

July 21, 1998

Introduced By:

Greg Nickels

clerk 7/23/98

Proposed No.:

98-471

ORDINANCE NO.

13506

AN ORDINANCE approving the Heights Water Association
Comprehensive Water System Plan.

PREAMBLE

K.C.C. 13.24 requires approval of comprehensive plans for water utilities as a prerequisite for granting right-of-way franchises and approval of right-of-way construction permits.

The Board of Trustees of the Heights Water Association approved the comprehensive water system plan (Plan) on May 12, 1998.

The Plan is categorically exempt from the State Environmental Policy Act because no pipe in the system is larger than eight inches in diameter (197-11-800 [24] [b] WAC).

The King County Utilities Technical Review Committee (UTRC) reviewed and conditionally approved the Plan on June 17, 1998. The conditions of approval (technical modifications to the Plan) have been met by the association.

The UTRC recommends that the council approve the Plan.

BE IT ORDAINED BY THE COUNCIL OF KING COUNTY:

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SECTION 1. The Heights Water Association Comprehensive Water System Plan

is hereby approved without conditions.

INTRODUCED AND READ for the first time this 27th day of July, 1998.

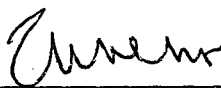
PASSED by a vote of 12 to 0 this 17th day of May

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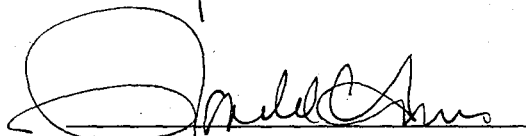
KING COUNTY COUNCIL
KING COUNTY, WASHINGTON


Chair

ATTEST:


Clerk of the Council

APPROVED this 27 day of May, 1999


King County Executive

Attachments: The Heights Water Association Comprehensive Water System Plan

13506

78-471

Hedges
& Roth Engineering, Inc.

ENGINEERS PLANNERS
SURVEYORS AM/FM/GIS
LANDSCAPE ARCHITECTS

1997 COMPREHENSIVE WATER SYSTEM PLAN
HEIGHTS WATER
May 7, 1998

Bellevue, WA

Wenatchee, WA

Chelan, WA

RECEIVED

Hedges & Roth Engineering, Inc.

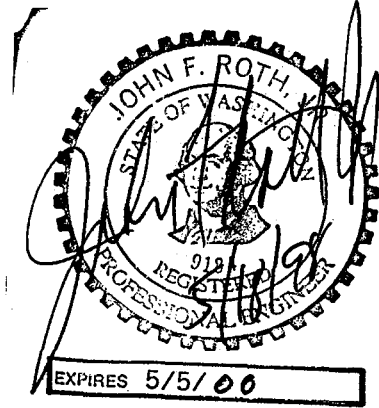
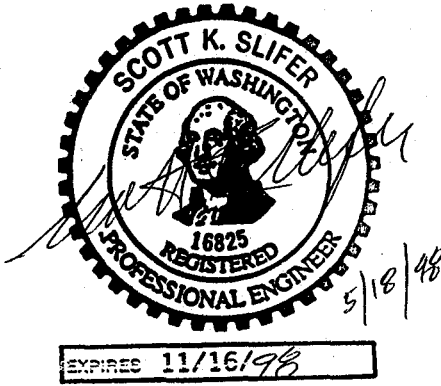
MAY 11 1998

HEDGES & ROTH ENGINEERING, INC.
BELLEVUE, WA

1997 COMPREHENSIVE WATER SYSTEM PLAN

FOR

HEIGHTS WATER
P.O. BOX 820
VASHON, WA 98070-0820



Prepared by: Scott Goss

Checked by: Scott K. Slifer, P.E.

Approved by Heights Water for Submittal:

By: Reed Fitzpatrick
Reed Fitzpatrick, President

Date: 5/5/98

Designated Contact for Heights Water:

Reed Fitzpatrick, President

HEIGHTS WATER 1997 COMPREHENSIVE WATER SYSTEM PLAN

Board of Trustees

Reed Fitzpatrick, President
Earl Larsen, Vice-President
George Kirkish, Treasurer
Earl Knight, Secretary

Heights Water Office

P.O. Box 820
Vashon, Washington 98070
Telephone: (206) 567-4855
FAX: (206) 567-4391

Contact: Reed Fitzpatrick

Consulting Engineer

Hedges & Roth Engineering, Inc.
14450 N.E. 29th Place, #101
Bellevue, Washington 98007
Telephone: (425) 869-9448 & (206) 682-7426
FAX: (425) 869-1190

HEIGHTS WATER 1997 COMPREHENSIVE WATER SYSTEM PLAN

TABLE OF CONTENTS

Engineer's Certification

Executive Summary

Chapter One - Introduction

History of Heights Water	1-1
Agreements with Other Entities.....	1-1
Previous Plan	1-2
1994 King County Comprehensive Plan	1-2
Vashon Community Plan.....	1-2
King County Water District 19	1-2
Vashon Coordinated Water System Plan	1-2
Vashon-Maury Island Ground Water Management Plan	1-3
Existing Service Area	1-3
Future Service Area	1-3

Chapter Two - Planning Considerations

Future Planning Area	2-1
Land Use and Zoning.....	2-1
Fire Protection	2-2
Sanitary Sewer Service	2-2
Heights Existing Service Population.....	2-3
Population Data, Forecasts and Capacity	2-3
Service Area Topography and Sensitive Areas	2-7
Geology and Soils	2-7
Historical Water Consumption	2-8
Future Water Consumption	2-9
Future Storage Requirements	2-9
Water Shortage Response.....	2-10
Surface Water Treatment Rule Compliance.....	2-11
Spring Water Data Collection	2-12
Well No. 4 Manganese	2-12

Chapter Three - Existing Water System

Supply	3-1
Wells.....	3-1
Springs	3-1
Water Rights	3-2
Pump Configuration and Usage.....	3-2

Revision Date: April 6, 1998

Combined Total Source	3-4
Wellhead and Watershed Protection	3-5
Treatment	3-5
Transmission	3-5
Water Production Capability	3-6
Water Storage	3-6
Distribution and Standards	3-8
Pressure Zones	3-8
Telemetry System	3-8
Fire Protection	3-9
Intertie	3-9
System Improvements Since Last Plan	3-10
 Chapter Four - Operations	
Board of Trustees and Staff	4-1
Facilities	4-1
Routine Maintenance	4-2
Cross-Connection Control	4-2
System Reliability	4-2
Emergency Response	4-2
Backup Power	4-3
Conservation	4-3
 Chapter Five - Water Quality	
Source Water Quality	5-1
Surface Water Treatment Rule	5-1
Water Quality Monitoring for Chlorine and Coliforms	5-1
Watershed Control	5-1
Cross-Connection Control	5-1
Lead and Copper Rule	5-1
Asbestos Rule	5-1
 Chapter Six - Financial Program	
Introduction	6-1
Rate Structure	6-1
Working Capital	6-2
Water Share Cost	6-2
Financial Viability Test	6-2
 Chapter Seven - System Requirements and Recommended Improvements	
System Requirements	7-1
Office	7-1
Vehicle Storage	7-1
Chemical and Equipment Storage	7-2
Source Protection	7-2
Water Rights	7-2
Source Diversity	7-2

Expansion of System.....	7-3
Satellite System Management.....	7-3
Surface Water Treatment Rule	7-3
Water Quality Monitoring.....	7-4
Coliform Monitoring Plan.....	7-4
Emergency Power	7-4
Telemetry	7-4
Main Replacement	7-4
Water Storage.....	7-5
Fire Flow.....	7-5
Rate Structure.....	7-5
Capital Improvement Plan	7-6

