazardous materials clean-up site	NO			
water system(s) with known quality problems	NO			
population density > 1 house/acre	YES			
residences commonly have septic tanks	NO			
Wastewater treatment lagoons	NO			
sites used for land application of waste	NO			

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

680 FT NORTH IS AN ABANDONED WELL IT IS DISCUSSED IN THE ATTACHED PAPERWORK. 265' W/ A 6" CASING

STORMWATER DRYWELLS ARE SHOWN IN RED ON THE MAP.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	___
< 2 mg/liter nitrate	___	___
2-5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
X Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	X	___
___ VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	X	___
___ EDB/DBCP tests required but not yet completed		
___ EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected	___	___
(pesticides and other synthetic organic chemicals)		

___ Other SOC tests performed but none detected
(list test methods in comments

X Other SOC tests not performed

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES X NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES X NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

: source located in an aquifer with a high horizontal flow rate? (These can include sources located on plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and)

___ YES X NO

here other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	___	X	___
6 month–1 year travel time	___	X	___
1–5 year travel time	___	X	___
5–10 year travel time	___	___	X

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	___	X	___
1–5 year travel time	X	___	___
5–10 year travel time	X	___	___

dentify or describe additional hydrologic or geographic conditions that you believe may affect the f the zone of contribution for this source. Where possible, reference them to locations on the map ed in Part IV.

Y WELLS ARE SHOWN BY RED MARKS ON THE MAP.

Suggestions and Comments

id you attend one of the susceptibility workshops? ___ YES X NO

id you find it useful? ___ YES ___ NO

id you seek outside assistance to complete the assessment? X YES ___ NO

---

his form and instruction packet are still in the process of development. Your comments, suggestions and estions will help us upgrade and improve this assessment form. If you found particular sections nfusing or problematic please let us know. How could this susceptibility assessment be improved or ade clearer? Did the instruction package help you find the information needed to complete the sessment? How much time did it take you to complete the form? Were you able to complete the sessment without additional/outside expertise? Do you feel the assessment was valuable as a learning perience? Any other comments or constructive criticisms you have would be appreciated.

400 to 420

m ..... to .....

t ..... to .....

..... to .....

cate if water bearing, and

Thickness (Feet)	Depth to Bottom (Feet)
76	76
189	265
15	280
120	400
20	420

depth ..... ft.

Give footage from

5. (Continued)

(a) FOR MUNICIPAL SUPPLY: To supply the city, town or community of Terrace Heights in the county of Yakima, having a present population of 1000 and an estimated population of 3000 in 19 50

by supplemental water

(b) FOR IRRIGATION: The land irrigated has a total area of 460 acres, and water is used each year for this purpose from Mar. 15th. (Date) to October 15th. (Date)

(c) Legal description of property on which water is used for all purposes ~~other than~~ including municipal supply: Terrace Heights Subdivision No.1 and Terreco Heights Subdivision No 2 and the S. 1/2 of the S. 1/2 of the S.E. 1/4 Sec. 16 and the N. 1/2 of the N.E. 1.4 of the N.E. 1/4 of Sec. 21, and the E. 1/2 of the N.W. 1/4 of the N.E. 1/4 of Sec 21.and that portion of the N.W. 1/4 of the N.W. 1/4 of Sec. 22 lying below the Selah and Moxee Canal all of the above in Twp. 13 N. R. 19 E.W.M.

Note.This is the area in which our company now supplies water for domestic purposes and our water users also use considerable water for irrigation purposes drawn through service connections. The use of water for irrigation purposes is increasing as it is found that the irrigation water supply from the Terrace Heights Irrigation District is not sufficent in volume when the land is subdivided in lots and smaller tracts.

6. DESCRIPTION OF WORKS:

(a) WELL: Depth 420 feet. Diameter 10 and 8" inches or feet. Dug or drilled Drilled Flowing or pump well Pump well.

IF PUMP WELL: Type and size of pump is Peerless Deep Well turbine/6" discharge.

Type and size of motor or engine is Verticle fifteen horse power.

Depth from ground surface to water level before pumping 200 feet.

After continuous operation for at least four hours, the measured discharge of pump is 165 to 180 GPM. g.p.m., and the drawdown of water level is 10 feet.

Date of test November 1945

IF FLOWING WELL: Measured discharge ____ g.p.m. on ____ (Date)

Shut-in pressure at ground surface ____ lbs. per sq. in. on ____ (Date)

Water is controlled by ____ (Cap, valve, etc.)

CASING: (Give diameter, commercial specifications and depth below ground surface of each casing size.)

10 inch diameter Standard Pipe from 0 to 265 feet

8 inch diameter " " from 265 to 400 feet

8 inch diameter Screen from 400 to 420 feet

____ inch diameter ____ from ____ to ____ feet

Describe and show depth of shoe, plug, adapter, liner or other details:

Depth of water bearing material is 20 feet. Well screen was attached to forward end of 8" pipe and driven down with it. There is an 8" drive shoe at end of well screen. Well screen is milled out of a length of eight inch standard pipe.

7. *Ownership of each existing well or other works for withdrawal of ground water within a radius of one-quarter mile and the distance and direction from well or other works being reported herein:*

George Sourwine (Name of owner) West (Direction) 1320 feet (Distance)

(This is used for domestic purposes by a single family, well is located on Lot 204 Terrace Heights Subdivision No.2)

Lillian Bardon North 680 feet.

(This is a 265 foot well with 6" casing. The well was drilled so crooked that the use of it has been abandoned)

(On accompanying plat or map show location of these existing wells or works.)

8. *Remarks:*

Country Club District Water Co.

by. [signature] President

[signature] Secretary

(Signature of claimant)

I, the claimant named in the foregoing claim, being first duly sworn, depose and say that I have read the above and foregoing claim to ground water right; that I know the contents thereof; and that to the best of my knowledge, information and belief, the facts therein stated are true and correct.

Subscribed and sworn to before me this ... day of ... 19 ...

Notary Public in and for the State of Washington,

Residing at ...

DIRECTIONS FOR PREPARING DECLARATIONS OF CLAIM

1. $2.00 filing and recording fee should accompany each declaration.
2. Write plainly in ink or use typewriter.
3. Read carefully all questions. Answer only those that apply to your project.
4. In answering Question 2, concerning location, give distance and direction of location of well or other construction works for withdrawal of water from nearest 40 acre corner or other legal subdivision, as

(a) "320 feet north and 1100 feet east from the southwest corner of SE¼ of SW¼ of Sec. 1, Twp. 13 N., Rge. 2 E. W. M.," or

"North 38° 20' east 400 feet from the northeast corner of NW¼ of SW¼ of Sec. 33, Twp. 12 N., Rge. 3 W. W. M." or

(b) If within limits of incorporated town or city, or recorded plat:
"Lot 4, Block 6 of Churchill's Addition to City of Spokane."

5. Maps, showing location of well or other works and place of use, must be made in triplicate (3) on the enclosed section plats. If for irrigation, show the approximate area irrigated. Show also location of other existing wells or other works for withdrawing ground water within a radius of one-quarter mile.

6. Sign declaration and affidavit on back of form.

CERTIFICATE RECORD NO. [illegible] PAGE NO. 891-D UNDER DECLARATION OF CLAIM NO. [illegible]

STATE OF WASHINGTON, COUNTY OF Yakima

Certificate of Ground Water Right

Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and the rules and regulations of the State Supervisor of Hydraulics thereunder.

THIS IS TO CERTIFY That COUNTRY CLUB DISTRICT WATER COMPANY, a corporation, of Yakima, Washington has filed in the office of the State Supervisor of Hydraulics of Washington Declaration of Claim No. 238 to withdraw ground waters of the State from a Pump Well located within Lot 4 of Country Club Suburban Tracts (Sec. 22, Twp. 13 N., Rge. 19 E.W.M.)

for the purpose of Municipal supply and supplemental irrigation

The right to the use of said ground waters has been sustained and approved by the Supervisor of Hydraulics in accordance with Chapter 263, Laws of Washington for 1945, and is [illegible] of record in Volume 8 of Ground Water Certificates at page 891-D the right [illegible] priority of June 1, 1926 [illegible] the amount of water which the Declar[illegible] withdraw for the aforesaid purpose is limited to the amount actually beneficially used and shall not exceed 165 gallons per minute; 162 acre-feet per year; and is appur[illegible] to the following described lands or place of use:

[illegible] Terrace Heights Subdivision Nos. 1 and 2, and the S[illegible] SE¼ [illegible] 16, and [illegible] of NE¼ [illegible] E½ [illegible] NW¼ of [illegible] and that portion of [illegible] of [illegible] Sec. [illegible] of the above in Twp. 13 N., Rge. 19 E.W.M. [illegible]

[illegible] ground water aforesaid hereby confirmed is restricted to the lands or [illegible]

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

IMPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

Roy

PART I: System Information

Well owner/manager : YAKIMA COUNTY PUBLIC WORKS

Water system name : TERRACE HEIGHTS WATER SYSTEM
FORMERLY COUNTRY CLUB WATER DISTRICT

County: YAKIMA

Water system number: 155000 Source number: 502

Well depth: 720 (ft.) (*From WFI form*) 590 ON WELL LOG

Source name: WELL #5

WA well identification tag number: ___ ___ ___-___ ___ ___

✓ well not tagged

Number of connections: 513 Population served: 2100

Township: 13N Range: 19E

Section: 22 1/4 1/4 Section: NE/NE

Latitude/longitude (if available): ___/___

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

PART II: Well Construction and Source Information

1) Date well originally constructed: 4 / — / 47 month/day/year

last reconstruction: __ / __ / __ month/day/year

_____ information unavailable

2) Well driller: WALTER LUDWIG

___ well driller unknown

3) Type of well:

X Drilled: X rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

4) Well report available? X YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 260 (gallons/min)

Source of information: PRODUCTION RECORDS

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated?

If so, what type of treatment:

X disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

CHLORINATION EQUIPMENT IS AVAILABLE TO DISINFECT THE SYSTEM SHOULD THE NEED ARISE

7) If source is chlorinated, is a chlorine residual maintained: ___ YES X NO

Residual level: _____ (*At the point closest to the source.*)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft X > 200 ft

___ information unavailable (*'< ' means less than; '> ' means greater than*)

2) Depth to ground water (static water level):

___ < 20 ft ___ 20–50 ft ___ 50–100 ft X > 100 ft

___ flowing well/spring (artesian)

How was water level determined?

X well log ___ other: _____

___ depth to ground water unknown

3) If source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

4) If source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated with this source: ___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 1245 (ft)

How was elevation determined? X topographic map ___ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

6) Confining layers: (This can be completed only for those sources with a drilling log, well log or geologic report describing subsurface conditions. Please refer to assistance package for example.)

X evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the ~~top~~ bottom of the ~~open interval?~~ lowest confining layer X YES ___ NO

___ information unavailable

7) Sanitary setback:

X < 100 ft* ___ 100–120 ft ___ 120–200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

A RESIDENTIAL NEIGHBORHOOD SURROUNDS THE SITE
HOMES ARE SINGLE FAMILY CONNECTED TO SEWER THE
AREA TO THE EAST IS THE ONLY LOCATION WHERE LESS THAN 100 FT
OF SETBACK EXISTS

8) Wellhead construction:

X wellhead enclosed in a wellhouse

___ controlled access (describe): _____

_____

___ other uses for wellhouse (describe): _____

_____

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

___ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

___ > 18 ft ('> ' *means greater than*)

X depth of seal unknown

X no surface seal

THERE IS NO RECORD OF A SEAL OR ITS DEPTH IF ONE EXISTS.

10) Annual rainfall (inches per year):

X < 10 in/yr ___ 10–25 in/yr ___ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 16.5 (gallons)

How was this determined?

X meter

___ estimated: ___ pumping rate (_____)

___ pump capacity (_____)

___ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 280 (ft)

1 year ground water travel time : 390 (ft)

5 year ground water travel time: 880 (ft)

10 year ground water travel time: 1240 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/open interval: 24 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? ___ YES X NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO			
stormwater injection wells	✓	NO	✓	
other injection wells				✓
abandoned ground water well			✓	
landfills, dumps, disposal areas	NO			
known hazardous materials clean-up site	NO			
water system(s) with known quality problems	NO			
population density > 1 house/acre	✓	✓	✓	
residences commonly have septic tanks	NO			
Wastewater treatment lagoons	NO			
sites used for land application of waste	NO			

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

≈ 500 FT NNW THERE IS AN ABANDONED WELL 265' DEEP W/ A 6" CASING. IT IS DISCUSSED IN THE DOCUMENTS ATTACHED.

STORMWATER DRYWELLS ARE SHOWN ON THE MAP IN REQ.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	___
< 2 mg/liter nitrate	___	___
2–5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___
X Nitrate sampling records unavailable		

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	___	___
X VOC sampling records unavailable		

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	X	___
___ EDB/DBCP tests required but not yet completed		
___ EDB/DBCP tests not required		

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected	___	___
(pesticides and other synthetic organic chemicals)		
___ Other SOC tests performed but none detected		
(list test methods in comments		
X Other SOC tests not performed		

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination: YES NO

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records). ___ X

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source. ___ X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES X NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

___ YES X NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

__ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	__	X	__
6 month–1 year travel time	__		__
1–5 year travel time	__		__
5–10 year travel time	__		__

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	✓	__	__
1–5 year travel time	✓	__	__
5–10 year travel time	✓	__	__

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

DRYWELLS ARE MARKED IN RED ON MAP.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES X NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? X YES ___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Log of Weisberger No 2 Well

			Total
15 ft		gray sand stone	15 ft.
5	"	gravel	20 "
20	"	Clay	40 "
1	"	gravel	41 "
7	"	Clay	48 "
11	"	Cement gravel	59 "
44	"	Clay	103 "
2	"	Cement gravel	105 "
65	"	Clay	170 "
52	"	Clay with sand streaks	222 "
2	"	Caving Clay	224 "
32	"	Tite stickey Clay	256 "
14	"	caving Clay & gravel	270 "
20	"	caving Clay with sand streaks Put in 12 in pipe	290 "
87	"	sandy clay	377 "
11	"	Hard sand stone	388 "
15	"	Clay gravel streaks little Water	403 "
40	"	sandy shale	443 "
50	"	shale Hard streaks	493 "
22	"	Clay with Muddy sand streaks	515 "
5	"	Clay	520 "
3	"	fine sand	523 "
8	"	Clay	531 "
21	"	Large Boulders	552 "
2	"	Blue Clay	554 "
14	"	sand & gravel streaks Water 24 ft screen	568 "
22	"	sandy shale	590 "

Water Level 227 ft.

12-in pipe

10" pipe

1 24ft 1 22ft

527 ft of 12 in pipe
91 ft of 10 in liner including 24 ft screen
Pumped 165 gal per m. at 20 ft. drawdown

224

INVOICE

State of Washington
DEPARTMENT OF HEALTH
K 17-9
1610 N.E. 150th Street, Seattle, WA 98155-7224

INVOICE NO. 87993

DATE November 29, 1990

TO: CCD Water Co.
P.O. Box 795
Yakima, WA 98907-075

QUANTITY	DESCRIPTION	COST	AMOUNT
3	EDB/DBCP analysis in water	$50.00	$150.00

Please remit to above address and return one copy of invoice with remittance.

OH 308-004 (1/90) (Formerly DSHS 18-335) -1007-

STATE OF
WASHINGTON

DEPARTMENT OF HEALTH
P.O. Box 190 L4-7, Wenatchee, WA 98807

TO: CCD Water Co.
P.O. Box 795
Yakima, WA 98907-0795

Report of Analytical Results

Date of Report: November 29, 1990

Date Sample Received: October 23, 1990

Sample Identification: 90E0268-0270

Analytical Results:

See attached tabulation

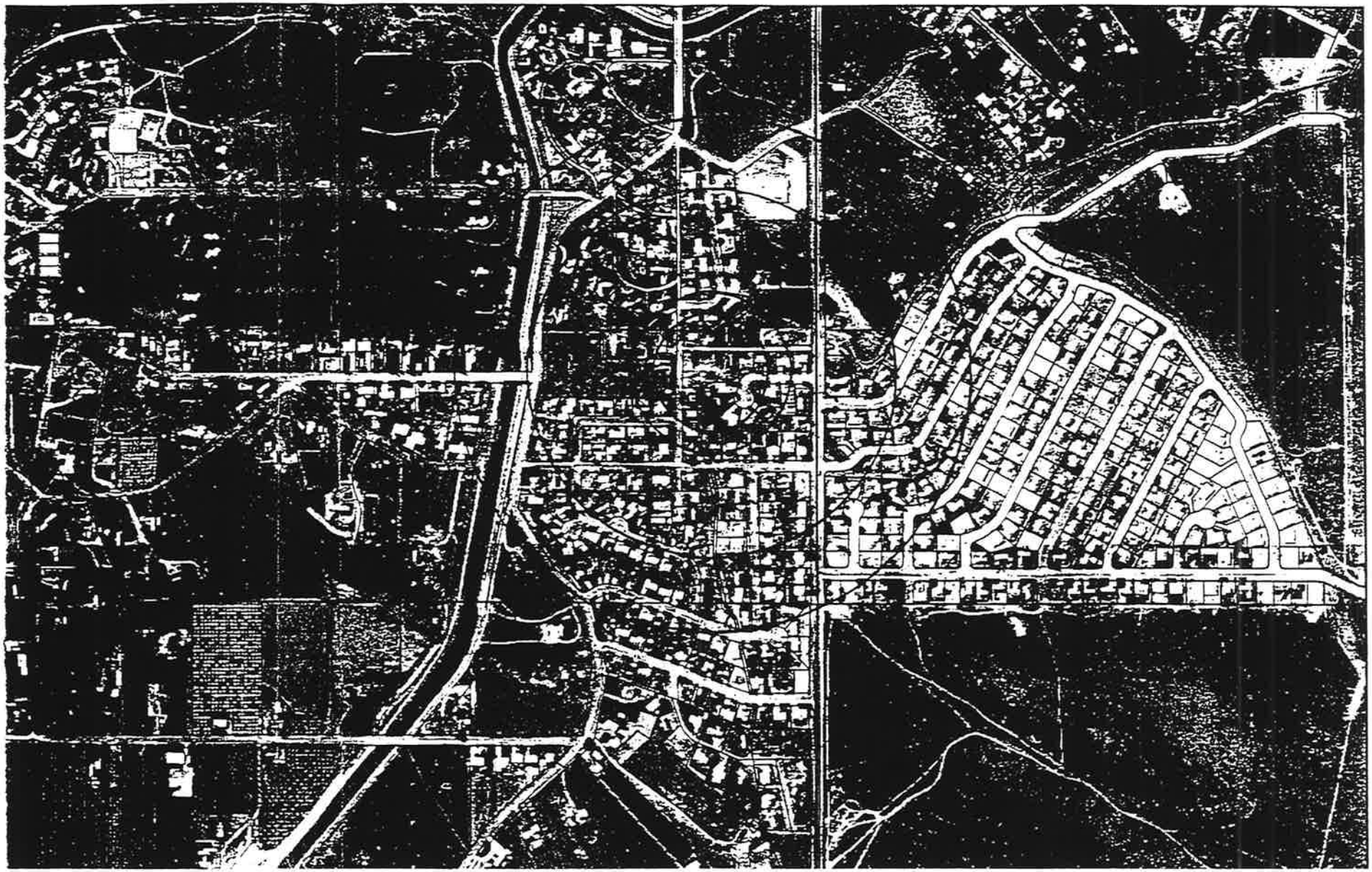
Albert L. Robbins
Regional Laboratory Director

Harold E. Ruark, Chemist

RESULTS OF ANALYSIS

Date:

Identification	Lab Number	Test or Residue	Results	Units	MRL
			November 29, 1990		
Water Co	90E0268	EDB	ND	PPB	.02
		DBCP	ND		
Water Co	90E0269	EDB	ND		
		DBCP	ND		
Water Co	90E0270	EDB	ND		
		DBCP	ND		



Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

'MPORTANT! Please complete one form for each ground water source (well, wellfield, spring) used in your water system. Photocopy as necessary.

'ART I: System Information

Well owner/manager : YAKIMA COUNTY PUBLIC WORKS

Water system name : TERRACE HEIGHTS WATER SYSTEM (FORMERLY COUNTRY CLUB DISTRICT)

:ounty: YAKIMA

Water system number: 155000 Source number: S03

Vell depth: 1502 (ft.) (*From WFI form*)

ource name: WELL # 6

WA well identification tag number:___ ___ ___-___ ___ ___

_____ well not tagged

Number of connections: 513 Population served: 2100

Township: 13N Range: 19E

ection: 16 1/4 1/4 Section: SE/SE

.atitude/longitude (if available): _____/_____

How was lat./long. determined?

_____ global positioning device _____ survey _____ topographic map
____other: _____

* Please refer to Assistance Packet for details and explanations of all questions in Parts II through V.

'ART II: Well Construction and Source Information

1) Date well originally constructed: 8 / 19 / 83 month/day/year

last reconstruction: ___ / ___ /___ month/day/year

_____ information unavailable

2) Well driller: RIEBE WELL DRILLING

1503 EAST NOB HILL

YAHIMA, WA.