List of Figures

Figure 1	Existing Water System Boundaries.....	1-3
Figure 2	Future System Boundaries	2-1
Figure 3	Zoning Map.....	2-1
Figure 4	Topographic Map.....	2-7
Figure 5	Composite Assessor's and Sensitive Areas Map.....	2-7
Figure 6	Distribution System Map	3-10
Figure 7	Operating Pressures Map.....	3-10
Figure 8	Spring Building Construction	3-10
Figure 9	Spring Pumping Building Construction	3-10
Figure 10	Chlorination System Detail.....	3-10
Figure 11	Storage Tank Details.....	3-10
Figure 12	Capital Improvements Plan Items.....	7-6

List of Tables

Table 2-1	1995 PSRC Population Forecast.....	2-4
Table 2-2	1996 King County Annual Growth Report Population Forecast..	2-5
Table 2-3	Growth Summary	2-6
Table 2-4	1997 Water Consumption.....	2-8
Table 2-5	Future Connections and Water Production Requirement	2-9
Table 2-6	Future Storage Volume Requirements Based on 600 gpd	2-10
Table 4-1	Water Usage and Conservation.....	4-3
Table 5-1	Sampling Station Locations.....	5-1
Table 6-1	Water Rates.....	6-1
Table 7-1	Capital Improvement Plan Items	7-6

List of Appendices

Appendix A	DOE Report of Examination
Appendix B	Sensitive Areas Maps
Appendix C	Hydrogeologic Report
Appendix D	Susceptibility Assessment
Appendix E	Water Quality Testing Results
Appendix F	Coliform Plan
Appendix G	Lead and Copper Testing Results
Appendix H	Financial Viability Test
Appendix I	Comments and Responses

Executive Summary

Purpose

The purpose of this document is to provide Heights Water with an updated Water Comprehensive Plan. This Plan is intended to provide Heights water with a single document containing both historical and background information and also information for future development of the system. This Plan is intended to supersede previous Plans and updates.

Authorization

Heights Water has directed Hedges and Roth Engineering, Inc. to prepare this Plan to provide for the planning needs of the system and its present and future customers. This Plan will be submitted for approval by Washington State Department of Health (DOH), Washington State Department of Ecology (DOE), and Metropolitan King County Council.

Scope and Objectives

Heights water is committed to providing a reliable, high quality water supply to its customers. The 1997 Comprehensive Water System Plan has been developed to provide direction and a method for the growth of the system to meet current and future needs. The Plan was prepared in accordance with the DOH Water System Plan submittal checklist and the King County Utilities Technical review Committee (UTRC) checklist.

The scope of the Plan includes:

- Historical data about the system
- Relationship to other Plans and neighboring systems
- Historical water use data
- Projected water use and population growth data
- Water quality analysis
- Description of the existing system
- Examination of Operational and Financial aspects of the system
- Recommended improvements

The objective of the Plan is to analyze the existing and projected future needs of the system and derive a program of improvement and development to be implemented to meet those needs. A specific program of studies and projects is outlined to direct future efforts to operate and develop the water system.

Chapter One -- Introduction

This Comprehensive Water System Plan is designed to help the Heights Water System maintain reliable delivery of high quality water, plan for growth of the system and make efficient use of the limited financial resources and water available on Vashon Island.

This plan is further intended to meet the criteria of the Washington State Department of Health (DOH) requirements for Heights Water to remain in compliance with State and Federal regulations and to assure compatibility with local and regional land use and water system plans.

History of Heights Water

The Heights Water District was originally incorporated in 1921 as a sub-group of the Vashon Heights Community, a non-profit mutual support organization for the residents on the upper plateau of the northern end of Vashon Island. Most of the existing water sources were individual, shallow, hand-dug wells. The 22 members of the Heights group decided to consolidate and find a suitable common water source. In 1931 they obtained water rights to two adjacent natural springs on the east slope of the Heights area (NE qtr of NE qtr of S 18, T23N, R3E, W.M.) These springs are still currently used as water sources for the system.

In response to population pressure, a well was drilled in 1979, into the same aquifer from which the springs flow. A second well was added to this same aquifer in 1984. A third well was added to this well field in 1993. These three wells are known as sources 2,3 and 4 and are all within sight of each other in a small valley west of the springs.

Heights Water is a private, non-profit, mutual water Association currently serving 590 connections. Water shares are owned by a controlled number of individuals. The system is designated as a Group A Community (Residential) Water System, with a Group 1 Distribution System. There is a waiting list of approximately 60 customers desiring connection to the system.

Agreements with Other Entities

Heights Water has only a verbal agreement with neighboring Water District 19 concerning the use of an existing intertie. Heights has sent a proposed agreement to District 19, which they are currently considering. Negotiations toward a final agreement are progressing.

The majority of the service connections are residential; the six commercial connections are standard services with no extra agreements and are derived from long-standing business properties established prior to the 1950's. Heights is also currently providing water on a contract basis to the North Vashon water system, a system with 26 services, which are included in the 590 Heights connections.

Previous Plan

The Plan currently in effect was prepared in 1992 by Heights Water. The programs and projects referenced in that Plan are still in effect. The Zoning and Land Use patterns in the service and planning areas remain the same.

Prior to the 1992 Plan, D.R. Strong Consulting Engineers prepared a Comprehensive Plan for the system in 1981.

1994 King County Comprehensive Plan

The 1994 King County Comprehensive Plan covers the Heights planning area and establishes the County's policies for land use, infrastructure, public safety, human services, economic development, parks and cultural resources. The Plan provides policy direction for functional plans, such as a Comprehensive Water System Plan.

Vashon Community Plan

The Vashon Community Plan, Domestic Water Section, makes a number of recommendations to State and County authorities for the protection of Vashon Island water sources, with particular regard to possible contamination from septic tank effluent, animal wastes and saltwater intrusion. The latter two are not significant concerns in the Heights area but possible contamination from septic tank effluent could be. Control of this problem is handled under the King County building permit process and the King County Health Department septic design approval process.

The Vashon Community Plan recommends that all water purveyors' comprehensive plans include information on the ability of the existing and potential water sources to meet anticipated population growth. Anticipated population growth and water production capability are covered elsewhere in this report. Currently, Heights Water has 60 potential customers on the waiting list for shares. An old well has been rehabilitated on the parcel of land where the office and storage tanks are located, in preparation for expansion of system capacity. The tested pump rate of this new well (42 gpm) indicates source capacity for 75 connections at 800 gallons per day (gpd) per connection, or 100 connections at 600 gpd per connection.

King County Water District 19

Heights Water has a common boundary with Water District 19. The future service and planning area of District 19 abuts the Heights Water service area at SW 164th Street. Heights maintains a closed emergency intertie with Water District 19. The intertie is discussed in greater detail in Chapter Three.

Vashon Coordinated Water System Plan

The Vashon Coordinated Water System Plan (Vashon CWSP) directs the planning of all of the public water systems on the Island. This Plan is in compliance with the Vashon CWSP, with reference to service area, conservation and other recommendations.

Vashon-Maury Island Ground Water Management Plan

The Heights Water System Plan is consistent with the goals of the VMIGWMP. The fundamental principles of the VMIGWMP are: 1) Enforcement of existing laws to protect water resources and 2) 1986 Vashon Community Plan policies should be implemented.

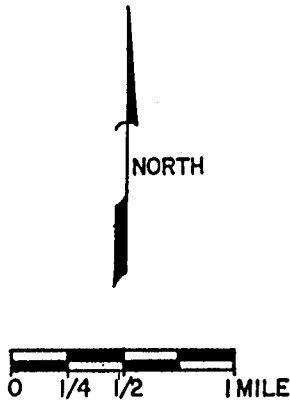
If the VMIGWMP is adopted, and its recommendations implemented, Heights could potentially have increased costs for information collection and distribution.

Existing Service Area

The Heights service area covers the north part of Vashon Island from approximately SW 164th Street SW to the north tip of the Island, except for the westernmost part of this area (see Figure 1, Plate V-1 from Vashon CWSP by Horton Dennis and Associates, 1990). The service area remains unchanged from the previous Plan.


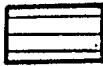

Future Service Area

The future service area is not expected to be different from the existing service area. Residential construction within the existing service area is predicted to utilize all future expansion capabilities of the system. Much of the land area within the service area is undeveloped or lacks a distribution main; development of these existing internal areas is anticipated for the future without expansion of the service area.



LEGEND

FRANCHISE AREAS
(Potential Service Areas)

-  Heights
-  Westside
-  Water District 19
-  Burton
-  Maury Mutual
-  Dockton
-  WATER DISTRICT 19 LEGAL BOUNDARY

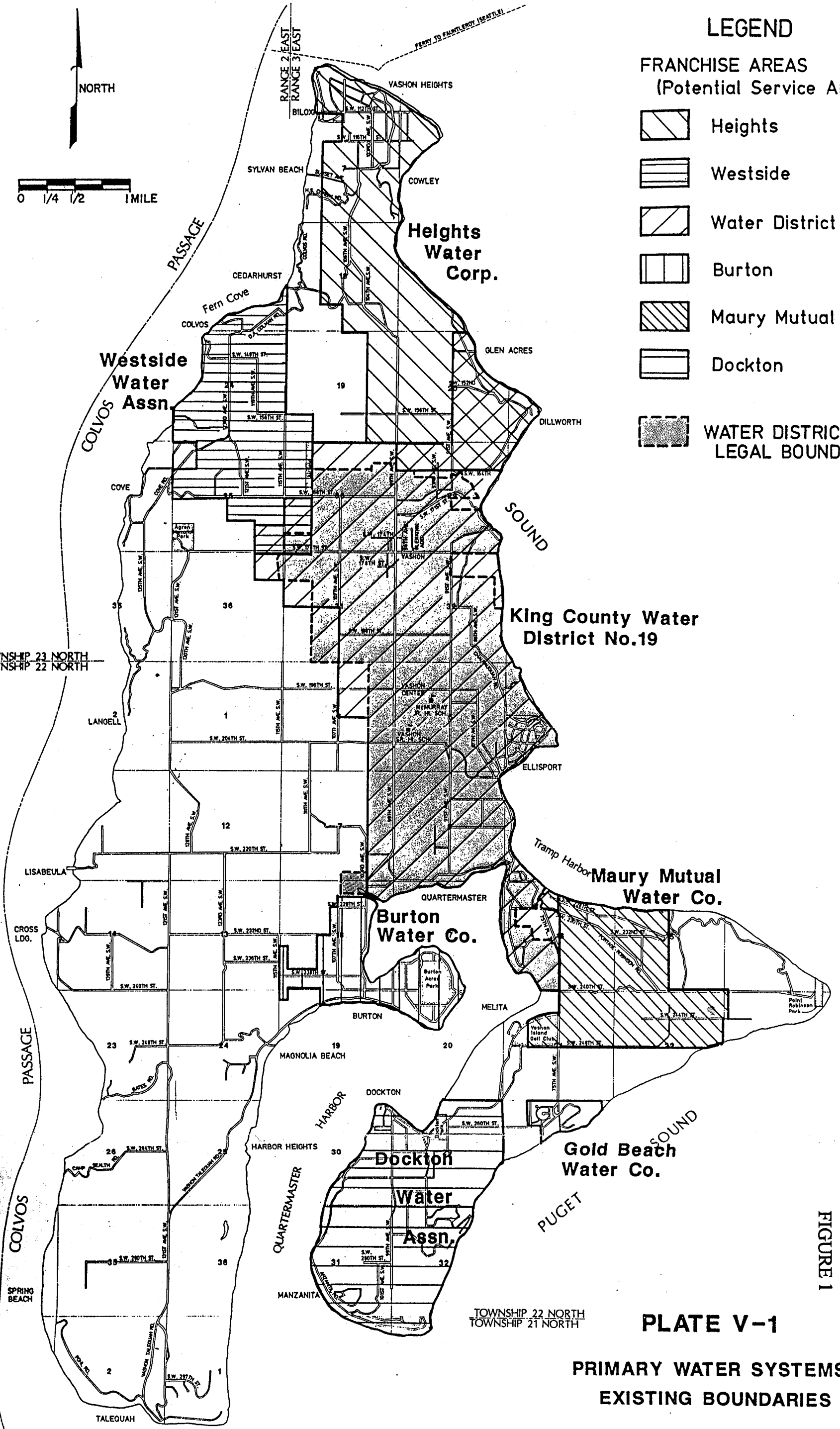


FIGURE 1

PLATE V-1

**PRIMARY WATER SYSTEMS
EXISTING BOUNDARIES**



Chapter Two -- Planning Considerations

Future Planning Area

The existing and future planning and service areas of the Heights Water System remain as recommended in the 1990 Vashon CWSP, Plate V-3 (Figure 2), and the same as in the 1992 Plan. There is the possibility of extending mains within the existing area, but there is currently no intention to expand the Planning or Service areas beyond the existing boundaries. The system is open to requests for service to groups in other areas, depending on the capability of the system.

Land Use and Zoning

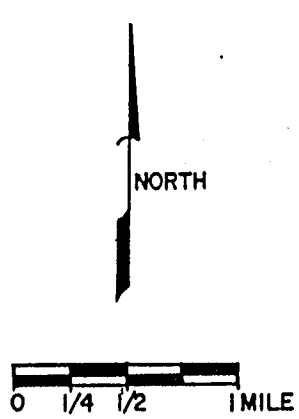
As noted in the Vashon Community Plan and the Vashon CWSP, zoning in the Heights area is primarily low-density rural residential. The 1995 King County Zoning Atlas map for the north part of Vashon Island is included as Figure 3, showing the designations. There are three zoning designations in the service area: RA-5 (Rural Area, one dwelling unit per 5 acres); RA-2.5 (Rural Area, one dwelling unit per 2.5 acres) and NB (Neighborhood Business). All of the existing tracts over 10 acres in size are zoned RA-5, allowing a maximum density of one residence per 5 acres. No change in the zoning is anticipated.

The majority of the service area is already subdivided to densities greater than the current zoning would allow. Because of this existing configuration, future division of most of the existing properties is not likely. A lot-by-lot examination of the service area revealed only a small number of tracts of land over 10 acres which could be subdivided to parcels of at least 5 acres (per the zoning). There appears to be approximately 1,166 parcels in the service area and a potential for the creation of about 25 more, for a total of 1,191 lots. Several very dense subdivisions exist in the service area, primarily along the waterfront. Some of these areas are not currently served by Heights, but instead by their own private wells or small public systems. These areas represent a large number of the potential future connections.

Of the existing 1,166 lots, Heights serves 590 parcels, approximately half of the lots. The remaining lots are either served from some other water source or remain vacant. Many of these lots are currently served by small public water systems or private wells.