___ well driller unknown

3) Type of well:

X Drilled: X rotary ___ bored ___ cable (percussion) ___ Dug

___ Other: ___ spring(s) ___ lateral collector (Ranney)

___ driven ___ jetted ___ other: _____

Additional comments: _____

4) Well report available? X YES (attach copy to form) ___ NO

If no well log is available, please attach any other records documenting well construction; e.g. boring logs, "as built" sheets, engineering reports, well reconstruction logs.

5) Average pumping rate: 356/500 (gallons/min)

Source of information: PRODUCTION RECORDS / WFI

If not documented, how was pumping rate determined? _____

___ Pumping rate unknown

6) Is this source treated? NO

If so, what type of treatment:

___ disinfection ___ filtration ___ carbon filter ___ air stripper ___ other

Purpose of treatment (describe materials to be removed or controlled by treatment):

7) If source is chlorinated, is a chlorine residual maintained: ___ YES ___ NO

Residual level: _____ (*At the point closest to the source.*)

III: Hydrogeologic Information

th to top of open interval: [check one]

___ < 20 ft ___ 20–50 ft ___ 50–100 ft ___ 100–200 ft X > 200 ft

___ information unavailable ('< ' *means less than;* '> ' *means greater than*)

th to ground water (static water level):

___ < 20 ft ___ 20–50 ft X 50–100 ft ___ > 100 ft

___ flowing well/spring (artesian)

How was water level determined?

X well log ___ other: _____

___ depth to ground water unknown

source is a flowing well or spring, what is the confining pressure:

_____ psi (pounds per square inch)
or
_____ feet above wellhead

source is a flowing well or spring, is there a surface impoundment, reservoir, or catchment associated is source: ___ YES ___ NO

ellhead elevation (height above mean sea level): 1120 (ft)

How was elevation determined? X topographic map ___ Drilling/Well Log ___ altimeter

___ other: _____

___ information unavailable

fining layers: (This can be completed only for those sources with a drilling log, well log or geologic describing subsurface conditions. Please refer to assistance package for example.)

X evidence of a confining layer in well log

___ no evidence of a confining layer in well log

If there is evidence of a confining layer, is the depth to ground water more than 20 feet above the ~~top~~ bottom of the ~~open interval?~~ LOWEST CONFINING LAYER X YES ___ NO

___ information unavailable

7) Sanitary setback:

___ < 100 ft* X 100-120 ft ___ 120-200 ft ___ > 200 ft
* if less than 100 ft describe the site conditions:

8) Wellhead construction:

___ wellhead enclosed in a wellhouse

X controlled access (describe): FENCED SITE AND METAL STRUCTURE OVER WELL. FENCE IS 10' WITH LOCKED GATE

___ other uses for wellhouse (describe): NONE

___ no wellhead control

9) Surface seal:

___ 18 ft

___ < 18 ft (no Department of Ecology approval) ('< ' *means less than*)

___ < 18 ft (Approved by Ecology, include documentation) ('< ' *means less than*)

X > 18 ft ('> ' *means greater than*)

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year):

X < 10 in/yr ___ 10-25 in/yr ___ > 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 48.7 (gallons)

How was this determined?

X meter

__ estimated: __ pumping rate (_____)

__ pump capacity (_____)

__ other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:
(see Instruction Packet)

6 month ground water travel time : 310 (ft)

1 year ground water travel time : 440 (ft)

5 year ground water travel time: 980 (ft)

10 year ground water travel time: 1390 (ft)

Information available on length of screened/open interval?

X YES __ NO

Length of screened/open interval: 60 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? X YES __ NO (mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon, or holding pond located within the 6 month time of travel boundary? __ YES X NO (mark and identify on map).

Comments: _____

_____

_____

_____

_____

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

Please indicate if any of the following are present within a circular area around your water source having a radius up to and including the five year ground water travel time:

	6 month	1 year	5 year	unknown
likely pesticide application	NO	→		
stormwater injection wells ORYWELLS	YES	YES	YES	
other injection wells				✓
abandoned ground water well				✓
landfills, dumps, disposal areas	NO	→		
known hazardous materials clean-up site	NO	→		
water system(s) with known quality problems	NO	→		
population density > 1 house/acre	YES	YES	YES	
residences commonly have septic tanks	NO	→		
Wastewater treatment lagoons	NO	→		
sites used for land application of waste	NO	→		

Mark and identify on map any of the risks listed above which are located within the 6 month time of travel boundary? (*Please include a map of the wellhead and time of travel areas with this form. Please locate and mark any of the following.*)

If other recorded or potential sources of ground water contamination exist within the ten year time of travel circular zone around your water supply, please describe:

STORMWATER ORYWELLS ARE INDICATED IN RED.

2) Source specific water quality records:

Please indicate the occurrence of any test results since 1986 that meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL = 10 mg/l)	YES	NO
Results greater than MCL	___	X
< 2 mg/liter nitrate	X	___
2-5 mg/liter nitrate	___	___
> 5 mg/liter nitrate	___	___

___ Nitrate sampling records unavailable

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)	YES	NO
Results greater than MCL or SAL	___	___
VOCs detected at least once	___	___
VOCs never detected	X	___

___ VOC sampling records unavailable

C. EDB/DBCP:	YES	NO
(EDB MCL = 0.05 ug/l or 0.00005 mg/l. DBCP MCL = 0.2 ug/l or 0.0002 mg/l.)		
EDB/DBCP detected below MCL at least once	___	___
EDB/DBCP detected above MCL at least once	___	___
EDB/DBCP never detected	X	___

___ EDB/DBCP tests required but not yet completed

___ EDB/DBCP tests not required

D. Other SOCs (Pesticides):	YES	NO
Other SOCs detected (pesticides and other synthetic organic chemicals)	___	___

___ Other SOC tests performed but none detected
(list test methods in comments

X Other SOC tests not performed

If any SOCs in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOCs detected, list test methods here: _____

_____

_____

_____

E. Bacterial contamination:

	YES	NO
Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).	___	X
Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.	___	X

___ Source sampling records for bacteria unavailable

Part VI: Geographic or Hydrologic Factors Contributing to a Non-Circular Zone of Contribution

The following questions will help identify those ground water systems which may not be accurately represented by the calculated fixed radius (CFR) method described in Part IV. For these sources, the CFR areas should be used as a preliminary delineation of the critical time of travel zones for that source. As a system develops its Wellhead Protection Plan for theses sources, a more detailed delineation method should be considered.

1) Is there evidence of obvious hydrologic boundaries within the 10 year time of travel zone of the CFR? (Does the largest circle extend over a stream, river, lake, up a steep hillside, and/or over a mountain or ridge?)

___ YES X NO

Describe with references to map produced in Part IV:

_____

_____

2) Aquifer Material:

A) Does the drilling log, well log or other geologic/engineering reports identify that the well is located in an area where the underground conditions are identified as fractured rock and/or basalt terrain?

X YES ___ NO

B) Does the drilling log, well log or other geologic/engineering reports indicate that the well is located in an area where the underground conditions are primarily identified as coarse sand and gravel?

___ YES X NO

3) Is the source located in an aquifer with a high horizontal flow rate? (These can include sources located on flood plains of large rivers, artesian wells with high water pressure, and/or shallow flowing wells and springs.)

__ YES X NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs?

a) Presence of ground water extraction wells removing more than approximately 500 gal/min within...

	YES	NO	unknown
< 6 month travel time	__	X	__
6 month–1 year travel time	__	X	__
1–5 year travel time	__	X	__
5–10 year travel time	__	X	__

b) Presence of ground water recharge wells (dry wells) or heavy irrigation within...

	YES	NO	unknown
< 1 year travel time	X	__	__
1–5 year travel time	X	__	__
5–10 year travel time	__	__	__

Please identify or describe additional hydrologic or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV.

FOR INFORMATION ON DRY WELLS REFER TO REQ MARKS ON CFR MAP.

Suggestions and Comments

Did you attend one of the susceptibility workshops? ___ YES _X_ NO

Did you find it useful? ___ YES ___ NO

Did you seek outside assistance to complete the assessment? _X_ YES ___ NO

This form and instruction packet are still in the process of development. Your comments, suggestions and questions will help us upgrade and improve this assessment form. If you found particular sections confusing or problematic please let us know. How could this susceptibility assessment be improved or made clearer? Did the instruction package help you find the information needed to complete the assessment? How much time did it take you to complete the form? Were you able to complete the assessment without additional/outside expertise? Do you feel the assessment was valuable as a learning experience? Any other comments or constructive criticisms you have would be appreciated.

Co
C
Copy [redacted] 9 1983

DEPARTMENT OF E
[illegible] Club District Water Co

WATER WELL REPORT

STATE OF WASHINGTON

Application No. G4-27699

Permit No. G4-27699 P

Address PO Box 795 Yakima WA 98907

N OF WELL: County Yakima SE¼ SE¼ SE ¼ Sec. 16 T. 13 N., R. 19E W.M. R

...nce from section or subdivision corner 153 FT N and 54' W From S.E. Corner of Sec 16

ED USE: Domestic ☐ Industrial ☐ Municipal ☑ Irrigation ☐ Test Well ☐ Other ☐

F WORK: Owner's number of well (if more than one)....

New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☑ Jetted ☐

IONS: Diameter of well 12 X 10 inches.
...25 ft. Depth of completed well 1495 ft.

UCTION DETAILS:

...alled: 12" Diam. from 0 ft. to 405 ft.
☐ 10" Diam. from 380 ft. to 1495 ft.
...d ☑ ___" Diam. from ___ ft. to ___ ft.

S: Yes ☐ No ☑
perforator used
f perforations ___ in. by ___ in.
... perforations from ___ ft. to ___ ft.
... perforations from ___ ft. to ___ ft.
... perforations from ___ ft. to ___ ft.

...es ☑ No ☐
...urer's Name Johnson
Model No.
...10 Slot size 016 from 440 ft. to 450 ft.
...10 Slot size 020 from 490 ft. to 500 ft.
016 520 530

...ked: Yes ☐ No ☑ Size of gravel:
...placed from 038 - 580 - 590 ft.
0 040 - 750 - 770

...: Yes ☑ No ☐ To what depth? 405 ft.
...sed in seal CEMENT
... strata contain unusable water? Yes ☑ No ☐
... water? ? Depth of strata ?
... sealing strata off CASING - CEMENT

...nufacturer's Name N/A
H.P.

VELS: Land-surface elevation above mean sea level 1120 ft.
...6 ft. below top of well Date 8-19-83
... lbs. per square inch Date
...ater is controlled by ___ (Cap, valve, etc.)

...TS: Drawdown is amount water level is lowered below static level
...? Yes ☑ No ☐ If yes, by whom? AKLAND
...nin. with 33 ft. drawdown after 8 hrs.
" 120 " 5 "
" " "

...taken as zero when pump turned off) (water level ...ll top to water level)

...vel	Time	Water Level	Time	Water Level
	4:18	96.11	4:20	96
	4:1830	96.6	4:21	95.10
...d	4:19	96.4	4:22	95.8

...-19-83

.../min. with ___ ft. drawdown after ___ hrs.
___ g.p.m. Date
... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Top Soil + Bolders	0	3
Hard Pan w/ Large Bolders	3	32
Clay Sand Stone Bolders	32	50
Shale Sand Stone + bolders	50	70
Sand Stone Clay Gravel Bolders	70	145
Clay + Bolders	145	295
Sand Stone w/ ST. of Clay	295	315
Clay Sand Stone Gravel Bolders	315	405
Sand Stone w/ ST of Clay + Sh...	405	455
Stickey Clay Sandy	455	465
Sand / Stone w/ ST of Shale	465	510
Sticky Clay	510	520
Sand / Stone + Gravel w/ ST of Clay	520	540
Clay + Shale	540	570
Layers of Sand Stone Clay Gravel	570	600
Hard Sand Stone w/ ST of Clay	600	650
Sand Stone Shale Sticky Clay	650	670
Blue Clay w/ ST of Sand	670	701
Sand Stone Gravel	701	702
Blue Clay w/ ST of Sand	702	710
Sand Sand Stone w/ ST of Clay	710	740
Brown + Blue Sand Stone w/ Clay	740	810
Cemeted Gravel Sand Stone Clay	810	830
Sand Stone Gravel Clay Bolders	830	895
Cement Gravel	895	908
Clay	908	912
Layers of Clay Gravel Bolders	912	935
Decomposed rock Gravel w/ ST Shale	935	963
Gravel Bolders Basalt w/ Clay Shale	963	982
Decomposed rock Black Brown	982	
Green and Gray Shale		990
Decomposed rock	990	997
Blue Shale w/ ST of Gravel	997	1040
Soft Gray Clay w/ ST of Sand	1040	1055
Shale Gravel + Bolders	1055	1068
Bolders rock + Shale	1068	1072

Work started 4-6, 1983. Completed 8-19, 1983

WELL DRILLER'S STATEMENT:

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

NAME Riebe Well Drilling
(Person, firm, or corporation) (Type or print)

Address 1503 East Nob Hill

[Signed] Bob Britton
(Well Driller)

License No. 421 Date 9-7, 1983

(USE ADDITIONAL SHEETS IF NECESSARY)

WATER WELL REPORT

STATE OF WASHINGTON

Application No G4-27699

Permit No G4-27699P

County Clay District Water Co Address

WELL: County ..... NE 1/4 SE 1/4 SE 1/4 Sec 16 T 13 N. R 19E WM.

Section or subdivision corner

R

USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

TYPE: Owner's number of well (If more than one) ....
Well ☐ Method: Dug ☐ Bored ☐
ered ☐ Cable ☐ Driven ☐
nditioned ☐ Rotary ☐ Jetted ☐

Diameter of well ..... inches.
Depth of completed well ..... ft.

DETAILS:

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

☐ No ☐
or used .....
ions ..... in. by ..... in.
rations from ..... ft. to ..... ft.
rations from ..... ft. to ..... ft.
rations from ..... ft. to ..... ft.

lo ☐
ame .....
..... Model No .....
ot size ..... from ..... ft. to ..... ft.
ot size ..... from ..... ft. to ..... ft.

s ☐ No ☐ Size of gravel: .....
m ..... ft. to ..... ft.

] No ☐ To what depth? ..... ft.
eal .....
ontain unusable water? Yes ☐ No ☐
..... Depth of strata .....
strata off .....

's Name .....
..... H.P .....

Land-surface elevation above mean sea level .... 1120 ft.
..... ft. below top of well Date .....
..... lbs. per square inch Date .....
controlled by .....
(Cap, valve, etc.)

Drawdown is amount water level is lowered below static level
] No ☐ If yes, by whom? .....
..... ft. drawdown after ..... hrs.
" "
" "

zero when pump turned off) (water level water level)

e	Water Level	Time	Water Level
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

.....
ith ..... ft. drawdown after ..... hrs.
..... g.p.m. Date .....
Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Blue Clay and Shale	1072	1103
Layers of Blue Clay & Sand	1103	1150
Blue Shale	1150	1172
Blue Shale w/ st of Sand	1172	1205
Green Blue Shale	1205	1225
Blue Shale w/ st of Sand	1225	1250
Blue Green Shale	1250	1282
Hard Gravel and Shale	1282	1287
Blue Shale	1287	1285
Layers of Gray Clay and Sand	1285	1325
Soft Gray Clay	1325	1337
Sandy Gray Clay	1337	1345
Gray & Blue Sandy Clay	1345	1365
Layers of Blue Clay & Sand	1365	1403
Hard Sand Gravel & Shale	1403	1406
Layers of Clay Sand & Shale	1406	1433
Thin Layers of Clay & Sand	1433	1465
Layers Shale & Sand Stone	1465	1495

Work started ..... 19..... Completed ..... 19.....

WELL DRILLER'S STATEMENT:

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

NAME .....
(Person, firm, or corporation) (Type or print)

Address .....

[Signed] .....
(Well Driller)

License No. ..... Date ....., 19.....

(USE ADDITIONAL SHEETS IF NECESSARY)

3

AKLAND IRRIGATION CO., INC.

2 East King Street — Yakima, Washington 98909

Phone 452-1325

Our Test No. 1

WELL TEST RECORD

OWNER COUNTRY CLUB DIST WATER

Address TERRACE HEIGHTS

Location

No. ____ Drilled By Riebe Drilling

98 Ft. depth ____ 19 83

O.D. of top 280 ft. of casing 12"

O.D. of next 1113 ft. of casing 10"

O.D. of next ____ ft. of casing ____

TOTAL 1493 ft. of casing 12" & 10"

Furnished by AKLAND IRRIGATION

This Well Test No. 8/18 19 83

Tested By AKLAND IRRG.

Equipment Used 8" COLUMN 10" BOWL

Setting Depth (pump column) 355 + Bowls ft.

Static Water Level 100 ft.

Length of Air Line used F. Tape ft.

Unusual Conditions Observed during Installation or Removal of Pump

SCREENS AT. 440-450'
490-500'
520-530'
580-590'
750-770'

Time	Hour	PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM	RECOVERY RATE
9/	8:30			255	From 124 ft.
	8:55	99'		240	to ____ ft.
	8:40	97½		250	Total ____
	8:45	97½		260	In ____ min.
	8:50	99'9"		280	____ sec.
	8:55	99'6"		330	
	9:00	100'		320	
	9:05	100'		320	
0	9:10	110'		620	
	9:15	112		620	
	9:30	113'6"		610	
	9:45	114'10"		600	
	10:00	116'6"		600	
0	10:01			900	

REMARKS: Water Condition, Temperature, Hardness, Stability

Recovery

4:15:30	124' 3"
4:16:30	97'-6"
4:17:30	97' 0"
4:18:00	96'11"
4:18:30	96' 6"
4:19:00	96' 4"
4:20:00	96' 0
4:21:00	95'10"
4:22:00	95' 8"
4:23:00	95' 6½
4:39.00	94'

Water clear 74°

8/23/83 pulled test pump

static water was at 90' 6

CONTINUATION SHEET

COUNTRY CLUB DIST WATER CO.

Terrace Heights Well

WELL TEST RECORD

Time: ate	Time: Hour	PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM	REMARKS: Water Condition, Temperature, Hardness, Stability
-19-83	10:15	141'6"	41'6"	870	Water Clear 74° Temp.
00 PM	10:30	144'2		790	SOME COURSE SAND.
	10:45	141'6		770	WATER CLEARING SAND
00 PM	11:00	141'6"		750	
	11:15	186'		1160	LITTLE SAND
	11:30	187'4"		1130	" "
00 PM	12:00	180'		1100	210 1260
	12:15	202'8"		1280	
	12:30	201'6"		1200	75° SOME SAND
	12:45	201	101'	1210	
30 PM	1:00				
	1:06			1260	
	1:15	210		1260	
	1:30	210		1200	
	2:00	206		1240	
00	2:05	158'10"		750	Water Clear SMALL AMOUN
	2:35	155'10"		750	SAND
	3:00	153'	53'	750	
ck 00 PM	3:05				
	3:20	125'		465	74° Temp
	3:35	125		475	
	3:50	124'6"		475	
	4:05	124'3"		475	
	4:15	124'3"		460	END OF TEST

AKLAND IRRIGATION CO., INC.

2 East King Street — Yakima, Washington 98909

Phone 452-1825

Our Test No. 1

WELL TEST RECORD

NER Terrace Heights Well

Address Terrace Heights

ocation

o. Drilled By Riebe Drilling

Ft. depth 19 83

D. of top 280 ft. of casing 12"

D. of next 1113 ft. of casing 10"

D. of next ft. of casing

TOTAL 1493 ft. of casing 12" & 10"

rnished by AKLAND IRRIGATION

This Well Test No. 8/18 19 83

Tested By AKland Irrg.

Equipment Used 8" Column 10" Bowls

Setting Depth (pump column) 355 + Bowls 12 ft.

Static Water Level 100 ft.

Length of Air Line used E. Tape ft.

Unusual Conditions Observed during Installation or Removal of Pump

Screens @ 440'-450'
490'-500'
520'-530'
580-590'
750'-770'

Time Hour	PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM
8:30			255
8:55	99'		240
8:40	97½		250
8:45	97½		260
8:50	99'9"		280
8:55	99'6"		330
9:00	100'		320
9:05	100'		320
9:10	110'		620
9:15	112		620
9:30	113'6"		610
9:45	114'10"		600
10:00	116'6"		600
10:01			900

RECOVERY RATE

From 24 ft.

to ft.

Total

In min.

sec.

REMARKS: Water Condition, Temperature, Hardness, Stability

Recovery

4:15:30 124'3"
4:16:30 97'6"
4:17:30 97'0"
4:18:00 96'11"
4:18:30 96'6"
4:19:00 96'4"
4:20:00 96'0"
4:21:00 95'10"
4:22:00 95'8"
4:23:00 95'6½"
4:39:00 94.'