The other known water systems in the service area are:

1. Biloxi Group with 6 services on springs,
2. Sylvan Beach Water System with 5 services on a well, or possibly springs,
3. Corbin Beach with 3 services utilizing well points,
4. Peretti with 5 services on a well,
5. Glen Acres Community System with 8 services on a well,
6. Morningside Water Group with 5 services and saltwater intrusion into wells,
7. Shanahan Road Group with 4 services on a well,
8. North Vashon with 26 services on springs - currently served by Heights Water on a contract basis.



-  Heights
-  Westside
-  Water District 19
-  Burton
-  Maury Mutual
-  Dockton
-  Gold Beach
-  Existing Boundaries

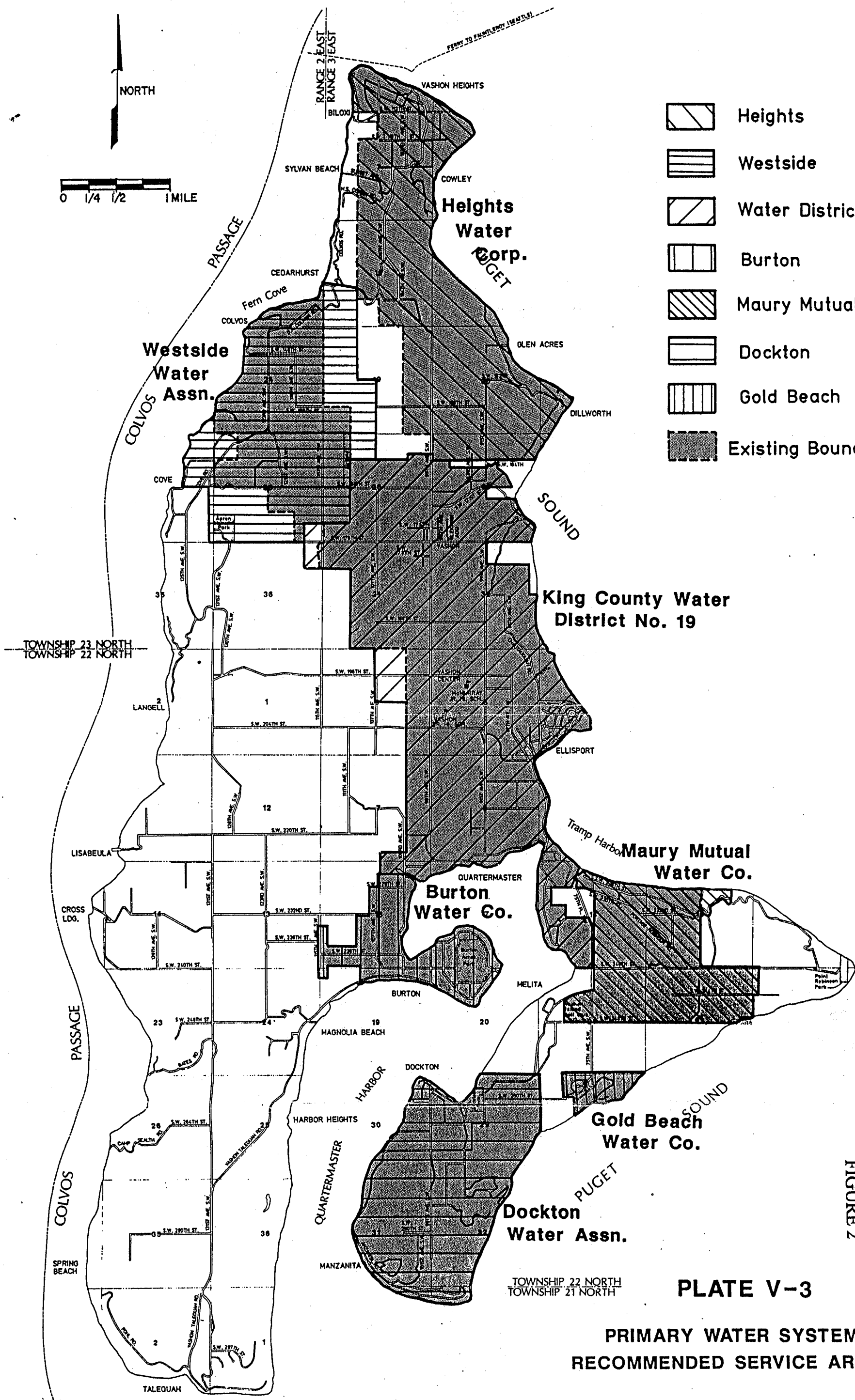
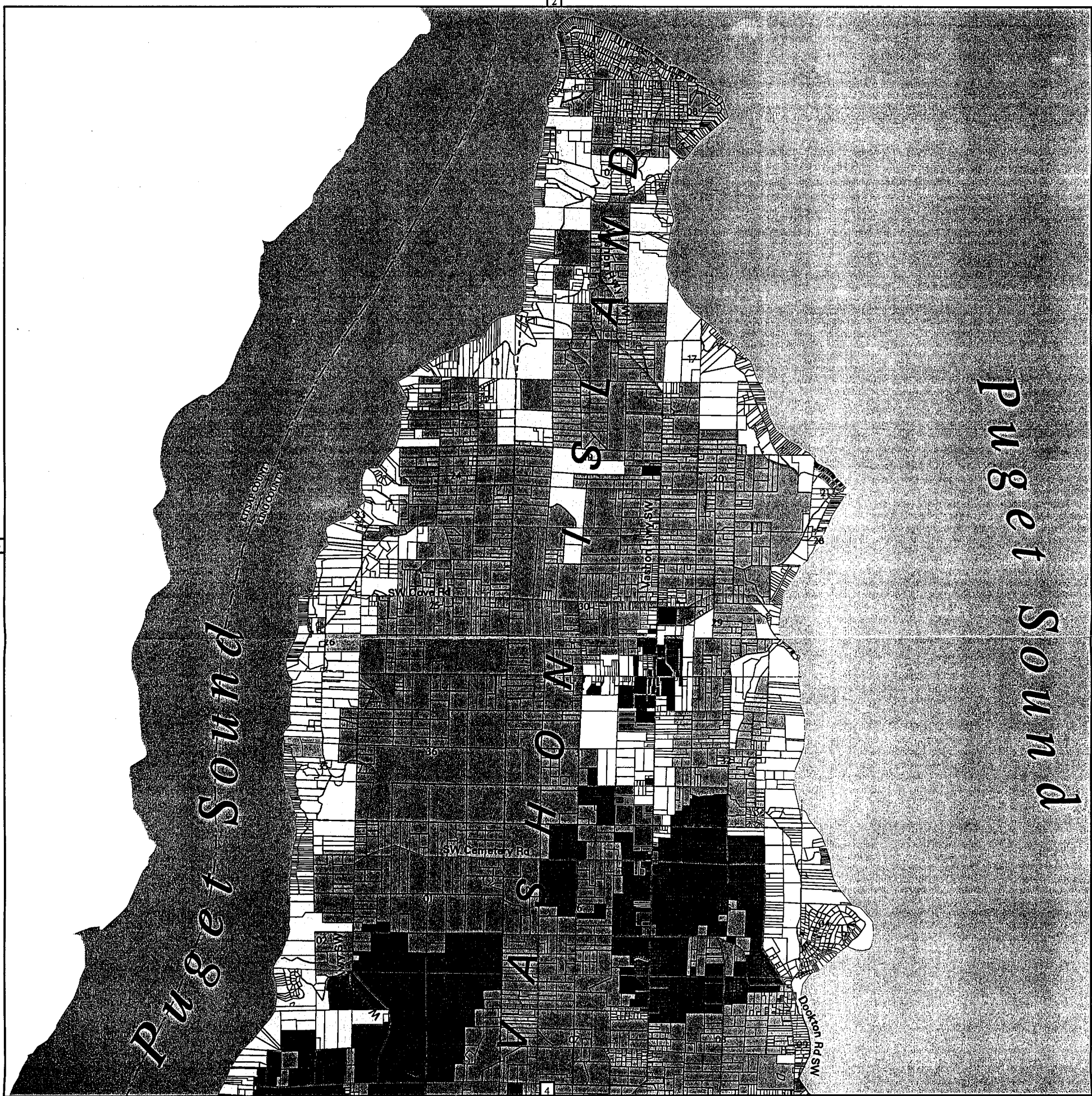


FIGURE 2

PLATE V-3

PRIMARY WATER SYSTEMS
RECOMMENDED SERVICE AREAS





KING COUNTY ZONING ATLAS

Vashon Island North

Includes zoning changes through Ordinance #12065 (December 1995)

ZONING CLASSIFICATION (DU = Dwelling Unit)

- | | | | |
|--|--|--|--------------------------------------|
| | A-10 - Agricultural, one DU per 10 acres | | R-8 - Residential, eight DU per acre |
| | A-35 - Agricultural, one DU per 35 acres | | R-12 - Residential, 12 DU per acre |
| | F - Forest | | R-18 - Residential, 18 DU per acre |
| | M - Mineral | | R-24 - Residential, 24 DU per acre |
| | RA-2.5 - Rural Area, one DU per 5 acres* | | R-48 - Residential, 48 DU per acre |
| | RA-5 - Rural Area, one DU per 5 acres | | NB - Neighborhood Business |
| | RA-10 - Rural Area, one DU per 10 acres | | CB - Community Business |
| | UR - Urban Reserve, one DU per 5 acres | | RB - Regional Business |
| | R-1 - Residential, one DU per acre | | O - Office |
| | R-4 - Residential, four DU per acre | | I - Industrial |
| | R-6 - Residential, six DU per acre | | Incorporated City |
| | | | Muckleshoot Reservation |
| | | | Urban Growth Area Boundary |

THIS MAP SHOWS ONLY THE BASE ZONING FOR EACH PARCEL OF PROPERTY.

THIS MAP DOES NOT SHOW SPECIAL DEVELOPMENT CONDITIONS, SUCH AS P-SUFFIX CONDITIONS, SPECIAL DISTRICT OVERLAYS, OR POTENTIAL ZONING THAT APPLY TO MANY PROPERTIES IN KING COUNTY.

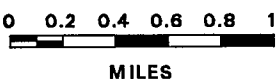
THIS MAP IS A GENERAL COLOR REPRESENTATION OF OFFICIAL ZONING CONTROLS. FINAL DECISIONS ON ANY INCONSISTENCIES ARE BASED ON THE ORDINANCE ESTABLISHING THE CURRENT ZONING.

ALL PROPERTY-SPECIFIC DEVELOPMENT CONDITIONS ARE DISPLAYED ON THE OFFICIAL ZONING CONTROL AT THE DEPARTMENT OF DEVELOPMENT AND ENVIRONMENTAL SERVICES (DDES), 3600 136TH PL SE, BELLEVUE, WA 98008, TELEPHONE 296-6600.

THE ATLAS IS PRODUCED BY KING COUNTY'S COMPUTER GEOGRAPHIC INFORMATION SYSTEM. COPIES OF THIS ATLAS ARE AVAILABLE FOR REVIEW OR PURCHASE AT DDES.

* for one DU per 2.5 acres exceptions see KGC 21A.12.030(B)(20)

FIGURE 3



These eight systems represent 62 services. These systems obtain water from a combination of wells and springs and are of varying ages and levels of development. Some of the systems would likely be eager to incorporate into Heights, such as Morningside Water Group, which the DOE has reported as being served by wells that appear to have a saltwater intrusion problem. The North Vashon system currently is served with water from the Heights system to replace its spring source. The existing small systems on springs are likely to incorporate early into the Heights system to avoid bearing the cost of Surface Water Treatment Rule compliance on their own. The Shanahan Road system is relatively new, being developed within the last three years on a well, and is likely to incorporate later, or not at all.

There are only six non-residential users of Heights Water: the Washington State Ferry System Pier; a restaurant; a former elementary school; a small garden nursery; a television transmitting station; and a nursing home. The six commercial customers use water equivalent to 22 residential connections.

The entirety of Vashon Island is designated as a Critical Water Supply Area and the Island residents are aware of the care that must be taken with this resource. The primary aquifer recharge area on Vashon Island is the inland uplands, including the central portion of the Heights service area. The edges of the island are generally steeper and the center of the island is relatively flatter. The Vashon Community Plan recommended a decrease in residential densities to help protect groundwater.

Fire Protection

As a Rural-zoned area, Heights Water is not required by the Fire Marshal to provide fire protection within its service area. While there are fire hydrants located throughout the distribution system, fire flow requirements are not met. The Vashon Volunteer Fire Department provides firefighting in the Heights service area. No hydraulic model or comprehensive residual pressure testing has been conducted on the system for this Plan. Limited testing has shown that the system is not capable of providing 1000 gpm. Heights plans to contact the connected residents during the next annual budget review to discuss the options and costs for provision of fire flow and to receive customer input.

Sanitary Sewer Service

Only the nursing home and one residence at the south end of the system are connected to a sanitary sewer system. All of the remaining service connections are served by either on-site sewage disposal systems or sewage holding tanks. Many of the septic systems in the service area are 20 to 30 years old and do not meet current King County Health Department codes. The Bunker Trail area, east of the ferry terminal along the waterfront, has been deemed a "Hazard Area" due to failing septic systems. There is current planning by the King County Health Department, and debate in the community, about extension of sewer service to this area but projected costs are high and sewer service is not foreseen for many years.

Because all of Vashon Island is in the rural part of King County, extension of sewer service into the Heights service area is unlikely.

Heights Existing Service Population

Heights Water currently has 590 direct service connections, 584 of them residential. Heights commercial connections add 22 Equivalent Resident Units (ERUs) to the 590 residential services, for a total of 612 ERUs currently served. The Heights Water System currently serves approximately 1,475 people.

Population Data, Forecasts and Capacity

In attempting to formulate population figures, there are several sources of information to consider. These sources include: the Puget Sound Regional Council (PSRC) 1995 population forecasts; the 1994 King County Comprehensive Plan Rural Household Ranges; the 1996 King County Annual Growth Report; a DOE report and; Height's knowledge of residences inside the service area obtaining water from small public water systems independent of Heights Water.

Capacity

The ultimate residential population capacity was calculated using the maximum number of housing units per acre, as allowed under the current zoning. Sensitive Areas (as described in the 1990 King County Sensitive Areas Map Folio), roads, parks and other lands not available for residential development were removed from the available area. Since there are currently only 6 non-residential connections to the system, and only two very small NB-zoned (Neighborhood Business) areas, growth of commercial uses is not anticipated (Figure 4). This analysis does not include a market availability factor or a cushion. The final residential capacity figure was converted to a population by multiplying by the local household size of 2.36 (1996 King County Annual Growth Report which assumes a constant household size over time). Residential capacity was calculated for the existing and future service area boundaries, which are the same. Facility planning was based on these figures.