Water clear 74°

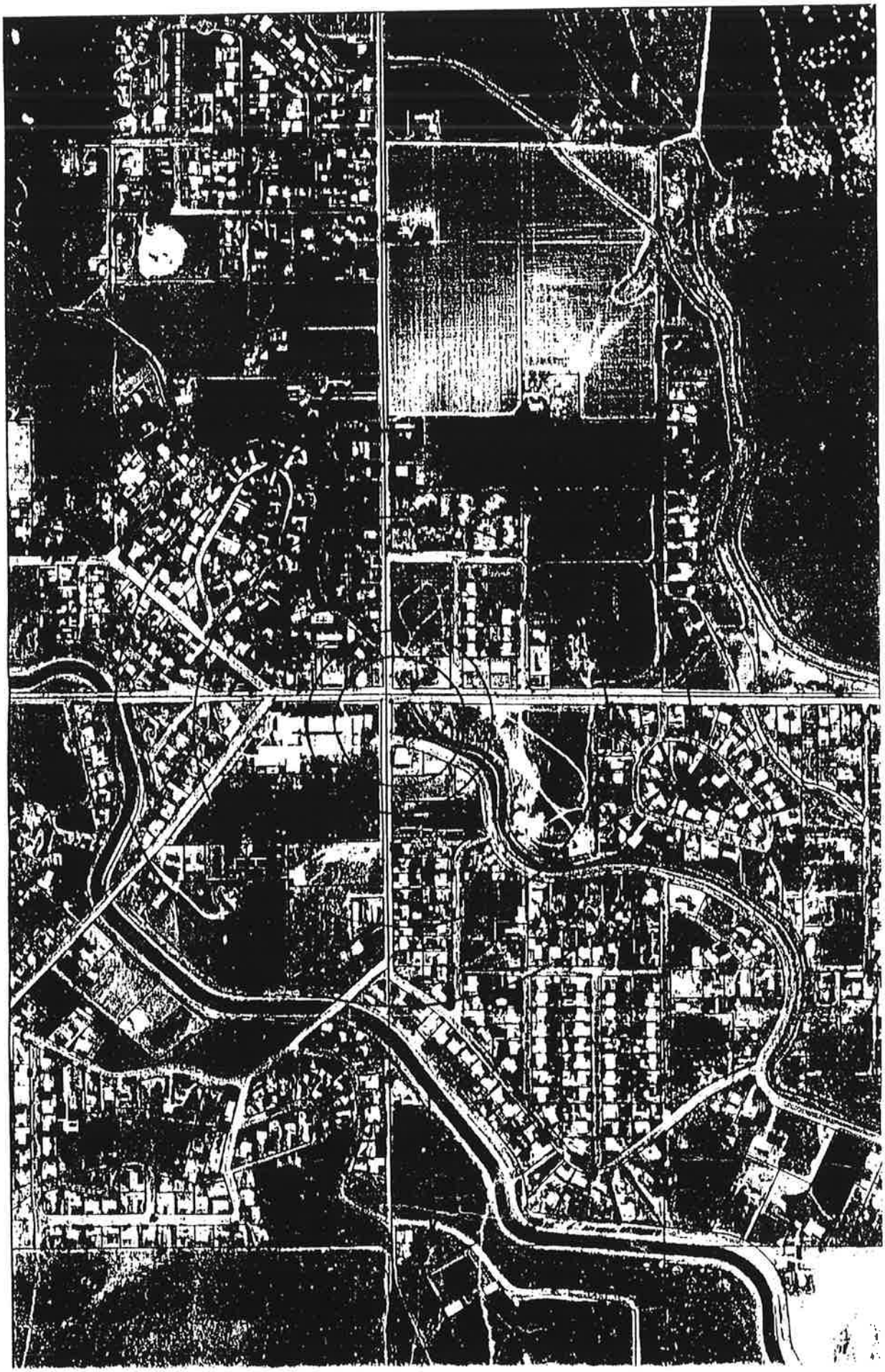
8/23/83 pulled test pump

Static water was at 90'6'

CONTINUATION SHEET

OWNER Terrace Heights Well — WELL TEST RECORD

Time Hour	PUMPING LEVEL (FT.)	DRAW DOWN (FT.)	VOLUME GPM	REMARKS: Water Condition, Temperature, Hardness, Stability
10:15	141'6"	41'6"	870	Water Clear 74° Temp.
10:30	144'2		790	some course sand.
10:45	141½		770	water clearing sand
11:00	141'6"		750	
11:15	186'		1160	little sand
11:30	187'4"		1130	
12:00	180'		1100	870 1360
12:15	202'8"		1280	
12:30	201'6"		1200	75° some Sand
12:45	201	101'	1210	
1:00				
1:06			1260	
1115	210		1260	
1:30	210		1200	
2:00	206		1240	
2:05	158'10"		750	water Clear small amoun
2:35	155'10"		750	sand
3:00	153'6	53'6	760	
3:05				
3:20	125'		465	74° Temp
3:35	125		475	
3:50	124'6"		475	
4:06	124'3"		475	
4:15	124'3"		460	END OF TEST



APPENDIX K

YAKIMA COUNTY CONTAMINANT INVENTORY DATABASE

Yakima County Inventory and Notification List											
						Delineation					
Site ID#	Site Name	Contact Name	Contact Address	City	Zip	10	5	1	0.5	Type	Well
12728	KIMA-TV		2801 TERRACE HTS DR	YAKIMA	98901	x				UST	THD 3
12728	KIMA-TV		2801 TERRACE HTS DR	YAKIMA	98901	x				LUST	THD 3
350	KIMA TV	JESSE GUZMAN	2801 TERRACE HTS DR	YAKIMA	98901	x				MOD	THD 3

Yakima County Property Owner List

Property Owner Name	Property Owner Street	City	State	Zip
CATES	101 ARTHUR BLVD	YAKIMA	Washington	98901
DYNASTY LAND COMPANY	3702 S FIFE ST # 21	TACOMA	Washington	98409
FERNALD	1111 VISTA DR	YAKIMA	Washington	98901
HANNICK	1600 ROSSMOOR PKWY	WALNUT CREEK	California	94595
MAYER	1391 COYOTE CREEK RD	YAKIMA	Washington	98901
MAYER	5206 PEAR BUTTE	YAKIMA	Washington	98901
SILVER	111 WOODWARD WEST	YAKIMA	Washington	98901
WHITMIRE	8 N 8TH AVE	YAKIMA	Washington	98902
WHITMIRE	6505 APPLEVIEW WAY	YAKIMA	Washington	98908
WHITMIRE	605 APPLEVIEW WAY	YAKIMA	Washington	98908
YAKIMA RANCHES OWNERS	PO BOX 1512	YAKIMA	Washington	98907
ANSON	801 N 57TH ST	YAKIMA	Washington	98901
BISSELL	181 LAREDO LN	YAKIMA	Washington	98901
CRICK	201 N 38TH AVE	YAKIMA	Washington	98902
DICKSON	107 N 94TH PL	YAKIMA	Washington	98908
ELLIOTT	110 LAREDO LN	YAKIMA	Washington	98901
GABLE	7514 W YELLOWSTONE	KENNEWICK	Washington	99336
HAHN	51 LAREDO LN	YAKIMA	Washington	98901
HERRERA	91 TERRACOTTA PLACE	YAKIMA	Washington	98901
HINCKLEY	7602 ZIER RD	YAKIMA	Washington	98908
KRACHT	5903 TERRETT DR	YAKIMA	Washington	98901
LA FRAMBOISE MARVIN	291 BOKOSKY DR	YAKIMA	Washington	98901
POWERS	4107 GARDEN PARK WAY	YAKIMA	Washington	98908
REXROAT	732 SUMMITVIEW AVE	YAKIMA	Washington	98902
SCOTT	611 BRATHOVDE RD	SELAH	Washington	98942
SETTER	15827 197TH PL NE	WOODINVILLE	Washington	98072
SMITH	4 N 96TH AVE	YAKIMA	Washington	98908
STANCHFIELD	2606 BARGE ST	YAKIMA	Washington	98902
TURNLEY	191 TERRA COTTA PL	YAKIMA	Washington	98901
YAKIMA COUNTY	2ND & B STR	YAKIMA	Washington	98901
ZERR	1217 S 15TH AVE	YAKIMA	Washington	98902
CASCADE NATURAL GAS CORP	222 FAIRVIEW AVE N	SEATTLE	Washington	98109
HALL	PO BOX 1262	YAKIMA	Washington	98907
KEITH & KEITH FUNERAL HOME	PO BOX 2824	YAKIMA	Washington	98907

NORTHWEST PIPELINE CORP	PO BOX 8900	SALT LAKE CITY	Utah	84158
RETLAW BROADCASTING CO	4880 N 1ST ST	FRESNO	California	93726
TERRACE HTS MEM PARK ASSN	3001 TERRACE HEIGHTS DR	YAKIMA	Washington	98901
YAKIMA COUNTY	2ND & B STR	YAKIMA	Washington	98901
ADKINS	5502 HILLTOP DR	YAKIMA	Washington	98901
AGUIRRE	117 S 57TH ST	YAKIMA	Washington	98901
ALBRECHT	108 N CANYON RD	YAKIMA	Washington	98901
ALEJO	5603 CASTLE MOUNTAIN CT	YAKIMA	Washington	98901
ALLEN	5900 MORNINGSIDE DR	YAKIMA	Washington	98901
ARMIJO	5824 MORNINGSIDE DR	YAKIMA	Washington	98901
AUSTIN	114 SKY VISTA PL	YAKIMA	Washington	98901
BARNES TR	1101 BEAUDRY RD	YAKIMA	Washington	98901
BEECHER	105 SKY VISTA PL	YAKIMA	Washington	98901
BELLROCK	110 S 58TH ST	YAKIMA	Washington	98901
BILLINGSLEY	5503 MORNINGSIDE DR	YAKIMA	Washington	98901
BONWELL	501 RICHARDS RD	UNION GAP	Washington	98903
BOSTON	104 N 57TH ST	YAKIMA	Washington	98901
BRASHEAR	15501 SE 168TH ST	RENTON	Washington	98058
BRIGHT	229 RIDGEWAY DR	YAKIMA	Washington	98901
BROWN	5602 PEAR BUTTE DR	YAKIMA	Washington	98901
BROWN	200 S 57TH ST	YAKIMA	Washington	98901
BROWN	5813 TERRACE HEIGHTS DR	YAKIMA	Washington	98901
BUCKALEW	118S S 58TH ST	YAKIMA	Washington	98901
BULL LIVING TRUST	5506 MORNINGSIDE DRIVE	YAKIMA	Washington	98901
BULL LIVING TRUST	5506 MORNINGSIDE DRIVE	YAKIMA	Washington	98901
BUNDY	501 W LINCOLN AVE # C	YAKIMA	Washington	98902
BUTLER	425 PINE BLUFF TRL	ORMOND BEACH	Florida	32174
CALL	5506 ROZA HILL DR	YAKIMA	Washington	98901
CAMERON	104 S 57TH ST	YAKIMA	Washington	98901
CARMODY	5500 CASTLE MOUNTAIN CT	YAKIMA	Washington	98901
CATER	103 S 57TH ST	YAKIMA	Washington	98901
CHANGALA	5831 MORNINGSIDE DR	YAKIMA	Washington	98901
CHARTIER	71 HIRBERT DR	MOXEE	Washington	98936
CLINTON	340 SNYDER RD	GRANGER	Washington	98932
COMER	101 SIERRA LN	NACHES	Washington	98937

COPELAND	5508 HILLTOP DR	YAKIMA	Washington	98901
CORNETT	5816 MORNIGSIDE DR	YAKIMA	Washington	98901
CRAUSE	5805 MORNINGSIDE DR	YAKIMA	Washington	98901
CROSSLIN	5602 CASTLE MOUNTAIN CT	YAKIMA	Washington	98901
DAHL	223 RIDGEWAY DR	YAKIMA	Washington	98901
DAUENHAUER	5502 CASTLEMOUNTAIN COURT	YAKIMA	Washington	98901
DELONG	5823 MORNINGSIDE DR	YAKIMA	Washington	98901
DUCRE	204 S 57TH ST	YAKIMA	Washington	98901
DUFAULT	112 SKY VISTA PL	YAKIMA	Washington	98901
EARLY	5606 HILLTOP DR	YAKIMA	Washington	98901
ERICKSON	5905 MORNINGSIDE DR	YAKIMA	Washington	98901
ESTEVES	11 S 12TH AVE	YAKIMA	Washington	98902
FRANK	103 SKY VISTA PL	YAKIMA	Washington	98901
FRISK	105 N CANYON RD	YAKIMA	Washington	98901
FUNG	204 S 58TH ST	YAKIMA	Washington	98901
GAMES	5602 ROZA HILL DR	YAKIMA	Washington	98901
GARCIA	2904 S 2ND ST	UNION GAP	Washington	98903
GARZA	217 RIDGEWAY DR	YAKIMA	Washington	98901
GENZ	219 RIDGEWAY DR	YAKIMA	Washington	98901
GILBERY	205 N CANYON RD	YAKIMA	Washington	98901
GILMARTIN	103 S 58TH ST	YAKIMA	Washington	98901
GLENN	242 RIDGEWAY DR	YAKIMA	Washington	98901
GOODWATER	5401 MORNINGSIDE DR	YAKIMA	Washington	98901
HALL	5702 PEAR BUTTE DR	YAKIMA	Washington	98901
HALSETH	5606 ROZA HILL DR	YAKIMA	Washington	98901
HANSES	106 S 58TH ST	YAKIMA	Washington	98901
HARPY	102 S 57TH ST	YAKIMA	Washington	98901
HARRIS FARMS INC	4507 ENGLEWOOD AVE	YAKIMA	Washington	98908
HARTER	5608 HILLTOP DR	YAKIMA	Washington	98901
HENLEY	PO BOX 972	MOXEE	Washington	98936
HENNEMAN	5908 MORNINGSIDE DR	YAKIMA	Washington	98901
HILL	301 N 57TH ST	YAKIMA	Washington	98901
HODGE	5605 HILLTOP DR	YAKIMA	Washington	98901
HOGENSON	5213 SUNSET DR	YAKIMA	Washington	98901
HUARD	114 N CANYON RD	YAKIMA	Washington	98901

HUARD	225 RIDGEWAY DR	YAKIMA	Washington	98901
HUNT	5601 HILLTOP DR	YAKIMA	Washington	98901
JAMESON	106 N CANYON RD	YAKIMA	Washington	98901
JOHNSON	5411 MORNINGSIDE DR	YAKIMA	Washington	98901
JOHNSON	5820 MORNINGSIDE DR	YAKIMA	Washington	98901
JOLY	107 N 57TH ST	YAKIMA	Washington	98901
JORDAN	5505 CASTLE MOUNTAIN CT	YAKIMA	Washington	98901
KAUFFMAN	5812 MORNINGSIDE DR	YAKIMA	Washington	98901
KINCAID	108 SKY VISTA PL	YAKIMA	Washington	98901
KIRSCH	112 N CANYON RD	YAKIMA	Washington	98901
KLAASSEN	505 N 40TH AVE	YAKIMA	Washington	98908
KNIGHT	110 N CANYON RD	YAKIMA	Washington	98901
KUHNS	105 N 57TH ST	YAKIMA	Washington	98901
KUSHNER	5213 MANOR DR	YAKIMA	Washington	98901
LAMOUREUX	5604 ROZA HILL DR	YAKIMA	Washington	98901
LARSEN	190 TERRETT DR	YAKIMA	Washington	98901
LARSON	4212 ARBOR CT SE	LACEY	Washington	98503
LAWSON	116 S 58TH ST	YAKIMA	Washington	98901
LEBLANC	104 S 56TH ST	YAKIMA	Washington	98901
LEMON	PO BOX 541	YAKIMA	Washington	98907
LENHARD	614 N 16TH AVE	YAKIMA	Washington	98902
LOCKE	5506 HILLTOP DR	YAKIMA	Washington	98901
LUSTER	5911 TERRACE HEIGHTS DR	YAKIMA	Washington	98901
LYNCH	1413 S 28TH AVE	YAKIMA	Washington	98902
MAC LEAN	11 BELGOLD DR	YAKIMA	Washington	98902
MAHER	102 N 57TH ST	YAKIMA	Washington	98901
MAIER	3994 HYACINTH ST	EUGENE	Oregon	97404
MANCE	111 S 58TH ST	YAKIMA	Washington	98901
MARSHALL	5505 MORNINGSIDE DR	YAKIMA	Washington	98901
MC CULLOUGH	5507 HILLTOP DR	YAKIMA	Washington	98901
MC DOUGAL	105 S 58TH ST	YAKIMA	Washington	98901
MC KINLEY	708 N 58TH AVE	YAKIMA	Washington	98908
MC LEAN	1315 S 38TH AVE	YAKIMA	Washington	98902
MC RAE	5512 PEAR BUTTE DR	YAKIMA	Washington	98901
MEERS	5808 MORNINGSIDE DR	YAKIMA	Washington	98901

MILLIN	202 RIDGEWAY DR	YAKIMA	Washington	98901
MOOR	3202 S 4TH ST	UNION GAP	Washington	98903
MORRISON	203 S 57TH ST	YAKIMA	Washington	98901
N L D INC	708 S 5TH AVE	YAKIMA	Washington	98902
NBR CONSTRUCTION INC	4112 SUMMITVIEW	YAKIMA	Washington	98908
NEILSEN	5602 HILLTOP DR	YAKIMA	Washington	98901
NHD COMPANY L L C	204 E VALLEY MALL BLVD	UNION GAP	Washington	98903
NUGENT	5808 MORNINGSIDE DR	YAKIMA	Washington	98901
NULPH	102 S 58TH ST	YAKIMA	Washington	98901
NUNEZ	107 S 57TH ST	YAKIMA	Washington	98901
O'CONNOR	5301 MORNINGSIDE DR	YAKIMA	Washington	98901
OLIVAS	5510 HILLTOP DR	YAKIMA	Washington	98901
OZUNA	110 S 57TH ST	YAKIMA	Washington	98901
PARRISH	5604 HILLTOP DR	YAKIMA	Washington	98901
PATTEN	116 S 11TH AVE	YAKIMA	Washington	98902
PETERS	5406 ROZA HILL DR	YAKIMA	Washington	98901
PIERCY	201 S 57TH ST	YAKIMA	Washington	98901
PRATT	221 RIDGEWAY DR	YAKIMA	Washington	98901
R & D CONSTRUCTION	10903 TIETON DR	YAKIMA	Washington	98908
RAMIREZ	115 S 58TH ST	YAKIMA	Washington	98901
RAMOS	105 S 57TH ST	YAKIMA	Washington	98901
RAPTCHEFF	5217 MANOR DR	YAKIMA	Washington	98901
RAY	5503 CASTLE MOUNTAIN CT	YAKIMA	Washington	98901
REEVES	114 S 58TH ST	YAKIMA	Washington	98901
RICHARDSON	470 TERRETT DR	YAKIMA	Washington	98901
RICHARDSON	1304 S 63RD ST	YAKIMA	Washington	98901
RIGGAN	5302 MORNINGSIDE DR	YAKIMA	Washington	98901
RINGER	107 S 58TH ST	YAKIMA	Washington	98901
ROBERTS	203 RIDGEWAY DR	YAKIMA	Washington	98901
RODRIGUEZ	101 S 58TH ST	YAKIMA	Washington	98901
ROGERS	244 RIDGEWAY DR	YAKIMA	Washington	98901
RUTHERFORD	5505 HILLTOP DR	YAKIMA	Washington	98901
SCHAFER	109 S 58TH ST	YAKIMA	Washington	98901
SCHRANK	2 N 54TH AVE	YAKIMA	Washington	98908
SCHREINER	2504 MCCULLOUGH RD	YAKIMA	Washington	98903

SCHUMACHER PAINTING COMPANY	2812 TERRACH HTS DR	YAKIMA	Washington	98901
SCOTT	112 S 58TH ST	YAKIMA	Washington	98901
SCULLY	113 S 57TH ST	YAKIMA	Washington	98901
SEGURA	20401 AHTANUM RD	YAKIMA	Washington	98903
SHAFER	5603 HILLTOP DR	YAKIMA	Washington	98901
SHAFFER	102 N CANYON RD	YAKIMA	Washington	98901
SMITH	9900 12TH AV W APT J103	EVERETT	Washington	98204
STALOCH	5509 PEAR BUTTE DR	YAKIMA	Washington	98901
STERBENZ	5412 MORNINGSIDE DR	YAKIMA	Washington	98901
STINER	206 N CANYON RD	YAKIMA	Washington	98901
STORM	5800 MORNINGSIDE DR	YAKIMA	Washington	98901
STROTHER	108 S 58TH ST	YAKIMA	Washington	98901
STUCK	2407 POINSETTIA ST	SANTA ANA	California	92706
SULLIVAN	104 N CANYON RD	YAKIMA	Washington	98901
SUND	235 RIDGEWAY DR	YAKIMA	Washington	98901
SUNDAY	615 S 16TH AVE	YAKIMA	Washington	98902
SUTTON	240 RIDGEWAY DR	YAKIMA	Washington	98901
SWOPE	113 S 58TH ST	YAKIMA	Washington	98901
THOMAS	109 SKY VISTA PL	YAKIMA	Washington	98901
THOMSEN	5504 HILLTOP DR	YAKIMA	Washington	98901
TOBIA	202 S 57TH ST	YAKIMA	Washington	98901
TRUHLER	109 S 57TH ST	YAKIMA	Washington	98901
TWETEN	712 COUNTRY CLUB DR	YAKIMA	Washington	98901
UHRICH	5509 HILLTOP DR	YAKIMA	Washington	98901
WEBER	202 S 58TH ST	YAKIMA	Washington	98901
WEBER	111 S 57TH ST	YAKIMA	Washington	98901
WHITE	101 S 57TH ST	YAKIMA	Washington	98901
WHITE	5607 HILLTOP	YAKIMA	Washington	98901
WIEHL	5211 SUNSET DR	YAKIMA	Washington	98901
WONG	4148 PECK RD APT D	EL MONTE	California	91732
WOOD	103 N CANYON RD	YAKIMA	Washington	98901
WOODS	5507 CASTLE MT COURT	YAKIMA	Washington	98901
YAKIMA COUNTY	2ND & B STR	YAKIMA	Washington	98901
YAKIMA COUNTY OF	128 N 2ND ST	YAKIMA	Washington	98901
YOUNG	231 RIDGEWAY DR	YAKIMA	Washington	98901