Population Forecasts

Forecasts for the future of the Heights service area were developed from percentages of the different population forecasting sources (PSRC and King County). The projected population within the service area must be based on a known population at some point in time. This population is used to calculate a percentage of the larger forecast area to be applied to the service area. The 1997 service population in the Heights area is 1,475 people, 14.8% of the island total population of 9,973 people, with the service area covering approximately 10% of the island's land area.

The areas within the service area which are currently served by small public water systems are assumed to be slowly incorporated into the Heights system over the 20-year forecasting period. It is further assumed that people with

private wells will remain on these wells to avoid the cost of connecting to Heights.

1994 King County Comprehensive Plan

The 1994 King County Comprehensive Plan adopted Household Growth Ranges, including the Vashon Rural Subarea. These ranges are based on policy decisions and commitments by King County and cities within King County. Based on 4,100 households in 1992 and a high/low growth range of 300 to 500 new households for the entire island, the Heights service area, currently with 14.8% of the Island population, should receive from 44 to 74 new households by the year 2012.

Puget Sound Regional Council Data

The August 1995 Puget Sound Regional Council Population data for Vashon Island predicts an annual growth rate of approximately 0.5% through the year 2020. The waiting list and predicted future connections for Heights Water shares approximately equals this growth estimate. The PSRC data forecasts an Island population of 10,553 in the year 2012 and 10,821 in the year 2020.

The PSRC regularly updates its Forecast Analysis Zone (FAZ) population forecasts. The August 1995 data was used for FAZ 6930, Vashon Island.

Table 2-1 Heights Water
Population Projections Based on 1995 PSRC for FAZ 6930

	1990	1997	2000	2002	2004	2010	2012	2017	2020
Vashon Total	9309	9963	10258	10303	10348	10486	10552	10719	10821
Heights @ 14.8% of total	1376	1475	1518	1525	1532	1552	1562	1586	1602
Annual Growth	base	0.975 %	0.975 %	0.22%	0.22%	0.22%	0.31%	0.31%	0.31 %
Household Size	2.51	2.46	2.45	2.42	2.39	2.31	2.30	2.28	2.27
Heights services	549	599	620	630	641	672	679	696	706

1996 King County Annual Growth Report

The 1996 King County Annual Growth Report discusses the 1995 growth trends and population data for Vashon Island. While the Report states that Vashon has been experiencing steady growth over the last decade, only 63 new residential units were permitted on the Island in 1995, down 28% from 1994. Since 1980, the rate of increase in growth has dropped from 25% to 11.2%. The year 2010 population for the Island is forecast at 10,500 people.

Table 2-2 - Heights Water - Population Projections Based on 1996 King County Annual Growth Report

	1990	1997	2000	2002	2004	2010	2012	2017
Vashon Total	9300	9989	10300	10339	10378	10500	10539	10639
Heights @ 14.8% Total	1376	1478	1524	1530	1536	1554	1560	1575
Annual Growth	base	0.26%	0.26%	0.19%	0.19%	0.19%	0.19%	0.19%
Household Size	2.43	2.36	2.36	2.36	2.36	2.36	2.36	2.36
Connections	566	626	646	648	651	658	661	667

Note: Bold figures come from the Growth Report.

Table 2-2 predicts a 20-year increase in the Heights service population of 96 people, which equates to 41 households at 2.36 people per household in the year 2012.

DOE Report of Examination

In July of 1993, Heights Water submitted an application to the Washington State Department of Ecology (DOE) to increase their water right for the springs. As part of the investigation, the DOE describes the projected water use for the system (Appendix A). The report describes a request by the Washington State DOH for Heights Water to provide water service to the existing customers of the Morningside Water System. The existing Morningside wells are reported to have saltwater intrusion problems and can no longer be counted on as a source. According to the report, this addition of customers would result in an immediate increase of 75 connections. At 600 gpd per connection this would create a need for 31.2 gpm of new source. It is unclear why the DOE stated that addition of the Morningside Water System to the Heights system would require water for 75 connections, since Heights has reported there are only 5 services on this system. For planning purposes, we will assume that water availability will provide the possibility of 30 new services, considerably more than currently in the area, yet less than DOE reports as possible.

The DOE Report further states 'The placing of the main distribution line to Morningside will also open an opportunity for other customers (mostly existing small inadequate systems) to connect to this service. Because of this, a 20-year projection (2016) of 800 services would be realistic'. This would represent a 20-year growth of 210 additional services, a 35% increase, or 1.01% annually. The DOE report predicts not the growth of the service area population but the transfer of people from existing water sources to Heights and is therefore not the same type of projected growth represented by the other population growth figures.

Heights has recently begun talks with the residents in the Morningside area concerning extension of water service from the Heights system. These talks are preliminary and are aimed at a cost-effective method of providing this service and gaining local support for the cost of the project. The project would consist of extending a water main from the existing Heights system north along Glen Acres Road.

Growth Summary

It appears that the 60 potential customers on the waiting list for connections to Heights Water represent a growth potential similar to the greater population growth trend on the Island. 60 new connections would be more than predicted by the annual growth rate, assuming that these services are provided in the next five years. Heights has recently been in moratorium (not connecting new customers) for several years and the waiting list appears to represent several years of backlogged demand for water. The moratorium has recently been lifted with the addition of a new source and a reduction in the supply requirement to 600 gpd per connection.

The new well (42 gpm) is capable of providing 100 ERUs at 600 gpd. Heights will provide service to those currently on the waiting list, in addition to transferred services from small and failing water systems inside the service area. Zoning in the service area does not encourage new non-residential growth, so the same six commercial connections previously mentioned are assumed to remain fixed. There is a marked difference in the predicted growth rates projected by the 1995 PSRC for FAZ 6930 and the 1996 King County Annual Growth Report. In the interest of planning for the greatest possibility of connections, we choose to use the higher projection of growth. In addition to population growth, Heights also assumes transfer of services from other systems within the service and planning area. The following table summarizes projected growth from the different sources.

Table 2-3
Household Growth Summary of Future Heights Services

	1997	2002	2004	2012	2017	Buildout
1996 King County Growth Report	566	648	651	661	667	-
Zoning	-	-	-	-	-	1191*
PSRC FAZ Zones	599	630	641	679	696	-
1994 KC (Household Growth Range)	590	605/615	611/625	634/664	649/689	-
DOE Report	590	665	-	-	800	-
Summary of Expected Growth	590 (612)	680** (702)	690 (712)	715 (737)	730 (752)	1191 (1213)

* Assumes every possible lot in service area served by Heights, including those on private wells and small public systems.

** Assumes service to the 60 customers on the waiting list and 30 in Morningside.

Service Area Topography and Sensitive Areas

The topography in the service area varies greatly. The wells and springs are located in the relatively steep eastern part of the service area. The main distribution network follows the relatively flat Vashon Highway and the main service population is located in the gently to steeply sloping northern part of the service area. A topographic map is included as Figure 4.

The topography of the service area greatly affects the potential growth of the service population and land use. The island has many very steeply sloping areas. The Sensitive Areas map folio pages (Appendix B) show the mapped Sensitive Areas. The entire outer edge of the island is mapped as Wetland. There is one small Seismic Hazard area. There are numerous Class 2 and Unclassified streams in the service area. Figure 5 is a composite of the Assessor's maps and the Sensitive Areas maps. The limits of the Sensitive Areas delineated on Figure 5 are approximate.