ZERR	233 RIDGEWAY DR	YAKIMA	Washington	98901
ZERR JR	227 RIDGEWAY DR	YAKIMA	Washington	98901
ABEGGLEN	704 TUMAC DR	YAKIMA	Washington	98901
ABERCROMBIE	306 N 57TH ST	YAKIMA	Washington	98901
AFFHOLTER	5504 MOUNT AIX WAY	YAKIMA	Washington	98901
AKRIDGE	9202 W GAGE BLVD	KENNEWICK	Washington	99336
ALLEN	4801 E HILLCREST DR	YAKIMA	Washington	98901
ALLMAN	4917 E HILLCREST DR	YAKIMA	Washington	98901
ALTHAUS	5303 MOUNT AIX WAY	YAKIMA	Washington	98901
ALVAREZ	5500 TUMAC DR	YAKIMA	Washington	98901
ANDERSON	5062 N SKY VISTA AVE	YAKIMA	Washington	98901
ANSON	801 N 57TH ST	YAKIMA	Washington	98901
ARMORED CAR	PO BOX 46	YAKIMA	Washington	98907
ASHBAUGH	341 BOHOSKEY DR	YAKIMA	Washington	98901
ATHANS	802 MAPUNAPUNA ST	HONOLULU	Hawaii	96819
AUSTIN	5404 TUMAC DR	YAKIMA	Washington	98901
BABEL	4961 N SKY VISTA AVE	YAKIMA	Washington	98901
BACH HENRY & ROSIE	5204 MOUNT AIX WAY	YAKIMA	Washington	98901
BAGLEY	4307 MAPLE AVE	YAKIMA	Washington	98901
BAIRD	4940 PEAR BUTTE DR	YAKIMA	Washington	98901
BAISINGER	5107 N SKY VISTA AVE	YAKIMA	Washington	98901
BARLOW	5083 N SKY VISTA AVE	YAKIMA	Washington	98901
BARNETT	5601 MOUNT CLEMANS WAY	YAKIMA	Washington	98901
BARWIN	5105 N CANYON RD	YAKIMA	Washington	98901
BATOR	5302 TUMAC DR	YAKIMA	Washington	98901
BAUMBACH	4965 PEAR BUTTE DR	YAKIMA	Washington	98901
BECKER	5504 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
BELL	4903 PEAR BUTTE DR	YAKIMA	Washington	98901
BENNETT	4601 E HILLCREST DR	YAKIMA	Washington	98901
BETSCH	4957 N SKY VISTA AVE	YAKIMA	Washington	98901
BIRD	319 N 57TH ST	YAKIMA	Washington	98901
BISSELL	181 LAREDO LN	YAKIMA	Washington	98901
BIXLER	5307 PEAR BUTTE DR	YAKIMA	Washington	98901
BJORKLUND	4809 E HILLCREST DR	YAKIMA	Washington	98901
BLACK	PO BOX 1418	RICHLAND	Washington	99352

BLACKBURN	5408 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
BLACKLEDGE	404 KENWARD WAY	YAKIMA	Washington	98901
BLANKENSHIP	5205 TUMAC DR	YAKIMA	Washington	98901
BLYTHE	5200 TUMAC DR	YAKIMA	Washington	98901
BOLLMAN	4959 PEAR BUTTE DR	YAKIMA	Washington	98901
BONNEVILLE	4725 E HILLCREST DR	YAKIMA	Washington	98901
BOS	501 LAURENT LN	HARRAH	Washington	98933
BOTHWELL	603 N 57TH ST	YAKIMA	Washington	98901
BROADFOOT	5407 MY AIX WAY	YAKIMA	Washington	98901
BROWN	5606 MT CLEMENS WAY	YAKIMA	Washington	98901
BULLO	PO BOX 603	YAKIMA	Washington	98907
BURCKHARD	403 TERRACE HILLS DR	YAKIMA	Washington	98901
BURKE	4715 E HILLCREST DR	YAKIMA	Washington	98901
BURKHART	5300 TUMAC DR	YAKIMA	Washington	98901
BURMAN	1908 RHODODENDRON WAY	BELLINGHAM	Washington	98226
BURNHAM	5604 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
BUTTERFIELD	9 W CALIFORNIA ST	UNION GAP	Washington	98903
CAMERON	4501 MAPLE AVE	YAKIMA	Washington	98901
CAMPBELL	5601 CHANNEL DR	YAKIMA	Washington	98901
CAMPBELL	305 TERRACE HILLS DR	YAKIMA	Washington	98901
CANTAMESSA	712 TUMAC DR	YAKIMA	Washington	98901
CARTWRIGHT	5403 CHANNEL DR	YAKIMA	Washington	98901
CASE	5400 PEAR BUTTE DR	YAKIMA	Washington	98901
CHAMBARD	5063 N SKY VISTA AVE	YAKIMA	Washington	98901
CHAMBERS	401 KENWARD WAY	YAKIMA	Washington	98901
CHASTAIN	309 TERRACE HILLS DR	YAKIMA	Washington	98901
CHRISTISON	5203 TUMAC DR	YAKIMA	Washington	98901
CLAASSEN	5305 MOUNT AIX WAY	YAKIMA	Washington	98901
CLARK	2812 SW LADOW AVE	PENDLETON	Oregon	97801
CONNOR	5404 MT AIX WAY	YAKIMA	Washington	98901
COOK	5602 KLOOCHMAN WAY	YAKIMA	Washington	98901
COOK	5071 N SKY VISTA AVE	YAKIMA	Washington	98901
COPELAND	707 TUMAC DR	YAKIMA	Washington	98901
CORRAL	5306 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
CORREA	703 TUMAC DR	YAKIMA	Washington	98901

CRAWFORD	201 W WALNUT ST	YAKIMA	Washington	98902
CREACH	5405 MOUNT AIX WAY	YAKIMA	Washington	98901
CREWS	231 COUGAR LN	YAKIMA	Washington	98901
CRITCHLOW	5603 KLOOCHMAN WAY	YAKIMA	Washington	98901
CRNICK	5501 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
CULLEN	700 TUMAC DR	YAKIMA	Washington	98901
CULP	540 COWIN LN	WAPATO	Washington	98951
CUMMINGS	5301 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
CUMMINGS	5066 N SKY VISTA AVE	YAKIMA	Washington	98901
DAHL	4509 MAPLE AVE	YAKIMA	Washington	98901
DAHL	4511 MAPLE AVE	YAKIMA	Washington	98901
DAILY	5067 N SKY VISTA AVE	YAKIMA	Washington	98901
DAVIS	4964 PEAR BUTTE DR	YAKIMA	Washington	98901
DAVIS	970 TIBBLING RD	SELAH	Washington	98942
DAWSON	5059 PEAR BUTTE DR	YAKIMA	Washington	98901
DEBLASIO VICTOR L & JANE	4941 PEAR BUTTE DR	YAKIMA	Washington	98901
DEVITIS	5505 TUMAC DR	YAKIMA	Washington	98901
DICKSON	107 N 94TH PL	YAKIMA	Washington	98908
DILLEY	4404 N ROZALEE WAY	YAKIMA	Washington	98901
DOTY	5043 N SKY VISTA AVE	YAKIMA	Washington	98901
DOWNER	4705 E HILLCREST DR	YAKIMA	Washington	98901
DRUMMINS	5504 CHANNEL DR	YAKIMA	Washington	98901
DUKES	4317 MAPLE AVE	YAKIMA	Washington	98901
DUKESHIRE	5305 TUMAC DR	YAKIMA	Washington	98901
DYKEMAN	5303 PEAR BUTTE DR	YAKIMA	Washington	98901
EAST VALLEY SCHOOL #90	2002 BEAUDRY RD	YAKIMA	Washington	98901
EDWARDS	6501 TORREY PINES CV	AUSTIN	Texas	78746
EDWARDS	5304 PEAR BUTTE DR	YAKIMA	Washington	98901
ELDER	5406 TUMAC DR	YAKIMA	Washington	98901
ELLIOTT	110 LAREDO LN	YAKIMA	Washington	98901
ELLIOTT	4515 MAPLE AVE	YAKIMA	Washington	98901
ELLIS	4506 E HILLCREST DR	YAKIMA	Washington	98901
ELLIS	106 PANORAMA DR	YAKIMA	Washington	98901
ELLIS	405 CHANNEL DR	YAKIMA	Washington	98901
ENRIQUEZ	4319 MAPLE AVE	YAKIMA	Washington	98901

ESLINGER	315 57TH ST	YAKIMA	Washington	98901
ETCHELLS	4703 HILLCREST DR	YAKIMA	Washington	98901
EVANS	4812 E HILLCREST DR	YAKIMA	Washington	98901
EVANS	5510 KLOOCHMAN WAY	YAKIMA	Washington	98901
FEDERAL NATIONAL MORTAGE ASSOC	% COUNTRYWIDE HOME LOANS INC	VAN NUYS	California	91410
FEIST	4719 E HILLCREST DR	YAKIMA	Washington	98901
FERGUSON	303 BOHOSKEY DR	YAKIMA	Washington	98901
FILCH	1802 W YAKIMA AVE	YAKIMA	Washington	98902
FISHER	4707 MAPLE AVE	YAKIMA	Washington	98901
FISHER	4940 N SKY VISTA AVE	YAKIMA	Washington	98901
FLACHSBART	110 PANORAMA DR	YAKIMA	Washington	98901
FORD	4723 E HILLCREST DR	YAKIMA	Washington	98901
FOWLER	600 N 57TH ST	YAKIMA	Washington	98901
FRAZIER	5305 CHANNEL DR	YAKIMA	Washington	98901
FRENZEL	605 TUMAC DR	YAKIMA	Washington	98901
FRESHWATER	5304 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
FULLER	832 NE 105TH ST	SEATTLE	Washington	98125
GABLE	7514 W YELLOWSTONE	KENNEWICK	Washington	99336
GALBREATH	515 CHANNEL DR	YAKIMA	Washington	98901
GALLIPO	4901 E HILLCREST DR	YAKIMA	Washington	98901
GARCIA	605 N 57TH ST	YAKIMA	Washington	98901
GATLEY	302 N 57 ST	YAKIMA	Washington	98901
GAUSE	602 N 57TH ST	YAKIMA	Washington	98901
GAVIN	6709 S J ST	TACOMA	Washington	98408
GERJETS	4962 PEAR BUTTE DR	YAKIMA	Washington	98901
GETTMAN	5400 TUMAC DR	YAKIMA	Washington	98901
GOELLNER	5050 PEARL ST	YAKIMA	Washington	98901
GRAJEDA	4506 MAPLE AVE	YAKIMA	Washington	98901
GRAJEDA	4504 MAPLE AVE	YAKIMA	Washington	98901
GRANBERG	5306 PEAR BUTTE DR	YAKIMA	Washington	98901
GRIFFIN	2803 W VIOLA AVE	YAKIMA	Washington	98902
HAHN	51 LAREDO LN	YAKIMA	Washington	98901
HAMEL	5302 CHANNEL DR	YAKIMA	Washington	98901
HAMILTON	5301 PEAR BUTTE DR	YAKIMA	Washington	98901
HARLOW	4813 E HILLCREST DR	YAKIMA	Washington	98901

HART	5042 N SKY VISTA AVE	YAKIMA	Washington	98901
HATZENBELER	5009 SYCAMORE DR	YAKIMA	Washington	98901
HAWES	5050 N SKY VISTA AVE	YAKIMA	Washington	98901
HAWK	4956 N SKY VISTA AVE	YAKIMA	Washington	98901
HAY	5501 TUMAC DR	YAKIMA	Washington	98901
HAYES	4966 PEAR BUTTE DR	YAKIMA	Washington	98901
HEIN	8940 MCDONALD RD	WAPATO	Washington	98951
HELMICK	104 PANORAMA DR	YAKIMA	Washington	98901
HENDERSON	112 PANORAMA DR	YAKIMA	Washington	98901
HENDRICKS	308 N 57TH ST	YAKIMA	Washington	98901
HERRERA	608 TUMAC DR	YAKIMA	Washington	98901
HEURION	204 PANORAMA DR	YAKIMA	Washington	98901
HEYEN	608 N 53RD AVE	YAKIMA	Washington	98908
HICKS	301 BOHOSKEY DR	YAKIMA	Washington	98901
HILL	4509 E HILLCREST DR	YAKIMA	Washington	98901
HILZENDEGER	601 N 57TH ST	YAKIMA	Washington	98901
HOCSON	2942 SIMPSON AVE	JUNEAU	Alaska	99801
HOESSMAN	13305 NE 171ST APT K172	WOODINVILLE	Washington	98072
HOLEMAN	5103 N CANYON RD	YAKIMA	Washington	98901
HOOK	5202 MT AIX WAY	YAKIMA	Washington	98901
HOWK	5506 KLOOCHMAN WAY	YAKIMA	Washington	98901
HUBER	4714 MAPLE AVE	YAKIMA	Washington	98901
HUGHES	5403 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
HYATT	5075 N SKY VISTA AVE	YAKIMA	Washington	98901
IDLER	4710 MAPLE AVE	YAKIMA	Washington	98901
ILENSTINE	4907 MAPLE AVE	YAKIMA	Washington	98901
JAQUINS	5406 CHANNEL DR	YAKIMA	Washington	98901
JARVIS	5204 TUMAC DR	YAKIMA	Washington	98901
JENKINS	603 LOCKHART DR	YAKIMA	Washington	98901
JENNINGS	5105 SYCAMORE DR	YAKIMA	Washington	98901
JENSEN	702 N 57TH ST	YAKIMA	Washington	98901
JIMENEZ	5602 CHANNEL DR	YAKIMA	Washington	98901
JOHNSON	5203 N CANYON RD	YAKIMA	Washington	98901
JOLY	5406 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
JUDD	1866 MONTREAL RD	SEVERN	Maryland	21144

KADELL	5055 PEAR BUTTE DR	YAKIMA	Washington	98901
KARNES	610 TUMAC DR	YAKIMA	Washington	98901
KELCH	705 N 57TH ST	YAKIMA	Washington	98901
KELLEY	712 N 57TH ST	YAKIMA	Washington	98901
KENNARD	701 N 57TH ST	YAKIMA	Washington	98901
KERBY	5201 PEAR BUTTE DR	YAKIMA	Washington	98901
KERNS	4401 MAPLE AVE	YAKIMA	Washington	98901
KING	4717 E HILLCREST DR	YAKIMA	Washington	98901
KINMARK	308 TERRACE HILL DR	YAKIMA	Washington	98901
KINNEY	5058 N SKY VISTA AVE	YAKIMA	Washington	98901
KIRKHAM	4703 MAPLE AVE	YAKIMA	Washington	98901
KLOSTER	201 E D ST	YAKIMA	Washington	98901
KLUVER	5602 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
KNOLL	710 TUMAC DR	YAKIMA	Washington	98901
KOMSTADIUS	5038 N SKY VISTA AVE	YAKIMA	Washington	98901
KRACHT	5903 TERRETT DR	YAKIMA	Washington	98901
KRAMER	5202 PEAR BUTTE DR	YAKIMA	Washington	98901
KUNNANZ	5301 N CANYON RD	YAKIMA	Washington	98901
LA FRAMBOISE MARVIN	291 BOKOSKY DR	YAKIMA	Washington	98901
LA PIERRE	4408 N ROZALEE WAY	YAKIMA	Washington	98901
LADWIG	5057 PEAR BUTTE DR	YAKIMA	Washington	98901
LANE	311 N 57TH ST	YAKIMA	Washington	98901
LANE TRUSTEE	5062 PEAR BUTTE	YAKIMA	Washington	98901
LANGHANS	5204 PEAR BUTTE DR	YAKIMA	Washington	98901
LARA	4406 ROZALEE WAY	YAKIMA	Washington	98901
LARSON	703 N 57TH ST	YAKIMA	Washington	98901
LAURENT	321 N 57TH ST	YAKIMA	Washington	98901
LEAVITT	5091 N SKY VISTA AVE	YAKIMA	Washington	98901
LEINGANG	4315 MAPLE AVE	YAKIMA	Washington	98901
LEMBECK	313 N 57TH ST	YAKIMA	Washington	98901
LENTZ	5500 MOUNT AIX WAY	YAKIMA	Washington	98901
LESLIE	5601 KLOOCHMAN WAY	YAKIMA	Washington	98901
LILJA	707 TUMAC DR	YAKIMA	Washington	98901
LILLICH	4701 CLINTON WAY	YAKIMA	Washington	98909
LINKER	711 TUMAC DR	YAKIMA	Washington	98901

LISK	311 TERRACE HILLS DR	YAKIMA	Washington	98901
LOCKETT	5306 CHANNEL DR	YAKIMA	Washington	98901
LOCKEY	5054 PEAR BUTTE DR	YAKIMA	Washington	98901
LOCKWOOD	4026 SW 327TH PL	FEDERAL WAY	Washington	98023
LOETSCHER	5401 PEAR BUTTE DR	YAKIMA	Washington	98901
LONGTON	510 TIPP RD	YAKIMA	Washington	98901
LOTH	5604 KLOOCHMAN WAY	YAKIMA	Washington	98901
LOUK	5007 SYCAMORE DR	YAKIMA	Washington	98901
LOUNSBURY	5103 N SKY VISTA AVE	YAKIMA	Washington	98901
LULOFF	4949 N SKY VISTA AVE	YAKIMA	Washington	98901
LYNCH	1413 S 28TH AVE	YAKIMA	Washington	98902
MABRY	4305 MAPLE AVE	YAKIMA	Washington	98901
MABRY	22 S 1ST ST	YAKIMA	Washington	98901
MACGREGOR	5301 MOUNT AIX WAY	YAKIMA	Washington	98901
MAHONI	5404 MOUNT CLEMENS WAY	YAKIMA	Washington	98901
MALSCH	PO BOX 1203	YAKIMA	Washington	98907
MAREY	203 PANORAMA DR	YAKIMA	Washington	98901
MARQUIS	5305 PEAR BUTTE DR	YAKIMA	Washington	98901
MARTIN	709 N 57TH ST	YAKIMA	Washington	98901
MARTIN	PO BOX 681	YAKIMA	Washington	98907
MARTINEZ	4961 PEAR BUTTE DR	YAKIMA	Washington	98901
MASTERS	5061 PEAR BUTTE DR	YAKIMA	Washington	98901
MAY	4405 N ROZALEE WAY	YAKIMA	Washington	98901
MAYER	5206 PEAR BUTTE DR	YAKIMA	Washington	98901
MAYO	5206 MOUNT AIX WAY	YAKIMA	Washington	98901
MC COY	4953 PEAR BUTTE DR	YAKIMA	Washington	98901
MCCLAMROCK	5087 N SKY VISTA AVE	YAKIMA	Washington	98901
MCKELHEER	402 TERRACE HILLS DR	YAKIMA	Washington	98901
MENARD	407 CHANNEL DR	YAKIMA	Washington	98901
MERCY	PO BOX 50	YAKIMA	Washington	98907
MERCY	5105 ROZA DR	YAKIMA	Washington	98901
MEYER	5406 MOUNT AIX WAY	YAKIMA	Washington	98901
MEYER	5406 MOUNT AIX WAY	YAKIMA	Washington	98901
MILLER	5502 CHANNEL DR	YAKIMA	Washington	98901
MILLER	5059 N SKY VISTA AVE	YAKIMA	Washington	98901

WINTERFELD	5102 N CANYON RD	YAKIMA	Washington	98901
WINTERS	102 GREENWOOD ST	LA GRANDE	Oregon	97850
WITHERS	4903 ROZA HILL DR	YAKIMA	Washington	98901
WOLF	5387 SNOWY MOUNTAIN DR	WINNEMUCCA	Nevada	89445
WONG	5063 PEAR BUTTE DR	YAKIMA	Washington	98901
WOOD	5508 KLOCKMAN WAY	YAKIMA	Washington	98901
WOODALL	515 N 57TH ST	YAKIMA	Washington	98901
WOODS	4505 MAPLE AVE	YAKIMA	Washington	98901
WORKMAN	517 N 57TH ST	YAKIMA	Washington	98901
WUESTE	5506 MOUNT AIX WAY	YAKIMA	Washington	98901
YAKIMA CITY	129 N 2ND ST	YAKIMA	Washington	98901
YAKIMA COUNTY OF	128 N 2ND ST	YAKIMA	Washington	98901
YAKIMA RANCHES LTD	PO BOX 1512	YAKIMA	Washington	98907
YANEZ	1116 S 19TH AVE # B	YAKIMA	Washington	98902
YOUNG	4807 E HILLCREST DR	YAKIMA	Washington	98901
ZERR	1217 S 15TH AVE	YAKIMA	Washington	98902

APPENDIX L

EMERGENCY RESPONSE PROCEDURES

APPENDIX 1 TO ANNEX Z-7.88

INCIDENT COMMAND JURISDICTIONS

I. PURPOSE

The following jurisdictions have assumed the responsibility of appointing an Incident Commander for a hazardous material incident.