The areas of greatest concern are the Erosion Hazard and Landslide Hazard Areas. The mapped Erosion Hazard areas surround the outer limits of the service area where it touches the waterfront. These are primarily very steep slopes along the waterfront. The Erosion Hazard Areas are extensive and by far the most limiting to development. These areas cover approximately half of the service area.

The presence of Sensitive Areas greatly increases the difficulty of subdividing land. When required building setbacks are factored in, much of an owner's land can become essentially untouchable for development, even on very large tracts.

The greatest potential for creation of new lots exists in the southern part of the service area. This area contains large areas of relatively flat or gently sloping land that is not mapped as containing sensitive areas. The section on Land Use and Zoning discussed the potential number of new lots in this area.

The Sensitive Areas place a severe limitation on the creation of new lots in the service area and may also impede the development of existing lots.

Geology and Soils

Glacial action shaped Vashon Island approximately 15,000 years ago. Much of the service area contains shallow soils over glacial till. The lack of suitable soil depth has played a role in limiting population growth in the area due to lack of suitability for septic tank/drainfield sewage disposal. Portions of the service area contain relatively deeper surface soils composed of coarse sands and gravels.

The three existing wells are located in, or near, a Seismic Hazard Area, per the Sensitive Areas Map Folio. The springs are located in a Landslide Hazard Area, as is much of the perimeter of Vashon Island. A landslide recently occurred (January 1, 1997) between the spring pump building and the shoreline. Heights has retained

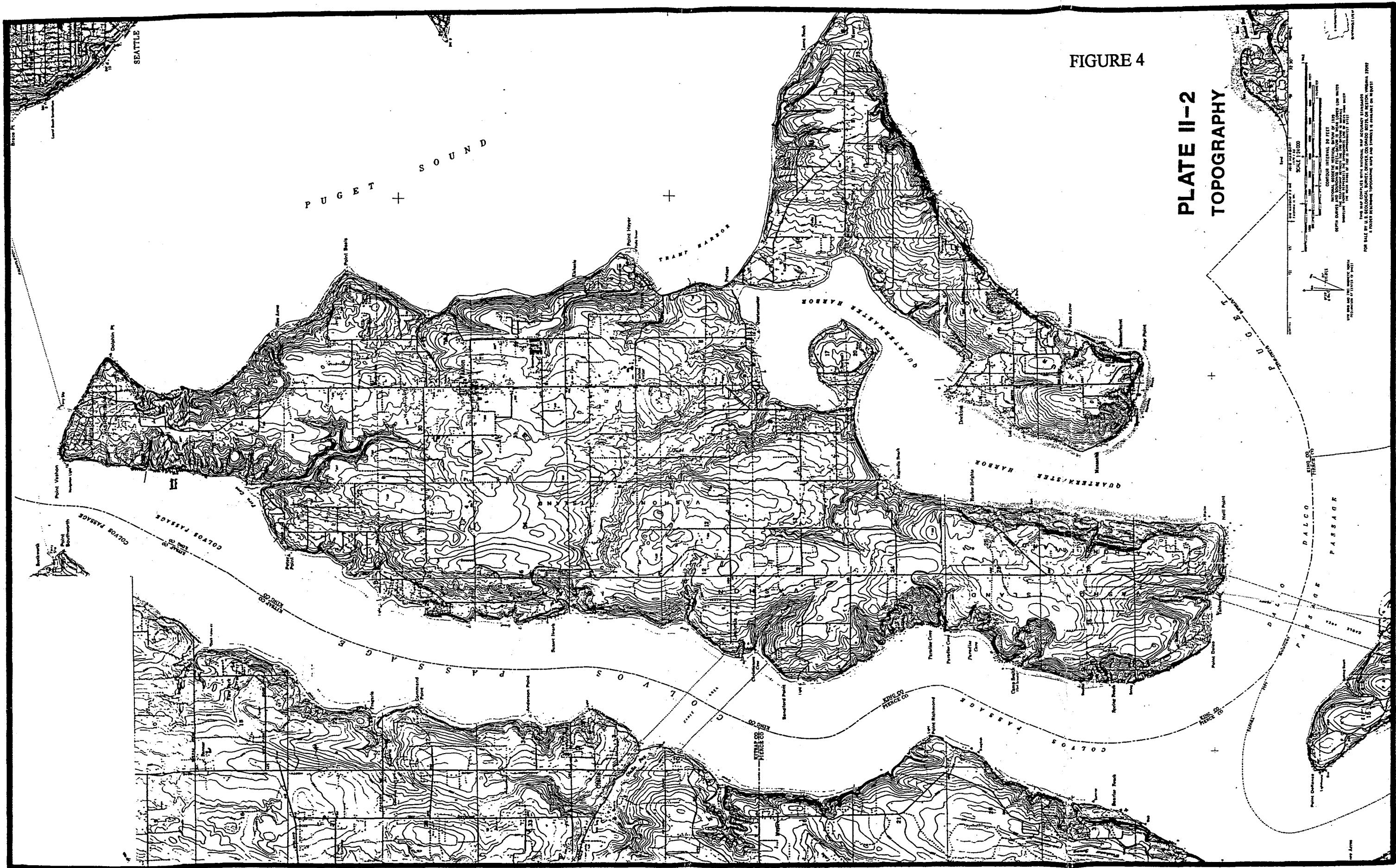


FIGURE 4

PLATE II-2
TOPOGRAPHY

SCALE 1:25,000

CONTOUR INTERVAL IN FEET
 50 FT. ABOVE 100 FT. ELEVATION
 20 FT. BELOW 100 FT. ELEVATION

THIS MAP COMPLETES WITH NATIONAL MAP ACCURACY STANDARDS
 FOR SALE BY U.S. GEOLOGICAL SURVEY, DISTRICT COLLEGE MAPS, OR RESTON, VIRGINIA 22092