Jurisdiction	Incident Command Agency
Grandview	Fire Department
Granger	Fire Department
Harrah	YCFPD #5
Mabton	Fire Department
Moxee	YSO
Naches	YCFPD #3
Selah	Fire Department
Sunnyside	Fire Department
Tieton	Fire Department
Toppenish	Fire Department
Union Gap	Fire Department
Wapato	Fire Department
Yakima	Fire Department
Zillah	Fire Department
Yakima Fire Protection Districts:	
# 1 Tieton/Cowiche	YCFPD #1
# 2 Selah	YCFPD #2
# 3 Naches	YCFPD #3
# 4 Terrace Hgts/Moxee	YSO
# 5 Lower Valley	YCFPD #5
# 7 Horse Heavens	YSO
# 9 Naches Hgts.	YSO
# 10 Fruitvale	YCFPD #10
# 11 Broadway	YCFPD #11
# 12 West Valley	YCFPD #12
# 13 Fairview	WSP
# 14 Nile	YSO
State & Federal Arterials	WSP

YCFPD = Yakima County Fire Protection District
YSO = Yakima County Sheriff's Office
WSP = Washington State Patrol

The response levels of a HAZMAT incident are described as follows:

Response Level	Description	Response Activities National Response Center*
I. Potential Emergency Condition	An incident which can be controlled by the first response agencies and does not require evacuation of other than the involved structure and/or the immediate outdoor area. The incident is confined to a small area and does not pose an immediate threat to life or property.	Fire Department Medical Control Facility Law Enforcement CHEMTREC
II. Limited Emergency Condition	An incident involving a greater hazard and/or larger area which poses a potential threat to life or property and which may require a limited evacuation of the surrounding area.	Agencies in Level I Public Works Health Department Red Cross County Office of Emergency Mgt. State Patrol State Department of Ecology Public Utilities
III. Full	An incident involving a severe hazard and/or a large area which poses an extreme threat to life and property and will probably require a large-scale evacuation; or an incident requiring the expertise or resources of county, state, federal, or private agencies.	Level I and II Agencies plus the following as needed: Mutual Aid Fire, Police, Emergency Medical Facilities State Emergency Management Agency State Departments of Environment and/or Health Resources.

*As required by law based on incident.

EMERGENCY RESPONSE NOTIFICATION CHART

HAZARDOUS MATERIALS

Type of Incident/
Notification Process

A. Spill requiring evacuation
1, 2, 3, 4, 5, 7, 12
** 14, 17, 15, 16

B. Spill to water, streams lakes, ponds, etc.
1, 2, 3, 5
** 14, 15, 16

C. Spill to air
1, 2, 3, 7, 5
** 14, 4, 15

D. Spill to land
1, 2, 3, 4, 5, 7
** 14, 15, 16

E. Spill to sewer
1, 2, 4, 3, 5
** 14, 15, 16

F. Spill to roadway/freeway
1, 2, 3, 5, 9, 8,
** 14, 15, 16

G. Fire/Explosion potential
1, 2, 3, 4, 5, 7, 8
** 14, 15, 16

H. Pesticide spill
1, 2, 3, 5
** 14, 15, 16

I. Radioactive spill
1, 2, 3, 4, 5
** 14, 15

J. Spill to water supply
1, 2, 3, 4, 5, 7
** 14, 15, 16

K. Chlorine/other Gases
1, 2, 3, 4, 5, 7, 8
11, 12 ** 14,15,16

L. Railroad
1, 2, 10, 3, 4, 11, 12
** 14, 15, 16

Local Contacts

1) Fire - jurisdiction
2) Law Enf. - jurisdiction
3) Emergency Management - County
4) Public Works - jurisdiction
5) Public Health Dept.
6) Clean Air Authority
7) Medical Control Facility
8) Yakima City Transit
9) Washington State Patrol
10) Washington Central Railroad
11) Chemtrec - when required
12) National Response Center
13) National Weather Service-Yak.
** Emergency Management to contact the following agencies:
14) Mayor/County Executive
15) Div of Emerg Mgt - State
16) Department of Ecology (DOE)
17) Red Cross/Salvation Army
18) Emergency Broadcast System

** NOTE: - If phone call or pager call to Emergency Management fails, YSO Dispatcher will notify Emergency Management agencies.

REFERENCE:

		Emergency	Administrative
1)	FIRE SERVICE:		
	A. Grandview	882-2000	882-2310
	B. Sunnyside	837-5000	837-3999
	C. Toppenish	865-3122	865-3111
	D. Wapato	877-4141	877-3161
	E. Yakima (Upper Valley)	248-2100	248-2103
2)	LAW ENFORCEMENT:		
	A. Yakima County Sheriff	248-3530	
	B. Appropriate jurisdiction		
3)	Yakima County Emergency Management	575-4051 (pager 515)	
4)	Public Works	Appropriate jurisdiction	
5)	Public Health Department	575-4040	
6)	Clean Air Authority	575-4116	
7)	MEDICAL CONTROL FACILITY:		
	A. St. Elizabeth's	575-5060	
	B. Yakima Memorial	575-8100	
8)	Yakima City Transit	575-6175	
9)	Washington State Patrol	575-2323	
10)	Washington Central Railroad	453-9166	
11)	CHEMTREC	1-800-424-9300	
12)	National Response Center	1-800-424-8802	
13)	National Weather Service - Yakima	575-5826	

****

The Office of Emergency Management will notify the following agencies:

NOTE: Should the Office of Emergency Management not be reached, the Sheriff Dispatch will make the appropriate callout.

15)	Chief Elected Official	Appropriate jurisdiction
16)	State Emergency Management	0800-1700 hours * 1-800 562-6108 1700-0800 hours * 1-800-262-5990
17)	Department of Ecology	575-2490
18)	Yakima Red Cross	457-1690
18)	Emergency Broadcast System	248-1460 (KMWX)

HAZMAT Accident Notification Form

1. Date: _____ Time of Notification: _____

2. Name of person receiving call: _____

3. Name and telephone number of on-scene contact: _____

_____

4. Location: _____

5. Nature of emergency and material (media into which release occurred, e.g., leak, explosion, spill, fire, derailment):

_____

_____

_____

6. Time of release: _____

_____

_____

7. Possible health effects/medical emergency information: _____

_____

_____

a. Precautions to take: _____

_____

b. Evacuation/Protective Shelter Recommendation: _____

_____

8. Number of injured or dead: _____

_____

9. Nearby population: _____

_____

_____

10. Name of material(s) released; if known: _____

_____

_____

a. Manifest/shipping invoice/billing label: _____

_____

b. Shipper/manufacturer identification: _____

_____

c. Container type: _____

_____

d. Rail car/truck 4-digit identification numbers: _____

_____

e. Placard/label information: _____

_____

11. Characteristics of material (e.g., color, small, etc.): _____

_____

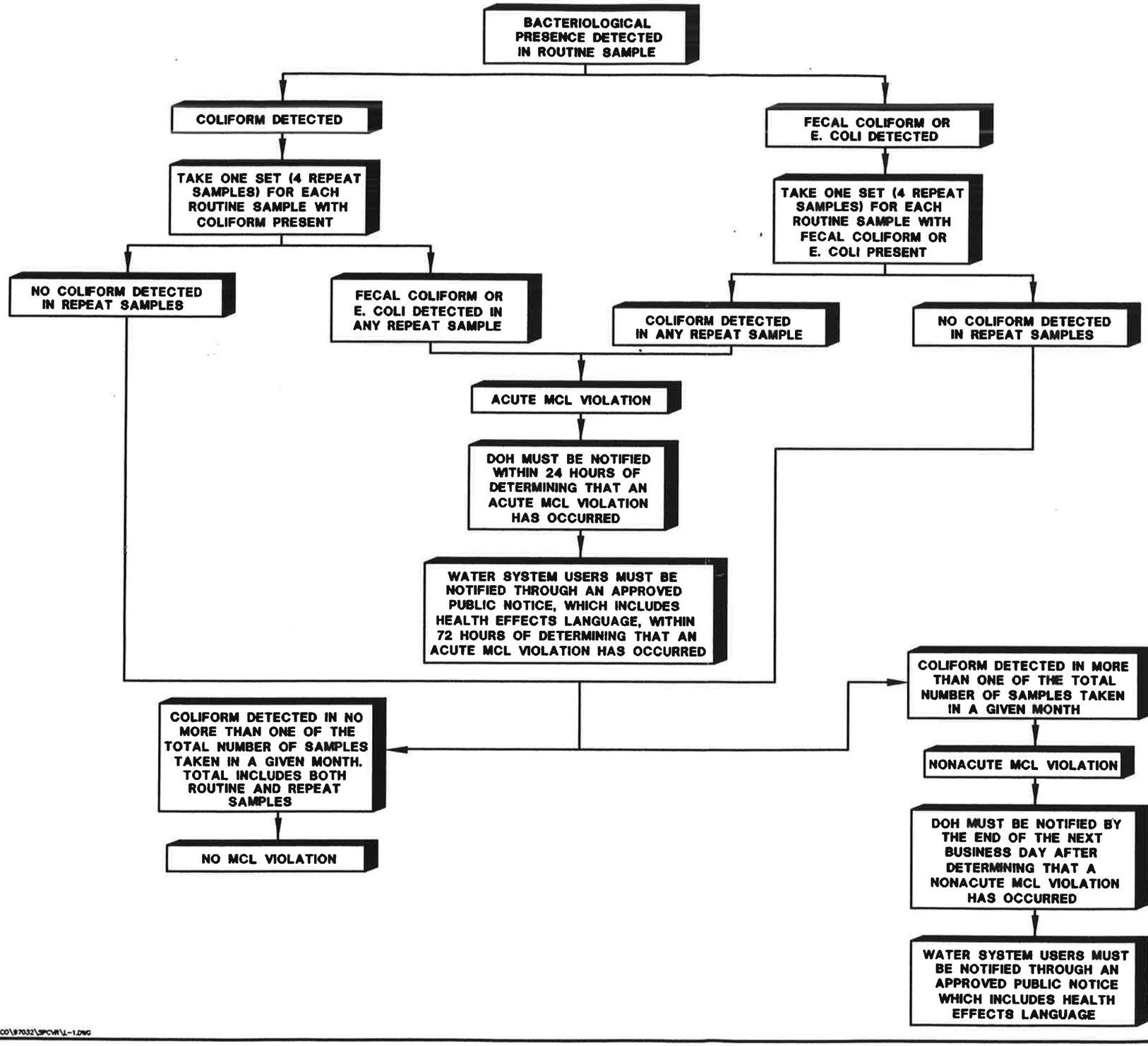
_____

12. Present status of material (e.g., gas, liquid): _____

13. Amount and speed of release: _____

14. Weather conditions: _____

_____



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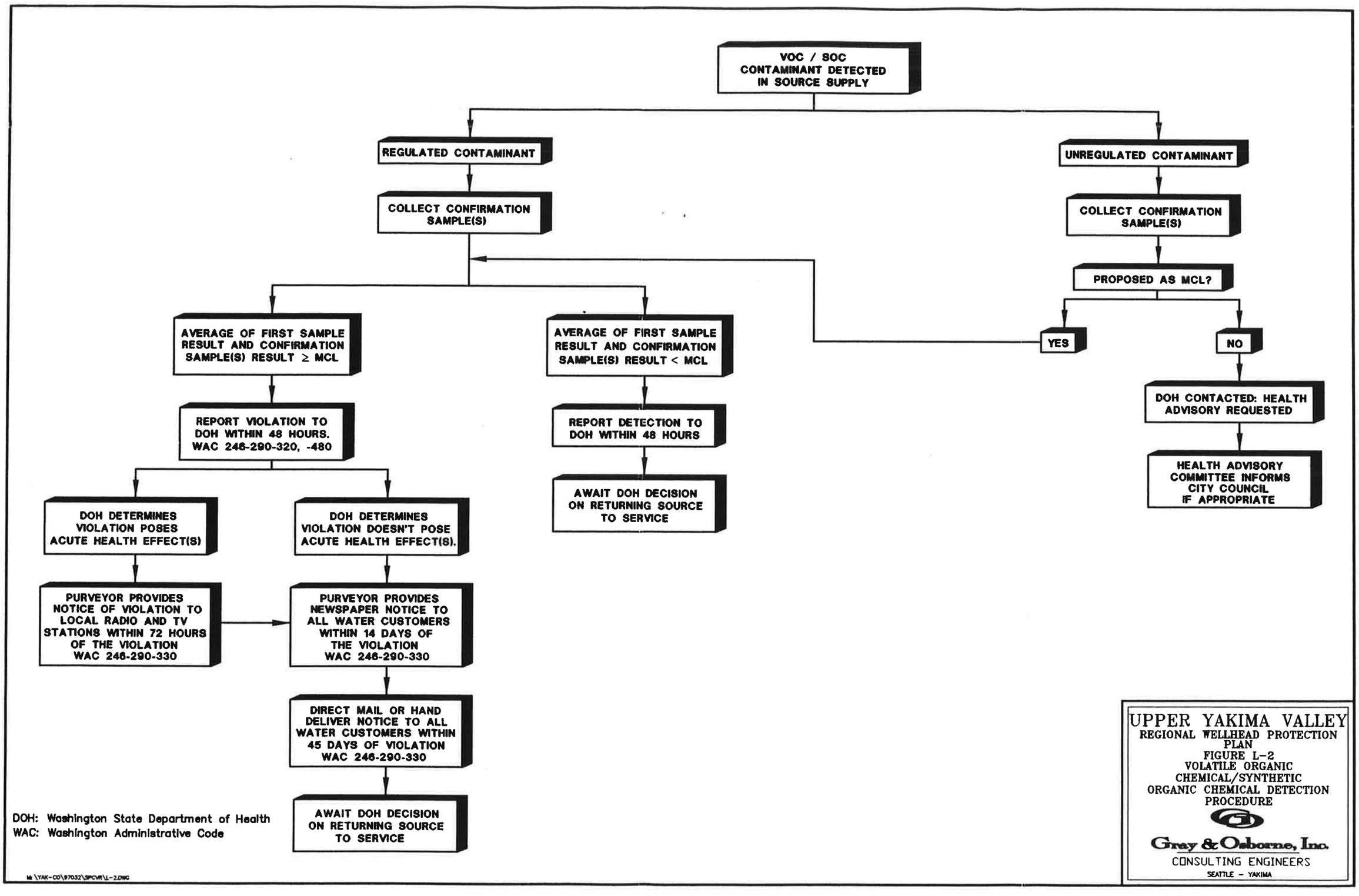
UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN
FIGURE L-1
BACTERIOLOGICAL PRESENCE DETECTION PROCEDURE

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE - YAKIMA

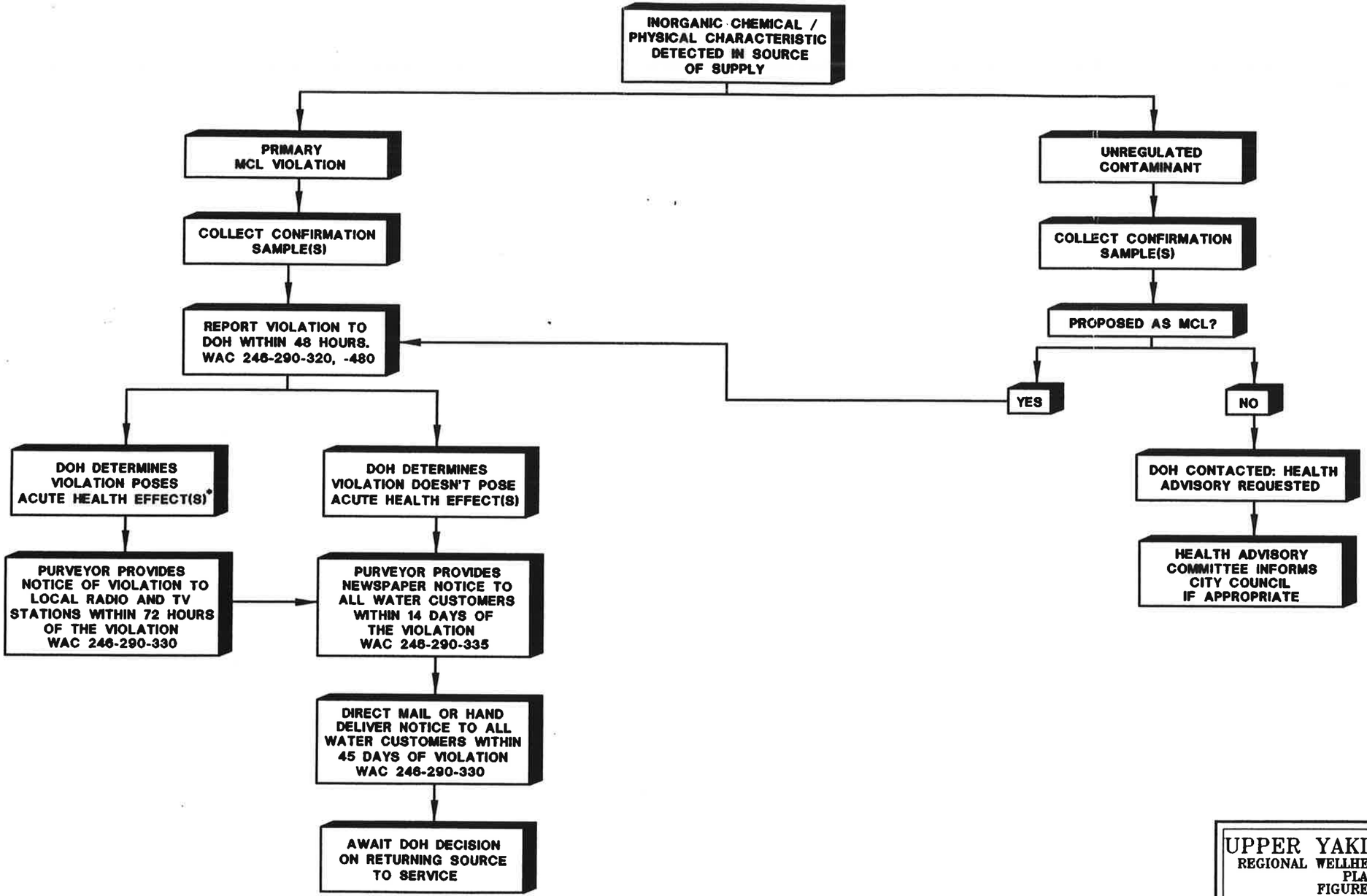


DOH: Washington State Department of Health
WAC: Washington Administrative Code

M: \YAK-CO\97032\SPCWP\L-2.DWG

UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN
FIGURE L-2
VOLATILE ORGANIC CHEMICAL/SYNTHETIC ORGANIC CHEMICAL DETECTION PROCEDURE

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE – YAKIMA



*A VIOLATION OF THE 10.0 MG/L NITRATE MCL CONSTITUTES AN ACUTE HEALTH EFFECT CONCERN.

M:\YAK-CO\97032\SPCWR\L-3.DWG

UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN
FIGURE L-3
INORGANIC CHEMICAL/PHYSICAL CHARACTERISTIC DETECTION PROCEDURE

Gray & Osborne, Inc.
CONSULTING ENGINEERS
SEATTLE - YAKIMA

APPENDIX M

YAKIMA COUNTY PUBLIC WORKS RECYCLING LITERATURE

Everyone uses hazardous chemical products

Most likely you have products in your home that are hazardous to human health or the environment. Items such as disinfectants, degreasers, pesticides, paints, toilet cleaners, turpentine, motor oil and antifreeze contain chemicals that when used improperly are poisonous, can burn skin and eyes and cause respiratory problems.

Hazardous products become hazardous waste

Household products can also be harmful when disposed of improperly. Reports of sanitation workers being injured by hazardous materials being thrown in the trash or dumped down the drain are not uncommon.

These wastes can damage the environment, too. Pesticides, motor oil or paint thinner rinsed down storm drains go directly into our lakes and rivers without treatment. They can harm water quality and wildlife. Hazardous wastes thrown in the trash end up at landfills where chemicals may seep into groundwater. Washed down the sink they can disturb septic tanks or pass through sewage treatment systems into area waters. Poured on the ground they can leach through the soil into groundwater that ultimately empties into streams, rivers and lakes.

What you can do

Careless or excessive use of hazardous household products and their unsafe disposal can cause environmental problems. The cost of cleaning up our waters once polluted with these wastes is astronomical. Control must begin with each of us. We all are responsible for keeping our lands and waters clean and safe. We don't have to stop using chemical products, but we must use them safely and dispose of them properly.

General tips

- Always read labels carefully before buying and using hazardous products. Be aware of their uses and dangers. If directions are unclear, contact the manufacturer or dealer before using.
- Buy the least toxic products available. Look for "non-toxic" on the label.
- Buy only what you need. Then you won't have to dispose of any excess material.
- Keep unused products in their original containers. Always preserve labels for directions to follow and a list of contents for reference in the case of accidental poisonings. Store in a safe place that is inaccessible to children or pets.
- Use only what is needed. Twice as much does not mean twice the results. Follow directions.
- Avoid mixing different products. That can cause explosive or poisonous chemical reactions.
- Always use hazardous products in well ventilated areas. Wear protective gloves or respirators when ever warranted. Many hazardous products have dangerous fumes that can burn your skin or irritate your eyes, nose and throat.
- Keep the Washington Poison Center, twenty four hour emergency hot line number handy in case of actual or suspected poisonings. 1-800-732-6985.

How to prepare your waste for transportation

1. Bring your household hazardous wastes in their original containers. If you use different containers, clearly label them. Use only containers that you can part with.
2. Keep containers from tipping or leaking while transporting your wastes to the facility. Pack newspaper around the bottles and place the bottles in a box or container. If the container is leaking, enclose it in another compatible container.
3. Keep all waste material out of the passenger compartments of your vehicle and away from children and pets.
4. Do not mix different types of household wastes in the same container.

Waste not accepted

Some types of waste cannot be accepted at this facility. Please do not bring non-hazardous household waste, radioactive waste, fluorescent tubes, empty containers, medical waste, road flares, explosives, ammunition, or asbestos.

Household Hazardous Waste Turn-in Schedules

Lower Valley Transfer Station. 9am-5pm 2nd Sat. in March, June & Oct.
(formerly Snipes Mt. Landfill)

Cheyne Landfill. ..... 9am-5pm 3rd Sat. in March, June & October

Household and Small Business Waste Collection Facility. ... Open: Wednesday, Thursday, and Friday, 7:30am - 5:00pm and Saturdays 9:00am -5:00pm
(Terrace Heights Landfill)

"No Charge For This Disposal Service"

A GUIDE TO DISPOSAL OF HOUSEHOLD HAZARDOUS WASTES

For more information contact:

Yakima County Public Works Department,
Solid Waste Division,
105 East "A" Street, Yakima WA 98901
Call (509) 574-2450 or
1-800-572-7354, Ext 2450

All of the following products may be disposed of at the Household and Small Business Waste Collection Facility or the Household Hazardous Waste turn ins.

	Products	Hazard	Proper Disposal
Pesticides	Weed killer, insecticides, slug bait, rose dust, mothballs, flea and roach powder, etc.	Poisonous	If products are currently registered, use up according to label directions. If you don't need, or the pesticides have been banned or restricted as to use, refer to dates and sites on other side for disposal.
	Wood preservatives	Poisonous & flammable	Dispose of just as you would pesticides. Wood preservatives containing pentachlorophenol and creosote are now banned from sale.
	Empty pesticide containers	Poisonous residues	Triple-rinse containers using rinse water as part of your spray application. Wrap empty container in newspaper or other appropriate manner and dispose of with your trash. **Remember!** If in doubt, please refer to the product label for use and disposal.
Paint Products	Oil-base paints	Flammable	Oil base paints contain lead, chromium and other heavy metals. Use up according to label directions or offer unused portions to others who can use them.
	Paint thinner, rust remover, turpentine, furniture stripper, other solvents.	Flammable	Use up according to label directions or offer unused portions to others who can use them. Reuse paint thinner by letting the contaminants (paint particles) settle out. Strain off the clear liquid for reuse.
Automotive Products	Waste motor oil and gasoline	Poisonous & flammable	Waste oil can be re-refined into motor oil or used to make fuel for large industries. It should always be recycled. Drain waste oil into a container with a tight fitting lid, take it to a used oil collection station for recycling. Call 574-2450 for a list of the collection station or business nearest you. Wrap empty oil cans and used oil filters in newspaper and discard in the trash.
	Antifreeze, and brake fluid	Poisonous & flammable	Antifreeze is very poisonous to animals. They are attracted by the sweet taste and smell. **DO NOT** pour into your septic tank system. Antifreeze can be recycled.
	Car batteries	Corrosive (acid)	Leave the old battery with your dealer at time of purchase or call 574-2470 for the location of the nearest battery recycler.
Cleaners	Drain openers, oven and toilet bowl cleaners, bleach	Corrosive & poisonous	Use remaining products according to label directions. Give unused portion to neighbors who can use them. Rinse containers three times and pour down the drain. Refer to the label for proper use and disposal if in doubt.
	Furniture polish, spot removers	Flammable	Carbon Tetrachloride is found in many old spot removers. Please do not use it is a known carcinogen.
Miscellaneous	Out-dated medicines. Hobby chemicals from crafts, photography, lab sets, etc.	Varies	Please refer to dates and sites on other side for disposal.
	Pool chemicals	Corrosive & poisonous	Use up according to label directions or offer unused portions to others who can use them.

Key to hazardous effects

Poisonous — Acutely toxic. Poisons can cause severe illness or death if ingested. Many can be absorbed directly through the skin or respiratory system.

Flammable — Many flammable products contain petroleum distillates or other solvents that are skin, eye and respiratory irritants. Can be fatal if ingested. Many are volatile, emit harmful vapors, and should be used only with proper ventilation.

Corrosive — Any extremely acid or alkaline product is corrosive. They can cause severe burns on contact, vapors can burn eyes and mucous membranes, and they are very poisonous if ingested.

Carcinogenic — Cancer - causing.

RECYCLING AT THE COUNTY LANDFILLS

In response to increased public interest in recycling and aggressive State and County waste diversion goals, Yakima County will be offering recycling opportunities at the Terrace Heights and Cheyne landfills and the Lower Valley Transfer Station.

ALUMINUM CANS

- Empty contents, rinse
- No aerosol spray cans

NEWSPAPER

- Includes anything that comes with a newspaper, such as advertisements.
- Do not tie with string or place in plastic bags. Leave loose in recycling container.
- NO plastic bags; brown paper sacks are okay.

MOTOR OIL

- At home, drain your oil and pour it into a sealable, reusable container. *(You may wish to use a plastic milk jug or a purchased automotive oil recycling container).*
- Never mix used oil with antifreeze, engine degreasers, gasoline, paint thinner, solvents or cooking oil.
- At the recycling station, you will be asked to sign a statement indicating the amount of oil you are recycling and verifying the oil you are bringing is clean, uncontaminated household oil.
- Pour your oil into the recycling tank and take your container with you to re-use the next time you change your oil.

MAGAZINES

- Keep dry; includes slick catalogs
- NO Junk Mail

HOW TO PREPARE YOUR RECYCLABLES

CLEAR GLASS BOTTLES & JARS

- Empty and rinse out all food
- Remove all lids — lids can be placed with tinned food and beverage cans.
- Leaving labels on is okay
- NO drinking glasses or window glass or "pyrex"
- NO light bulbs

PLASTIC MILK JUGS - HDPE #2

- Empty and rinse out
- REMOVE lids
- Flatten to save space
- NO motor oil containers
- NO colored plastics of any kind

(look for the recycling symbol on the bottom of the container)

CARDBOARD - CORRUGATED ONLY

- Flatten your boxes for better storage
- NO waxed or oil coated cardboard such as milk cartons.
- NO cereal or shoe boxes

PLASTIC POP BOTTLES – PET #1

- REMOVE caps and rings
- Empty and rinse out
- Flatten to save space
- NO motor oil containers

(look for the recycling symbol on the bottom of the container)

TIN FOOD & BEVERAGE CANS/STEEL CANS

- Empty and rinse out all food
- Remove paper labels
- Flatten cans to save space

Yakima County landfills and transfer station will accept the following residential/non-commercial materials for recycling:

- Cardboard (corrugated)
- Newspaper
- Magazines
- Household Batteries
- Non-Ferrous Metals
- Clear glass
- Aluminum Cans
- Plastic Pop Bottles, #1 PET
- Clean Yard Wood Debris * (charge)
- Plastic Milk Jugs #2 HDPE
- Steel/Tinned Cans
- Appliances * (charge)
- Motor Oil
- Ferrous Metals

RESIDENTIAL, NON-COMMERCIAL RECYCLABLES THAT ARE CLEAN AND SEPARATE, NO CONTAMINATION OR GARBAGE OF ANY KIND, WILL BE ACCEPTED FREE OF CHARGE. CLEAN YARD AND WOOD DEBRIS AND APPLIANCES WILL BE ACCEPTED AS A RECYCLABLE, HOWEVER THERE WILL BE A CHARGE.

A GUIDE TO YAKIMA COUNTY'S SOLID WASTE DISPOSAL FACILITIES and *Expanded Recycling Opportunities*

Yakima County Public Works Department
Solid Waste Division
105 East "A" Street
Yakima, Washington 98901
(509) 574-2450

LANDFILL HOURS

TERRACE HEIGHTS LANDFILL
7601 Roza Hill Drive

7:00 am - 5:00 pm Monday thru Fridays
9:00 am - 5:00 pm Saturdays
9:00 am - 5:00 pm Sundays
(March thru October)
12 noon - 5:00 pm Sundays
(November thru February)

LOWER VALLEY TRANSFER STATION
1150 Luther Road
and
CHEYNE LANDFILL
4970 Cheyne Road

Monday thru Saturday
9:00 am - 5:00 pm
Sundays
12:00 noon - 5:00 pm

DROP BOX HOURS

All seven (7) sites open 24 hours a day, every day, EXCEPT, closed at 5:00 pm the day before, and open by 10:00 am the following day for each of the following Holidays:

New Years Day	Easter Sunday
Memorial Day	Independence Day
Labor Day	Thanksgiving
	Christmas

NOTE: All landfills closed the same Holidays listed for Drop Boxes

NEW PROGRAM!!

Yakima County residents can dispose of Household Hazardous Materials at the NEW HOUSEHOLD AND SMALL BUSINESS WASTE COLLECTION FACILITY.

Located at the Terrace Heights Landfill.

Hours: Wednesday, Thursday, and Friday,
7:30 am - 5:00 pm
Saturday
9:00 am. - 5:00 pm
(509) 574-2472

*Small Quantities
*No Containers over 5 Gallon Size

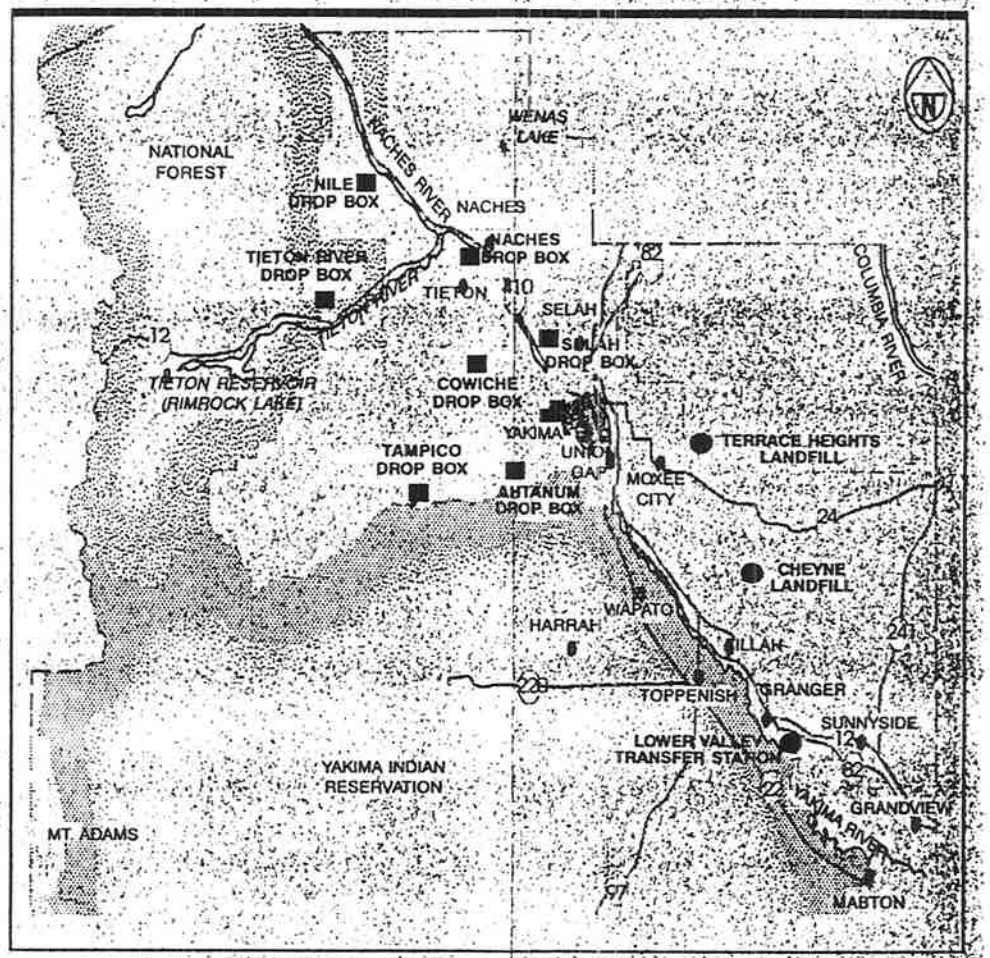
We cannot accept Agricultural Wastes
(Small Business Waste Accepted by Appointment Only)

DROP BOX FACILITY LOCATIONS

Tieton River: *29323 Hwy. 12, 2 miles west of Trout Lodge*
Selah: *1991 Speyers Rd.*
Naches: *41 Lewis Rd.*
Nile: *511 Nile Rd. 1 mile west of Woodshed Inn on Nile Loop Rd.*
Ahtanum: *2001 S. 64th Ave.*
Cowiche: *41 Cowiche Dump Rd.*
Tampico: *22700 Ahtanum Rd.*

● Landfill / Transfer Station

■ Drop Box



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RECYCLE USED OIL
YAKIMA COUNTY OIL RECYCLING SITES

For Further Information
contact the
Yakima County Public Works Department
Solid Waste Division at 574-2450

COWICHE
Sunset Auto Body and Glass 41 Sunset Way
Hours: Monday - Friday: 9:00 a.m. - 5:30 p.m.
Saturday - Sunday: Closed
678-4351

GLEED
Suntides Market 11 Pence Road
Hours: Monday - Friday: 6:00 a.m. - 9:00 p.m.
Saturday: 6:00 a.m. - 9:00 p.m.
Sunday: 6:00 a.m. - 9:00 p.m.
965-2775

GRANDVIEW
Bleyhl Farm Services 119 East Main
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - Noon
Sunday: Closed
800-676-4450

GRANGER
Bleyhl Farm Services 100 Bailey Avenue
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - Noon
Sunday: Closed
854-1144

HARRAH
Harold's Merchandise
4 South Main
848-2282

MOXEE
City Maintenance Plant 7412 Postma Rd
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday - Sunday: Closed
575-8853

MABTON
Mabton Family Grocery 330 North Street
Hours: Monday - Saturday: 7:30 a.m. - 8:00 p.m.
Sunday: 8:00 a.m. - 8:00 p.m.
894-4432

NACHES
Gary's Auto Parts 9881 Highway 12
Hours: Monday - Friday: 7:00 a.m. - 6:00 p.m.
Saturday: 8:00 a.m. - 5:00 p.m.
Sunday: 8:00 a.m. - 4:00 p.m.
653-2307

SELAH
Napa Auto Store 261 S. 1st. Street
Hours: Monday - Friday: 8:00 a.m. - 7:00 p.m.
Saturday: 8:00 a.m. - 6:00 p.m.
Sunday: 9:00 a.m. - 4:00 p.m.
697-7241

SUNNYSIDE
Bleyhl Farm Services 1720 Eastway Road
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - Noon
Sunday: Closed
837-5755

Schuck's Auto Works 2100 E. Edison
Hours: Monday - Friday: 8:00 a.m. - 9:00 p.m.
Saturday: 8:00 a.m. - 8:00 p.m.
Sunday: 9:00 a.m. - 6:00 p.m.
839-0393

Some Other Things To Consider..

- Watch for, and fix automotive fluid leaks
- Make safety a priority and avoid prolonged exposure to all automotive products.
- Put used auto fluids in well sealed and labelled plastic jugs to transport to the recycling site.
- Other automotive products (i.e. antifreeze, brake fluid, carb cleaners) can be taken to the County Landfills on the Household Hazardous Waste Turn-In Days.

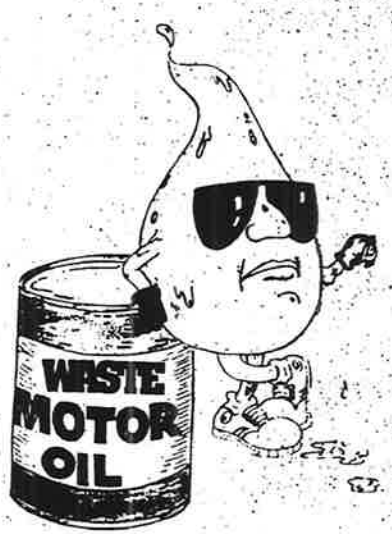
NOTE: If you think your oil may be contaminated or you have used oil from your business to dispose of, we can help you. Please call 574-2450 for more disposal options.

For Further Information
contact the
Waste Management and Recycling
Hotline at 1-800-453-8007
or
Yakima County Public Works Department
Solid Waste Division at 574-2450

printed on recycled paper

Old Slick Says

Recycle Used Oil



and Practice Pollution Prevention

TOPPENISH

Bleyhl Farm Services 205 Asotin Avenue
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - Noon
Sunday: Closed
865-4641

UNION GAP

Coco's Convenience Store 16th & Lower Ahtanum Rd
Hours: Monday - Friday: 5:00 a.m. - 10:00 p.m.
Saturday - Sunday: 6:00 a.m. - Midnight
575-1847

WAPATO

Kile's Korner Convenience Store Wapato Rd & Lateral A
Hours: Monday - Saturday: 6:00 a.m. - 10:00 p.m.
Sunday: Closed
877-4632

Topp Auto Parts 717 West First
Hours: Monday - Saturday: 8:00 a.m. - 6:00 p.m.
Sunday: Closed
877-2896

YAKIMA

Cenex 1st and Washington
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - 5:00 p.m.
Sunday: 9:00 a.m. - 6:00 p.m.
457-5380

Shucks Auto Works 1216 South 1st Street
Hours: Monday - Friday: 8:00 a.m. - 9:00 p.m.
Saturday: 8:00 a.m. - 8:00 p.m.
Sunday: 9:00 a.m. - 6:00 p.m.
457-0336

Steins Pro Hardware Home Center 7200 West Nob Hill Blvd.
Hours: Monday - Friday: 8:00 a.m. - 7:00 p.m.
Saturday: 8:00 a.m. - 6:00 p.m.
Sunday: 9:00 a.m. - 5:00 p.m.
965-2622

Yakima Battery and Auto Electric Inc. 3402 Fruitvale Blvd.
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday - Sunday: Closed
452-6031

ZILLAH

Bleyhl Farm Services 1404 1st Avenue
Hours: Monday - Friday: 8:00 a.m. - 5:00 p.m.
Saturday: 8:00 a.m. - Noon
Sunday: Closed
829-6922

...OR TAKE YOUR USED OIL TO THE LANDFILL NEAREST YOU

TERRACE HEIGHTS LANDFILL 7601 Roza Hill Dr, Yakima
Hours: Monday - Friday: 7:00 a.m. - 5:00 p.m.
Saturday: 9:00 a.m. - 5:00 p.m.
Sunday: 9:00 a.m. - 5:00 p.m.
(March - October)
Sunday: 12 Noon - 5:00 p.m.
(November - February)

CHEYNE LANDFILL 4970 Cheyne Rd, Zillah
Hours: Monday - Saturday: 9:00 a.m. - 5:00 p.m.
Sunday: 12 Noon - 5:00 p.m.

LOWER VALLEY TRANSFER STATION
1150 Luther Rd, Granger
Hours: Monday - Saturday: 9:00 a.m. - 5:00 p.m.
Sunday: 12:00 noon - 5:00 p.m.

What Is The Problem?

Many of us are concerned when a super tanker has an oil spill. Few of us realize the importance of our own waste management practices. It is estimated that 60% of automotive oil changes today are performed by do-it-yourselfers. In Yakima County, that amounts to over 20,000 gallons of used oil per month! Just one quart of oil will foul the taste of 250,000 gallons of water!

During engine use, oil picks up toxic contaminants, carcinogens and heavy metals (lead, zinc, arsenic, chromium and cadmium). If used oil is not properly recycled, these toxics are carried into the environment and can disrupt decomposition in septic systems; as well as contaminate the soil and water.

Proper disposal of oil includes taking it to one of Yakima County's collection sites. It is against the law to dump oil on the ground or into surface waters of Washington. Our goal is to recycle and re-refine **all** oil collected through this program.

What Can You Do?

- Recycle your used oil
- Buy Refined Oil and *"Buy American"*

How?

1. Save your plastic milk jugs, and lids, or other sealable, reusable containers. You may want to try the special reusable containers available at some auto stores.
2. Drain your oil and pour it into the sealable, reusable containers you have saved.
3. **Keep The Oil Pure.** Caution, never mix used oil with antifreeze, engine degreasers, gasoline, paint thinner, solvents, and cooking oil. These non-motor oil substances interfere with the reprocessing and re-refining processes. One bad jug of contaminated oil can ruin all the oil in the collection tank.
4. Take your clean uncontaminated oil to one of the recycling stations listed on this flyer.
5. Upon arrival at the recycling station you will be asked to sign a statement indicating the amount of oil you are recycling and verifying the oil you are bringing is clean, uncontaminated household oil. Oil from businesses cannot be accepted at these sites.
6. Pour your oil into the recycling tank and take your container with you to re-use the next time you change your oil.
7. **CLOSE THE LOOP.** The only way to close the recycling loop is to purchase recycled products. By using and requesting re-refined oil, you'll be taking the final step in the cycle.

Washington State Law declares that it is the policy of the state to promote the collection and recycling of used oil (Chapter 12.114, RCW). But because of variable market conditions, it can be difficult to find a used oil recycling station in some parts of the state. It is unlawful to spill oil into the ground water or surface waterways of Washington (Chapter 90.48, RCW), so used oil should be disposed of properly to protect the environment.

APPENDIX N

WHPA NOTIFICATIONS

APPENDIX N

WHPA NOTIFICATIONS

The wellhead protection notification requirements described in WAC 246-290-135 require:

- documentation of purveyor's notification of all owners/operators of potential sources of ground water contamination within the WHPA boundaries; and
- documentation of purveyor's notification to regulatory agencies and local governments of the boundaries of the WHPAs and the finding of the WHPA inventory

Notifications consistent with these requirements are presented in this document with the exception of site addresses of inventory contaminant sites, which the RWPC is unable to provide at this time. The Yakima County Assessor's office is responsible for developing site addresses for all properties in Yakima County. This database is incomplete and in some cases the addresses are not in the format required for mailing. Yakima County has included property owner notifications in this report, which is based on Assessor's data used for property taxes. Yakima County will include property site notifications in the first biennial update after this data becomes available. Additionally, the DOE databases for the point source contaminant sources do not always include both a property owner and site address; rather, a contact address is provided that may or may not be located at the site, but to whom all correspondence should be addresses. Yakima County has included notification of appropriate contacts as part of this report and will include further notification in subsequent biennial updates if additional information becomes available.

In this appendix, the following documents are provided in accordance with the requirements of WAC 246-290-135:

- a sample notification letter sent to all property owners within the WHPAs
- a sample notification letter sent to all businesses within the WHPAs identified in the potential contaminant source inventory
- the notification letter sent to the Washington State Department of Health
- the notification letter sent to the Washington State Department of Ecology
- the notification letter sent to Yakima County Local Emergency Planning Committee
- the notification letter sent to Yakima County Health District

Note: The notification list is the same as the potential contaminant list provided in Appendix K and has not been duplicated in this appendix.

July 1, 1999

Dear Property Owner or Resident:

The Regional Wellhead Protection Committee (RWPC) was formed by eight water purveyors in the Upper Yakima Valley in 1996 under the leadership of Yakima County in response to Washington State Department of Health (DOH) wellhead protection planning requirements. The RWPC and the County are taking a proactive approach to wellhead protection planning to ensure that each community's groundwater supplies are adequately protected from potential contamination sources on the ground surface. The purpose of this letter is to notify you of your location within the County's wellhead protection area and provide you with information on how you can help protect the County's drinking water supplies.

Wellhead protection planning includes the following four elements:

- development of wellhead protection areas, or areas which may be susceptible to contamination
- identification of potential contamination sources, which include septic tanks, underground storage tanks, abandoned wells, and certain businesses
- coordination of management efforts to help minimize the impact of potential contamination sources, including posting of signs, distribution of literature, and public education efforts
- development of contingency planning to ensure that prompt response procedures are in place in the event that a well becomes contaminated

The RWPC and the County understand that most homeowners recognize the need to protect the environment in and around their residence. We hope that informing you of your location within the County's wellhead protection area will result in an increase in precautions to ensure your activities do not adversely impact our drinking water supply. The following practices can be greatly reduce the threat of contamination to groundwater supplies:

- Recycle all household cleaners, paint thinner, motor oil, pesticides, antifreeze, batteries, and other chemicals at free local collection points throughout the valley. Contact Yakima County Solid Waste Division at 574-2450 for locations, drop times, and materials accepted.
- Do not dispose of any oil, antifreeze, paint thinner, or other chemicals on the ground.
- Use natural fertilizers, pesticides, and herbicides whenever possible.

For more information or to view your location in the WHPA, please visit the RWPC Website at:

http://www.co.yakima.wa.us/Publicworks/wellhead/index.htm

Very Truly Yours,

Mr. Joe Stump
Yakima County Public Works, RWPC Chairman

July 1, 1999

Dear Property Owner or Resident:

The Regional Wellhead Protection Committee (RWPC) was formed by eight water purveyors in the Upper Yakima Valley in 1996 under the leadership of Yakima County in response to Washington State Department of Health (DOH) wellhead protection planning requirements. The RWPC and the County are taking a proactive approach to wellhead protection planning to ensure that each community's groundwater supplies are adequately protected from potential contamination sources on the ground surface. The purpose of this letter is to notify you of the location of your business within the County's wellhead protection area and provide you with information on how you can help protect your the County's drinking water supplies.

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- development of contingency planning to ensure that prompt response procedures are in place in the event that a well becomes contaminated

The RWPC and the County understand that most business owners recognize the need to protect the environment in and around your business. We hope that informing you of the location of business within the County's wellhead protection area will result in an increase in precautions to ensure your activities do not adversely impact our drinking water supply. The following practices can be greatly reduce the threat of contamination to groundwater supplies:

- Recycle all hazardous wastes used on the premises, including solvents, paints, cleaners, printing supplies, or other chemicals through Yakima County's free small quantity generator or recycling programs (574-2450).
- Reduce the amount of hazardous waste used through waste minimization efforts. Free literature on waste minimization is available from the Department of Ecology (DOE) and your local water purveyor.
- Conserve water whenever possible. Water conservation reduces waste volumes and reduces the threat of contaminant transport.

For more information or to view your location in the WHPA, please visit the RWPC Website at:

http://www.co.yakima.wa.us/Publicworks/wellhead/index.htm

Very Truly Yours,

Mr. Joe Stump
Yakima County Public Works, RWPC Chairman

Ms. Michele Vazquez
Washington State Department of Health
Department of Health
1500 West 4th Avenue; Suite 305
Spokane, Washington 99204

SUBJECT: UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN

Dear Ms. Vazquez:

The Regional Wellhead Protection Committee, consisting of the following eight water purveyors, has completed the Upper Yakima Valley Regional Wellhead Protection Plan in accordance with the requirements of WAC 246-290-135:

- Yakima County
- City of Yakima
- City of Union Gap
- City of Moxee
- City of Selah
- Town of Tieton
- Town of Naches
- Nob Hill Water Association

The RWPC has established an interlocal agreement to administer continuing wellhead protection efforts through each biennial update. Additionally, the RWPC looks forward to coordinating the management efforts identified in the regional plan with the DOH, including identification of potential contamination sources through sanitary surveys and integration of water quality information into County's GIS database.

We look forward to any additional input that you might provide on protecting groundwater supplies in the Upper Yakima Valley.

Very Truly Yours,

JOE STUMP
CHAIRMAN, REGIONAL WELLHEAD PROTECTION COMMITTEE

Ms. Teri Fisher
Water Quality Program
Department of Ecology
Central Regional Office
15 W Yakima Ave, Suite 200
Yakima, WA 98902

Dear Ms. Fisher:

The Regional Wellhead Protection Committee, consisting of the following eight water purveyors, has completed the Upper Yakima Valley Regional Wellhead Protection Plan in accordance with the requirements of WAC 246-290-135:

- Yakima County
- City of Yakima
- City of Union Gap
- City of Moxee
- City of Selah
- Town of Tieton
- Town of Naches
- Nob Hill Water Association

The RWPC has established an interlocal agreement to administer continuing wellhead protection efforts through each biennial update. Additionally, the RWPC looks forward to coordinating the management efforts identified in the regional plan with the DOE, including the following:

- identification of private and improperly-abandoned wells for inclusion in County's GIS database
- prioritization of hazardous materials sweeps for businesses within WHPAs
- identification of LUSTs, USTs, and other high risk businesses for inclusion in County's GIS database

We look forward to any additional input that you might provide on protecting groundwater supplies in the Upper Yakima Valley.

Very Truly Yours,

JOE STUMP
CHAIRMAN, REGIONAL WELLHEAD PROTECTION COMMITTEE

Mr. Don Thompson
Yakima County Emergency Management
128 North 22nd Street, Room B10
Yakima, WA 98901

SUBJECT: UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN

Dear Mr. Thompson:

The Regional Wellhead Protection Committee, consisting of the following eight water purveyors, has completed the Upper Yakima Valley Regional Wellhead Protection Plan in accordance with the requirements of WAC 246-290-135:

- Yakima County
- City of Yakima
- City of Union Gap
- City of Moxee
- City of Selah
- Town of Tieton
- Town of Naches
- Nob Hill Water Association

The RWPC has established an interlocal agreement to administer continuing wellhead protection efforts through each biennial update. Additionally, the RWPC looks forward to coordinating the management efforts identified in the regional plan with the LEPC, including identification of the 6-month WHPA as a critical facility and coordination of spill and emergency response measures outlined in the contingency plan.

We look forward to any additional input that you might provide on protecting groundwater supplies in the Upper Yakima Valley.

Very Truly Yours,

JOE STUMP
CHAIRMAN, REGIONAL WELLHEAD PROTECTION COMMITTEE

Mr. Gordon Kelly
Yakima County Health District
104 North 1st St.
Yakima, WA 98901
(509) 575-4040

SUBJECT: UPPER YAKIMA VALLEY
REGIONAL WELLHEAD PROTECTION PLAN

Dear Mr. Kelly:

The Regional Wellhead Protection Committee, consisting of the following eight water purveyors, has completed the Upper Yakima Valley Regional Wellhead Protection Plan in accordance with the requirements of WAC 246-290-135:

- Yakima County
- City of Yakima
- City of Union Gap
- City of Moxee
- City of Selah
- Town of Tieton
- Town of Naches
- Nob Hill Water Association

The RWPC has established an interlocal agreement to administer continuing wellhead protection efforts through each biennial update. Additionally, the RWPC looks forward to coordinating the management efforts identified in the regional plan with the Health District, including identification of septic tanks and private wells with the District's GPS equipment for inclusion in County's GIS database of potential contamination sources.

We look forward to any additional input that you might provide on protecting groundwater supplies in the Upper Yakima Valley.

Very Truly Yours,

JOE STUMP
CHAIRMAN, REGIONAL WELLHEAD PROTECTION COMMITTEE

APPENDIX O

COORDINATION LETTERS AND FORMS

PLANNING REVIEW FORMS

Wellhead Protection Information Transmittal Form

The purpose of this form is to ensure protection of groundwater supplies by identifying development within WHPAs and verifying compliance with existing regulations.

1. Type of Planning Review

   a) Plat Review ☐
   b) Building Permit ☐
   c) Zoning Review ☐
   d) Environmental Review (SEPA) ☐
   e) Other (Specify) _____ ☐

2. Parcel Number _____

3. Developer/Owner Name _____

4. Developer/Owner Address _____

5. Type of Development: Residential ☐ Commercial ☐ Industrial ☐

6. If commercial or industrial development, check applicable.

Chemical Storage Areas	☐	Jewelry and Metal Plating Shops	☐
Recycling/Reduction Facilities	☐	Railroad Tracks and Yards	☐
Airports	☐	Electronic Equipment Manufacturers/Storage	☐
Cemeteries and Graveyards	☐	Dry Cleaners	☐
Country Clubs and Golf Courses	☐	Logging and Lumber Facilities	☐
Automotive Shops/Service Stations	☐	Other _____	☐

   SIC Code / NAICS Code (if applicable)_____

7. Will water service be provided by (Check one):
   Individual Well ☐ Community Well ☐ Public Water System ☐

8. Will sewer service be provided by: septic system ☐ public sewer system ☐

9. Private Well Disclosure Form Completed (attach copy). ☐

10. Appropriate notification form sent to owner. ☐

11. A copy of this form sent to DOE. ☐

12. A copy of this form sent to County GIS ☐

Signature: _____ Date: _____

PROPERTY DISCLOSURE STATEMENT OF ADDENDUM

Disclosure of Property Well Information

Following completion of this form, return one copy to each of the following addresses (2 total copies):

Washington State Department of Ecology
Central Regional Office, Water Resources
15 W Yakima Avenue
Yakima, WA 98902

Yakima County Geographical Information System
Courthouse Room 421
128 North 2nd Street, Room 408
Yakima, WA 98901

Complete the following questions to the best of your knowledge, using additional sheets if necessary.

1. Provide a property description (i.e. 123 Pleasant Avenue, Yakima). _____
2. How many wells have historically been located on the property? _____
3. Provide a name and location for each well historically located on the property (e.g. Well No. 1, 350 feet north and 125 feet west of the SE property corner). _____
4. Are there any known water rights associated with the well(s), or are the well(s) classified under the domestic exemption? If water rights exist, provide application, permit, and/or certificate numbers, if known. _____
5. What is the current type of use(s) of the well(s) (i.e., domestic, irrigation, stockwatering, community)? _____
6. What is the current status of the well(s) (i.e., abandoned, not currently in use, in use)? _____
7. If well(s) have been abandoned, was abandonment carried out in accordance with WAC 332-17-310? _____
8. Provide any information known about the construction of the well(s), including depth, diameter, screened interval, construction date, and presence/absence of a surface seal. Include well logs if available. _____
9. Provide any information on the quality or characteristics of the well water (e.g., hard, sulfur smell, color, taste, bacteria presence). Attach any available water quality tests performed on the well. _____

Thank you for your cooperation and assistance. The above information will be used in regional water quality and water resource management to ensure that high quality water supplies continue to be available in Yakima County.

DRAFT

WASHINGTON ASSOCIATION OF REALTORS

November 15, 2000

Ms. Jeannette Witham
Executive Officer
Yakima Association of Realtors and Multiple Listing Service
2707 River Road
Yakima, WA 98902

RE: UPPER YAKIMA VALLEY REGIONAL WELLHEAD PROTECTION PLAN
G&O NO. 97032

Dear Ms. Witham:

In response to our recent conversations regarding the potential for issuing an addendum to the Washington Association of Realtors disclosure statements for the purpose of identifying and managing private wells within the wellhead protection areas identified in the Upper Yakima County Regional Wellhead Protection Plan, we have submitted this letter to provide you with information on the following:

1. History on the development of the Upper Yakima County Regional Wellhead Protection Plan (WHPP);
2. Purpose of the WHPP;
3. Need for the identification and management of improperly decommissioned wells; and
4. Scope of the requested local addendum issued to the WAR disclosure statement.

History

In the spring of 1994, the Washington State Department of Health (DOH) invited representatives from the major water purveyors in the Upper Yakima Valley to a meeting in Yakima to discuss wellhead protection requirements identified in WAC 246-290-135. The 1994 meeting generated interest in developing a regional wellhead protection plan instead of eight individual plans because of the benefits in teaming of resources and coordination with management areas that would likely cross jurisdictional boundaries. In February 1996, the group of eight water purveyors, the Regional Wellhead Protection Committee (RWPC), was awarded a Centennial Clean Water grant from the Washington State Department of Ecology (DOE) for the development of the WHPP under the lead of Yakima County. Gray and Osborne, Inc. was subsequently selected to coordinate the development of the WHPP.

Purpose

The purpose of wellhead protection planning is to ensure the long-term quality and quantity available from the groundwater source by effective management of potential contamination sources. The DOH requires the following elements to be addressed in the WHPP:

1. Delineations: A region around the well is delineated based on pump capacity, aquifer characteristics, hydraulic gradient and other factors. This "wellhead protection area" (WHPA) defines the area in which potential contamination sources will be identified and managed.
2. Inventory: Potential contamination sources within the WHPA are identified through scrutiny of DOH, DOE, and local databases (i.e., underground storage tanks, landfills, high risk businesses, and improperly decommissioned wells), and through "windshield surveys" or drive-throughs of the area.
3. Contingency Planning: Coordination with emergency management and spill-response procedures and identification of alternate water supplies to ensure proper and swift response in the event that a well becomes contaminated.
4. Management Plan: The focus of the WHPP is management of the potential contamination sources to ensure that contingency plans are never exercised and that the quality and quantity of the water supply is preserved. Management strategies include integration of wellhead protection planning efforts into the existing regulatory framework, adoption of ordinances or zoning overlays, and education of the public.

Need for Identification of Improperly Decommissioned Wells

Since the award of the grant in 1996, substantial progress has been made on the WHPP. The WHPAs have been delineated, the inventory of potential contamination sources has been established, contingency procedures have been documented and several management strategies have been pursued with Yakima County, DOH, DOE, and local communities and service groups.

One of the most critical potential contamination sources identified in the inventory is existing wells that have been improperly decommissioned or are currently unused. In some cases, these wells can act as conduits for the migration of surface contaminants into the groundwater and can lead to the rapid and catastrophic contamination of the water supply. While the DOE is charged with the management of improperly decommissioned wells, the vast majority have not been recorded or identified. Yakima County is also concerned about the potential health threat posed by these wells and views wellhead protection planning as a vehicle for identifying these wells and minimizing their potential impact on groundwater supplies.

Scope of Requested Local Addendum

The Washington Association of Realtors can aid in the identification of improperly decommissioned wells and help protect future property buyers by adopting the enclosed Property Disclosure Statement Addendum. This addendum provides questions on the number of wells on the property, the characteristics of the wells, and the history of their use and provides for the optional notification of this information to the DOE.

We understand that the WAR considers the Property Disclosure Statement to be a confidential document between the property seller and buyer, and that the WAR is concerned about the potential liability associated with providing notification outside of these entities. We propose that the Property Disclosure Statement Addendum be adopted so the property buyer is informed about the nature and extent of wells on the property and the potential health risks associated with improperly decommissioned wells. Additionally, we would propose that the Addendum allow for optional notification of the DOE, at the discretion of the property buyer, so that the DOE can begin to manage these wells under the requirements of WAC 173-160-381 and reduce the impact of these potential contamination sources.

Following receipt of the Disclosure Statement Addendum by the DOE, the information will be catalogued and the threat of the improperly decommissioned well to groundwater supplies assessed. DOE will incorporate this information into its GIS system and provide Yakima County with updates for wellhead protection planning. Based on the information provided in the disclosure, the DOE will contact the property owners to find out additional information for those wells that may have been improperly decommissioned. Under the requirements of WAC 173-160-381, the DOE can only require decommissioning of a well if the well poses a health risk to the surrounding environment. Examples of wells that may pose a health risk include wells without sanitary seals and wells that have historically demonstrated poor water quality. This process would only be triggered by the voluntary submittal of the Property Disclosure Statement Addendum by the property buyer.

Currently, the DOE is focusing most of its staffing efforts in the identification and abandonment of hand-dug wells that are no longer in use. The DOE does not have the authority to interfere with the sale of a property over this issue, but could require the decommissioning of a well in the future if a health risk exists. In most cases, the decommissioning process can be completed within a few weeks, and consists of sealing the well with approved fill material (sand or concrete).

In summary, the Property Disclosure Addendum will provide a much-needed database of improperly decommissioned wells in Yakima County that may pose a significant threat to public health and the environment. Distribution of the Addendum to locations providing For-Sale-By-Owner (FSBO) disclosure statements will broaden the area targeted and provide for additional protection of groundwater supplies. We would appreciate the opportunity to provide you with more information on our goals in this plan and how the Washington State Association of Realtors can contribute to wellhead protection planning in Yakima County.

Very Truly Yours,

JOE STUMP, P.E.
YAKIMA COUNTY PUBLIC WORKS, CHAIR, REGIONAL WELLHEAD PROTECTION COMMITTEE

TERI FISHER
WASHINGTON STATE DEPARTMENT OF ECOLOGY

MICHELE VAZQUEZ
WASHINGTON STATE DEPARTMENT OF HEALTH

cc: Mr. Preston Shepherd, Nob Hill Water Association
Mr. Dave England, Nob Hill Water Association
Mr. Dave Brown, City of Yakima
Mr. Carl Strickland, Town of Tieton
Mr. Dennis Henne, City of Union Gap
Mr. John Elsden, Town of Naches
Mr. Byron Adams, City of Moxee
Mr. Bill Trout, City of Selah

PROPERTY DISCLOSURE STATEMENT OF ADDENDUM

Disclosure of Property Well Information

Following the seller's completion of this form, the buyer is encouraged, but not required to return one copy to the following address. The information provided will be used in regional water quality and water resource management to ensure that high quality water supplies continue to be available in Yakima County.

Washington State Department of Ecology
Central Regional Office, Water Resources
15 W Yakima Avenue
Yakima, WA 98902

Complete the following questions to the best of your knowledge, using additional sheets if necessary.

1. Provide a property address (i.e. 123 Pleasant Avenue, Yakima). _____
2. How many wells have historically been located on the property? _____
3. Provide a map or the name and location of each well historically located on the property (e.g. Well No. 1, 350 feet north and 125 feet west of the SE property corner). _____
4. Are there any known water rights associated with the well(s), or are the well(s) classified under the domestic exemption? If water rights exist, provide application, permit, and/or certificate numbers, if known. _____
5. What is the current type of use(s) of the well(s) (i.e., domestic, irrigation, stockwatering, community)? _____
6. What is the current status of the well(s) (i.e., abandoned, not currently in use, in use)? _____
7. If well(s) have been abandoned, was abandonment carried out in accordance with WAC 173-160-381? _____
8. Provide any information known about the construction of the well(s), including depth, diameter, screened interval, construction date, and presence/absence of a surface seal. Attach a copy of the well log(s) if available. _____
9. Provide any information on the quality or characteristics of the well water (e.g., hard, sulfur smell, color, taste, bacteria presence). _____

Thank you for your cooperation and assistance.

DEPARTMENT OF HEALTH

STATE OF WASHINGTON
DEPARTMENT OF HEALTH
1500 West 4th Avenue, Suite 305 • Spokane, Washington 99204
FAX (509) 456-2997

June 12, 1998

Jeff Stevens
Gray and Osborne, Inc.
107 S. 3rd St.
Yakima, WA 98901

RE: Yakima County
Regional Wellhead Protection Plan
Coordination of Sanitary Surveys in WHPAs

Dear Jeff:

Dan has requested that I respond to your letter dated April 15, 1998 regarding the strengthening of the relationship between the sanitary survey and the Regional Wellhead Protection Plan that is currently being conducted in the upper valley.

In reviewing your letter, we found that a few clarifications were necessary. We have, therefore, developed the attached document which identifies the avenues for coordination between sanitary surveys and the wellhead program that we believe to be workable from the coordination and implementation viewpoints.

Please let me know if our proposal is acceptable, or if you wish to make any suggestions for minor changes. Once we have your agreement, we will begin the necessary work requirements for implementation.

Sincerely,

Michele Vazquez

Michele Vazquez
Regional Planner
Eastern Water Operations
(509) 456-2774

att

cc: Dan Sander
Tom Justus

May 26, 1998

Mr. Dennis Lynch
United States Geologic Survey, Oregon District Chief
10615 SE Cherry Blossom Drive
Portland, Oregon 097216

SUBJECT: UPPER YAKIMA VALLEY REGIONAL WELLHEAD PROTECTION PLAN
YAKIMA COUNTY, WASHINGTON
G&O NO. 97032

Dear Mr. Lynch:

We are currently working with Yakima County and seven communities in the upper Yakima Valley to develop a regional wellhead protection plan for public groundwater sources under a grant from the Centennial Clean Water Fund. The Washington State Department of Health and the Washington State Department of Ecology are overseeing this project. One of the goals of this study is to provide Yakima County with a database on groundwater quality that Yakima County can use to track water quality trends and prevent contaminants from impacting public groundwater sources.

It is our understanding from Ms. Elaine Taylor of Yakima County Planning, and subsequent conversations with Mr. Joe Rinella that the next round of National Water Quality Assessment (NAWQA) studies may be funded in 1998, and if so, that the Yakima River Basin may be included in the studies because it has previously been a pilot study and because of the continuing surface water quality problems in the area. It is our understanding that the focus of this study (if funded and approved) will be surface water in the Yakima River Basin, because of the substantial use of surface water in the basin.

The purpose of this letter is to request that an evaluation of groundwater be included in the next round of NAWQA studies for the Yakima River Basin. The primary use of surface water in the Yakima River Basin is for irrigation. While the quality of irrigation water is of concern, drinking water supplies are largely derived from groundwater and are more likely to impact human health. Additionally, because the DOE believes the surface waters of the Yakima River Basin are over-appropriated, the surface water rights for the basin are being adjudicated. Therefore, the majority of new drinking water sources are likely to be groundwater sources.

By including groundwater monitoring and evaluation in the next round of NAWQA studies for the Yakima River Basin, the USGS can accomplish the following:

- Track trends and impacts of surface and sub-surface contaminants among surface and groundwater sources.
- Complement the extensive information already available on surface water sources with a parallel groundwater database.
- Create opportunities for data sharing among other interested parties, including the Upper Yakima Valley Regional Wellhead Protection Committee.

We would appreciate any consideration you could give this matter. Please call if you have any questions or need any additional information.

Very truly yours,

GRAY & OSBORNE, INC.

JEFFREY W. STEVENS, P. E.

JWS:DRH:jh

cc: Mr. Joe Stump, Yakima County
Ms. Michele Vasquez, DOH
Ms. Teri Fisher, DOH
Mr. Joe Rinella, USGS
File

APPENDIX O

WASHINGTON STATE DEPARTMENT OF TRANSPORTATION

Washington State Department of Transportation
Sid Morrison
Secretary of Transportation

Transportation Building
P.O. Box 47300
Olympia, WA 98504-7300

January 14, 1999

Roy Simonson – O, Dan (L), Vern Joe - O
Surface Water & Utilities
Yakima Co. Terrace Heights
128 N. 2nd St. Rm. 408
Yakima, WA 98901

Dear Mr. Simonson:

This is to express the Washington State Department of Transportation's (WSDOT's) interest in the development of your "Wellhead Protection Plan". WSDOT is taking this proactive approach to assure that highway related activities do not contribute to contamination of groundwater resources. WSDOT wishes to be actively involved in the development of your plan to the extent considered appropriate. Included as attachments are summaries of WSDOT activities throughout the state which might relate to wellhead protection. We will continue to perform these activities unless concerns expressed by purveyors are demonstrated to cause groundwater problems. You are being sent this letter because review of our data indicates that a state highway intersects the ten year time of travel boundary of one or more of your system's wells.

Please contact me at 360-705-7812 at your convenience, if you have questions on this matter. We would appreciate your sending a copy of your approved plan, a map showing the exact location of the wells in your system and a short narrative on the status of your wellhead protection plan. This information should be sent to: WSDOT, Environmental Service Branch, PO Box 47358, Olympia, WA 98504-7358.

Sincerely,

DOUG PIERCE
Environmental Manager
Environmental Service Branch

Geotechnical Drilling Activities

WSDOT performs geotechnical activities within compliance of Chapter 18.104 Revised Code of Washington. All geotechnical and resource well construction activities are conducted by licensed WSDOT drillers or by contracted licensed drilling firms. The predominant drilling activity conducted by WSDOT is explorative drilling of resource wells consisting of monitoring wells, observation wells, piezometers, and geotechnical wells and spill response wells. All wells no longer in use are plugged and abandoned in accordance with the provisions of Minimum Standards for Construction and Maintenance of Water Wells, chapter 173-160-560 Washington Administrative Code.

New Construction Environmental Review

Identification of environmentally sensitive areas, including wellhead protection areas, occurs early in the transportation design process. This identification occurs as an integral portion of the "Scoping" process which is required by 40 Code of Federal Regulations Part 1501.7. Scoping is a preliminary determination of the range of issues to be addressed and identifies the significant issues (traffic, funding, safety, mobility, environment) related to a proposed transportation construction project.

Wellhead boundaries, ten-year time of travel boundaries, and susceptibility ratings are some of the features considered in scoping. Potential impacts will be evaluated based on:

1) wellhead time of travel zones, 2) wellhead susceptibility rating, and 3) number of connections.

All efforts will be taken to identify and minimize the potential impacts of proposed transportation projects within wellhead protection areas. Efforts to address potential impacts within identified wellhead protection areas will include, but are not limited to, project siting and design, design and location of stormwater treatment systems, and highway operation and maintenance practices. Alternatives to avoid and minimize the potential impacts related to transportation activities within wellhead protection zones will be examined in project scoping and added to related environmental assessment and permitting documents.

Stormwater Treatment Best Management Practices

WSDOT stormwater discharges to surface and groundwater are authorized by National Pollutant Discharge Elimination System (NPDES) Municipal Stormwater Discharge permits. These permits cover all WSDOT stormwater discharges within the unincorporated areas of Snohomish, King, and Pierce counties and within the city limits of Seattle and Tacoma. WSDOT has applied for coverage under a fourth NPDES permit to cover all stormwater discharges within unincorporated areas of Clark county and the City of Vancouver.

NPDES permits require WSDOT to install only approved stormwater treatment Best Management Practices (BMPs). Approved stormwater treatment BMPs are contained in WSDOT Highway Runoff Manual. Washington State Department of Ecology has approved the Highway Runoff Manual which provides uniform procedures for the design and installation of stormwater treatment facilities throughout the state.

NPDES Municipal Stormwater Discharge permits require WSDOT to research new stormwater best management practices. WSDOT has partnered with the United States Geological Survey to assess the impact of stormwater infiltration on groundwater. WSDOT will use knowledge gained from this research to design and select stormwater treatment BMPs that protect groundwater quality within wellhead protection boundaries. Washington Department of Ecology will approve the use of groundwater specific BMPs before the BMPs are added to the Highway Runoff Manual.

Rating, Ranking, and Retrofitting Stormwater Outfalls

WSDOT has a responsibility under its NPDES Municipal Stormwater permits and the Puget Sound Action plan to retrofit stormwater treatment best management practices on existing stormwater discharges. WSDOT has completed an inventory of stormwater discharges within the NPDES Municipal Stormwater permit areas and greater Puget Sound region. All stormwater outfalls were rated and ranked through a Stormwater Outfall Prioritization process. Outfalls that discharged into a 6-month, 1-year or 5-year time of travel wellhead protection zone will receive the highest water quality rating (a

multiplier of 1.5). This rating effects the overall ranking of each stormwater outfall. WSDOT uses this rating to determine which outfall to target for BMP retrofit construction using the I-4 category funding. WSDOT will attempt to establish funding through the I-4 Environmental Retrofit - Stormwater BMP budget category as part of its stormwater program.

Traffic Accident Incident Response

WSDOT Maintenance personnel respond to traffic accidents at the request of the State Patrol for the purpose of traffic management. This includes redirection of traffic through lane blocking and signage. The Washington State Patrol accident data shows more than ninety-five percent of the vehicle accidents involve passenger cars and therefore the resultant spillage of small amounts of vehicle fluids, which are handled by onsite responders. Occasionally, vehicle accidents of larger commercial trucks results in release of diesel from ruptured saddle tanks. And more rarely, vehicle accidents involving tankers result in release of large amounts of hazardous materials. WSDOT incident response personnel do not become involved in control of releases of hazardous liquids. This is the role of responding WSP, Ecology, fire and/or spill contractors.

Vegetation Management Practices

The majority of roadside vegetation management activity occurs in response to safety concerns with trees and brush encroaching on the roadway, legal mandates for the control

of designated noxious weed species, and preservation of the roadside environment with regard to these objectives. To a lesser degree activities are initiated in response to aesthetic considerations, neighbor concerns, and issues relating to local or federal jurisdiction.

Vegetation management activity consists primarily of mechanical cutting and herbicide application, with additional activity in the form of revegetation, care and feeding of existing beneficial vegetation, and other preventative techniques.

Herbicide applications are made by licensed state maintenance personnel with certification through Washington State Department of Agriculture. All herbicides are registered and controlled through the US Environment Protection Agency and applications are made in accordance with product label specifications. As a matter of policy WSDOT will limit herbicide applications within 100' of an approved public water well.

Winter Deicing and Anti-icing Practices

An important objective of WSDOT is to prevent or minimize the unsafe driving conditions caused by ice and snow. Liquid and solid compounds are applied at specific rates to the road surface to prevent ice from forming or to melt ice which has formed. Stockpiles of sand are also mixed with salt compounds to prevent freezing. WSDOT is working on secondary containment for liquid deicer tanks and stockpile covering for sensitive areas. Deicing chemicals purchased and used are environmentally safer than common road salt.

APPENDIX O

EDUCATIONAL SERVICE DISTRICT 105

Educational Service District 105

33 South Second Avenue
Yakima, Washington 98902
(509) 575-2885
FAX (509) 575-2918

Feb. 1,1999

Yakima County Public Works
Regional Wellhead Protection Committee
Joe Stump, Chairman
128 N. 2nd Street
Yakima, WA. 98901

Dear Mr. Stump,

We are very pleased to write in support of the Wellhead Protection Plan. The inclusion of an education component for students and teachers throughout the area allows us to participate as a partner in the dissemination of information and materials the committee has prepared.

Our Environmental Education program is anxious to include the Wellhead Protection information in its teacher training workshops, which in turn allows teachers the ability to include this information in their classroom curriculum.

Thank you for allowing us to participate.

Mike Bernazzani
Superintendent
Educational Service District 105

WELLHEAD PROTECTION PERFORMANCE SURVEY

Upper Yakima Valley Regional Wellhead Protection Program

For more information please contact:

Yakima County
(509) 574-2300

City of Yakima
(509) 575-6154

City of Union Gap
(509) 248-0432

City of Selah
(509) 698-7369

City of Moxee
(509) 575-8851

Nob Hill
Water Association
(509) 966-0272

Town of Tieton
(509) 673-3162

Town of Naches
(509) 653-2647

Department of Health
(509) 456-3115

Dear Customer:

The Regional Wellhead Protection Committee (RWPC) represents the eight major water purveyors in the Upper Yakima Valley. In 1999, the RWPC adopted a Regional Wellhead Protection Plan as required by the Washington State Department of Health. The goal of the plan is the protection of groundwater supplies in the Upper Yakima Valley and several public education and management strategies were implemented towards that goal. A copy of this plan can be viewed at the main office of any of the eight water purveyors listed on the left.

Every two years, the Washington State Department of Health requires the plan to be updated to ensure that the community remains proactive in its efforts to protect groundwater in the Upper Yakima Valley. The RWPC plans to update its wellhead protection plan in 2001 and is seeking input both on the current effectiveness of the plan and any ways in which the plan might be improved.

The attached questionnaire will provide essential information on the effectiveness of the public education efforts attempted thus far and may provide us with new insights on providing the public with information on wellhead protection. Please take just a few minutes and complete the attached questionnaire. The questionnaire can be returned in the self-addressed stamped envelope, or you may return it to the main office of any of the eight purveyors.

Thank you for your time and effort in this endeavor. For more information on ways you can help protect groundwater in your area, visit our website at:

http://www.co.yakima.wa.us/Publicworks/wellhead/index.htm

Very Truly Yours,

JOE STUMP, P.E.
YAKIMA COUNTY PUBLIC WORKS, CHAIR, REGIONAL WELLHEAD PROTECTION COMMITTEE

c/o Yakima County Public Works · 128 North 2nd Street, Room 408 · Yakima, Washington 98901-2614

Wellhead Protection Plan Public Response Form

Please fill out this form and return it to Yakima County in the attached self-addressed envelope or to your local water purveyor's office.

Name: _____

Address: _____

1. Have you ever heard about wellhead protection? Yes ☐ No ☐
2. Are you aware of some of the ways that you can protect your groundwater resources, such as proper methods of storing household hazardous wastes? Yes ☐ No ☐
3. Have you ever visited our website? Yes ☐ No ☐
4. Have you ever seen wellhead protection signs on area roads? Yes ☐ No ☐
5. Is groundwater protection a part of your area school's curriculum?

   Yes ☐ No ☐ I don't know ☐
6. What is the source of your domestic water supply?

   City/Town of _____ ☐ Water Association ☐ Private Well ☐
7. What is the source of your irrigation water supply?

   City/Town of _____ ☐ Water Association ☐ Private Well ☐

   Irrigation District _____ ☐ None ☐
8. Is your home currently served by municipal sewer service or a septic tank?

   Sewer ☐ Septic Tank ☐
9. Do you have any suggestions on ways we can promote groundwater protection?

   _____

   _____

Thank you for your assistance in protecting the groundwater in your area. For more information, please visit our website at:

http://www.co.yakima.wa.us/Publicworks/wellhead/index.htm

c/o Yakima County Public Works · 128 North 2nd Street, Room 408 · Yakima, Washington 98901-2614

APPENDIX P

REGIONAL CONTAMINANT INVENTORY MAP

(THE REGIONAL CONTAMINANT INVENTORY MAP CAN BE FOUND IN THE FOLLOWING PLANS:

NOB HILL WATER ASSOCIATION,

CITY OF MOXEE,

TOWN OF TIETON,

CITY OF UNION GAP)

APPENDIX Q

COST ESTIMATES

Table Q-1 : New 300 Ft. Well

(October 1998 ENR National Construction Cost Index #5986)

	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1.	Mobilization/Demobilization	1 LS	$ 10,000.00	$ 10,000
2.	Drilling for 16-inch Casing	120 FT	120.00	14,400
3.	Drilling for 12-inch Casing	180 FT	95.00	17,100
4.	16-inch Casing	120 FT	40.00	4,800
5.	12-inch Casing w/ Perforations	220 FT	30.00	6,600
6.	16"x12" Double K Packer	1 LS	400.00	400
7.	Authorized Work	40 HRS	200.00	8,000
8.	Pump Test	1 LS	6,000.00	6,000
9.	Video Logging	1 LS	800.00	800
10.	Grouting	1 LS	4,000.00	4,000
11.	Wellhouse and Ventilation	1 LS	25,000.00	25,000
12.	Pump (800 gpm/125 hp)	1 LS	35,000.00	35,000
13.	Electrical			
13a.	Control Panel	1 LS	1,500.00	1,500
13b.	Service/Distribution	1 LS	7,000.00	7,000
13c.	Soft Starter	1 LS	3,500.00	3,500
13d.	Wiring and Fixtures	1 LS	9,000.00	9,000
13e.	Well Depth Monitoring	1 LS	1,500.00	1,500
14.	P.U.D. Electrical Construction	1 LS	10,000.00	10,000
15.	Plumbing	1 LS	32,000.00	32,000
16.	Fence	1 LS	2,000.00	2,000
17.	Gravel Surfacing	1 LS	1,500.00	1,500
18.	Access Road	1 LS	5,000.00	5,000

Engineer's Estimate	$ 205,100
7.0% Sales Tax	14,357
Sub-Total	$ 219,457
25% Contingency	54,864
Sub-Total	$ 274,321
20% Admin., Fiscal, Legal, Engineering	54,864
Total Project Costs	$ 329,185
Round to	$ 329,000

NOTES: Cost does not include land acquisition, and assumes site within 1/4 mile of 3-phase service.

Table Q-2 : New 500 Ft. Well

(October 1998 ENR National Construction Cost Index #5986)

	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1.	Mobilization/Demobilization	1 LS	$ 10,000.00	$ 10,000
2.	Drilling for 16-inch Casing	200 FT	120.00	24,000
3.	Drilling for 12-inch Casing	300 FT	95.00	28,500
4.	16-inch Casing	200 FT	40.00	8,000
5.	12-inch Casing w/ Perforations	350 FT	30.00	10,500
6.	16"x12" Double K Packer	1 LS	500.00	500
7.	Authorized Work	40 HRS	200.00	8,000
8.	Pump Test	1 LS	8,000.00	8,000
9.	Video Logging	1 LS	1,000.00	1,000
10.	Grouting	1 LS	6,000.00	6,000
11.	Wellhouse and Ventilation	1 LS	25,000.00	25,000
12.	Pump (800 gpm/150 hp)	1 LS	50,000.00	50,000
13.	Electrical			
13a.	Control Panel	1 LS	1,500.00	1,500
13b.	Service/Distribution	1 LS	10,000.00	10,000
13c.	Soft Starter	1 LS	4,500.00	4,500
13d.	Wiring and Fixtures	1 LS	10,500.00	10,500
13e.	Well Depth Monitoring	1 LS	2,000.00	2,000
14.	P.U.D. Electrical Construction	1 LS	10,000.00	10,000
15.	Plumbing	1 LS	32,000.00	32,000
16.	Fence	1 LS	2,000.00	2,000
17.	Gravel Surfacing	1 LS	1,500.00	1,500
18.	Access Road	1 LS	5,000.00	5,000

Engineer's Estimate	$ 258,500
7.0% Sales Tax	18,095
Sub-Total	$ 276,595
25% Contingency	69,149
Sub-Total	$ 345,744
20% Admin., Fiscal, Legal, Engineering	69,149
Total Project Costs	$ 414,893
Round to	$ 415,000

NOTES: Cost does not include land acquisition,
and assumes site within 1/4 mile of 3-phase service.

Table Q-3 : New 1000 Ft. Well

(October 1998 ENR National Construction Cost Index #5986)

	ITEM	QUANTITY	UNIT PRICE	AMOUNT
1.	Mobilization/Demobilization	1 LS	$ 10,000.00	$ 10,000
2.	Drilling for 16-inch Casing	400 FT	120.00	48,000
3.	Drilling for 12-inch Casing	600 FT	95.00	57,000
4.	16-inch Casing	400 FT	40.00	16,000
5.	12-inch Casing w/ Perforations	650 FT	30.00	19,500
6.	16"x12" Double K Packer	1 LS	800.00	800
7.	Authorized Work	40 HRS	200.00	8,000
8.	Pump Test	1 LS	10,000.00	10,000
9.	Video Logging	1 LS	1,500.00	1,500
10.	Grouting	1 LS	8,000.00	8,000
11.	Wellhouse and Ventilation	1 LS	25,000.00	25,000
12.	Pump (800 gpm/300 hp)	1 LS	70,000.00	70,000
13.	Electrical			
13a.	Control Panel	1 LS	1,500.00	1,500
13b.	Service/Distribution	1 LS	15,000.00	15,000
13c.	Soft Starter	1 LS	7,500.00	7,500
13d.	Wiring and Fixtures	1 LS	12,000.00	12,000
13e.	Well Depth Monitoring	1 LS	3,000.00	3,000
14.	P.U.D. Electrical Construction	1 LS	10,000.00	10,000
15.	Plumbing	1 LS	32,000.00	32,000
16.	Fence	1 LS	2,000.00	2,000
17.	Gravel Surfacing	1 LS	1,500.00	1,500
18.	Access Road	1 LS	5,000.00	5,000

Engineer's Estimate	$ 363,300
7.0% Sales Tax	25,431
Sub-Total	$ 388,731
25% Contingency	97,183
Sub-Total	$ 485,914
20% Admin., Fiscal, Legal, Engineering	97,183
Total Project Costs	$ 583,097
Round to	$ 583,000

NOTE: Cost does not include land acquisition, and assumes site within 1/4 mile of 3-phase service.