U.S. GEOLOGICAL SURVEY, DISTRICT COLLEGE MAPS, OR RESTON, VIRGINIA 22092

FIGURE 5

COMPOSITE OF SENSITIVE AREAS
AND ASSESSOR'S MAPS

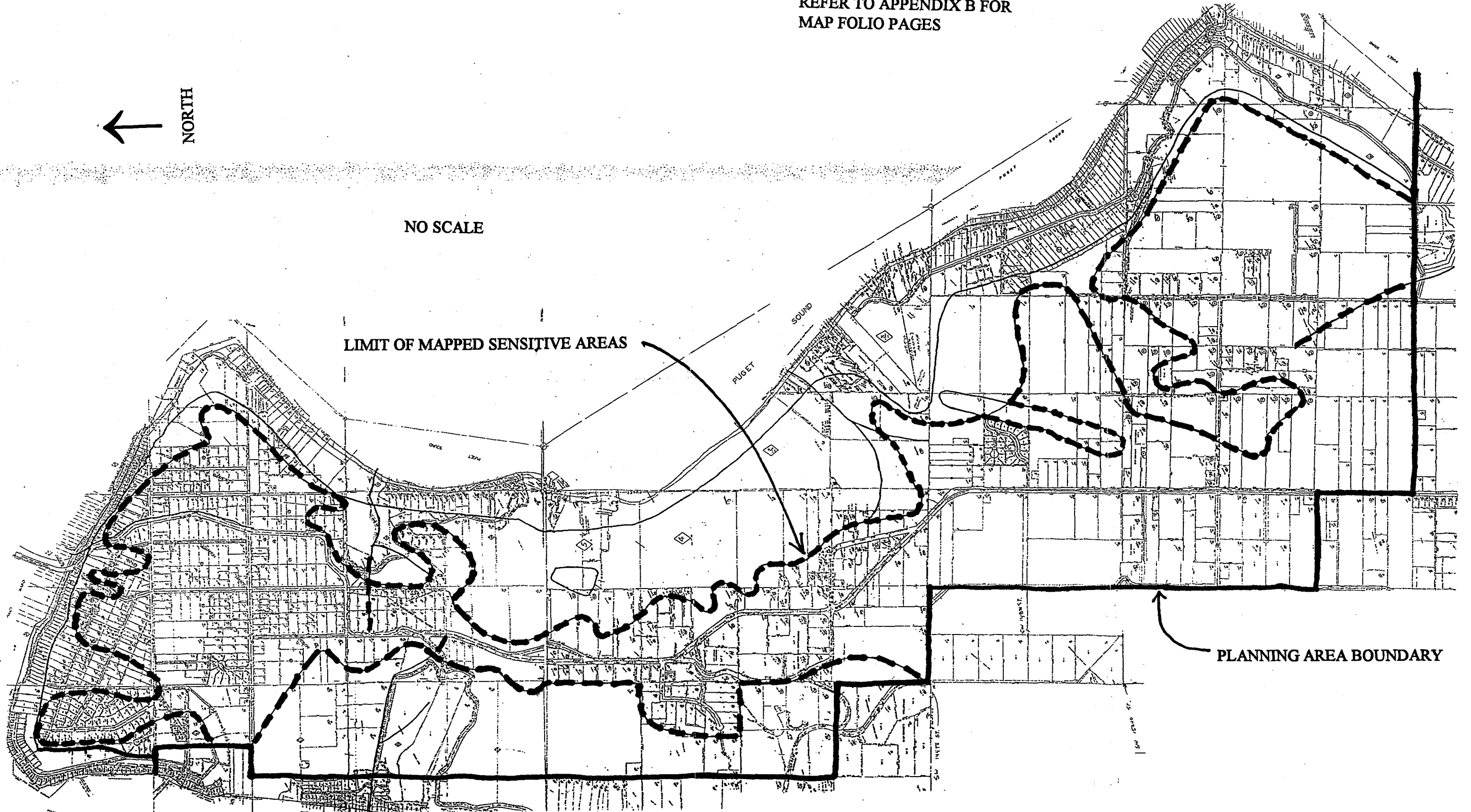
REFER TO APPENDIX B FOR
MAP FOLIO PAGES



NO SCALE

LIMIT OF MAPPED SENSITIVE AREAS

PLANNING AREA BOUNDARY



the services of a specialist to rebuild the affected area to protect the building. There was no harm done to any portion of the water system; the slide was down the hill from the easternmost part of the system.

Much of the service area is considered Erosion Hazard Area, due to the steep slopes. The wells and springs are all located in this area.

There are several streams in the service area, mostly unclassified. The westernmost part of the service area contains two short Class 2 streams near the shoreline. While these two streams are located in the service and planning area, there are no mains located near these streams and the general vicinity of these streams is not currently served by the system.

The entire shoreline of Vashon Island is classified as Wetlands and a small wetland is mapped in the south-central part of the service area, east of the Vashon Highway. This wetland is located approximately one mile south of the wells and springs.

A portion of a Hydrogeological Report by R. Rongey and Associates is included as Appendix C. This document discusses the subsurface geology of the service area, focusing on the aquifer.

Historical Water Consumption

The following table illustrates water consumption in the Heights system for 1997.

Table 2-4
 1997 Water Consumption

	Cubic feet per Month	System Gallons/Month	System Gallons/Day	gpd/conn.
January	374,008	2,797,954	93,265	158
Feb/March	401,455	3,003,285	100,109	170
April/May	312,346	2,336,660	77,889	132
June/July	433,665	3,244,248	108,142	183
Aug/Sept	609,781	4,561,772	152,059	258
Oct/Nov	740,739	5,541,468	184,716	313
December	404,326	3,024,763	100,825	171

Total 1997 Consumption (cubic feet)	5,774,306
Total 1997 Consumption (gallons)	43,197,583
Average Day Demand (ADD) per connection	201 gallons
Average cf consumption/day/connection	26.8 cf
Average cf consumption/month/connection	804.4 cf
Average cf consumption/billing period/connection	1,608.8 cf

Water production is a direct result of system demand on the pumps at the well and spring clearwells. The percentage of unaccounted-for water (non-revenue water) in

the distribution system is currently approximately 22%. The long-term goal is to reduce this to 10% or less.

Peak Day Demand can be best estimated from 1997 October/November average usage of 313 gpd per connection, with a peaking factor of 2.5, for an estimated PDD of 782 gpd. Production meters are read weekly and customer meters are read every two months. Water consumption varies considerably throughout the year, seemingly in response to weather changes, and also possibly due to annual migration of people from off-island to their summer homes, mostly on the beaches. Seasonal patterns of agricultural irrigation are not a concern since development patterns over the years have replaced the Island's small farms with residences.

Future Water Consumption

DOH has granted Heights a reduction in the required production capability from 800 gpd per connection to 600 gpd, based on historical usage data. This is reflected in Table 2-5, which combines the service area population forecasts with the Washington State DOH water source supply requirement of 600 gpd per connection.

Table 2-5
Future Connections and Water Production Requirement

Year	Number of ERUs- (based on Table 2-3)	Production Requirement* (gpd)
1997 (present)	612**	367,200
2002 (5 years)	702	412,200
2004 (7 years)	712	427,200
2012 (15 years)	737	442,200
2017 (20 years)	752	451,200

* Based on 600 gpd/connection.

** Current ERUs.

Current production approx. 503,586 gpd, enough for 839 ERUs at 600 gpd.

It is clear from Table 2-5 that additional source capacity will be required to provide for anticipated future growth of the system beyond 15 years. Long-term growth of the system will be dependent on securing new water sources.

Future Storage Requirements

The storage requirements of the system are summarized below. The system currently has an adequate volume of storage capacity. It appears that future storage volumes are also adequate. It may be in the interest of the system to change the physical location of any future storage tanks. With the exception of the 10,000 gallon elevated tank serving the south part of the system, all of the storage is centralized at the office. For the current supply sources this location is ideal. Should additional sources more distant from the office be incorporated into the system, it may be advisable to add storage facilities near those sources.

Table 2-6
 Future Heights Storage Volume Requirements Based on 600 gpd per connection

year	# of ERU	Q Total (gpm)	Largest source (gpm)(1)	Standby storage (gallons)	MID	Equalizing storage (gallons)	Total storage (gallons)
1997	612	349	185(2)	122,400	511	24,300	146,700
2002	702	349	185	140,400	574	33,750	174,150
2004	712	349	185	142,400	581	34,800	177,200
2007	737	349	185	147,400	599	37,500	184,900
2017	752	349	185	150,400	609	39,000	189,400

(1) This calculation assumes the most productive source out of service. This source is the wells at 185 gpm, however, when the wells are not pumping, the spring flow is at full capacity. The combined flow of 369 gpm is reduced by 1/3 of the 184 gpm (leaving 122 gpm) spring capacity when the wells are operating, for a total flow of 307 gpm, plus the new well at 42 gpm = 349 gpm. Springs at full flow (184 gpm) plus new well (42 gpm) = 226 gpm for standby calculation.

(2) This represents an approximate 45.1 gpm deficit in current production capability, based on full spring flow of 184 gpm.

* The new well was placed in service in 1997.

The current storage volume capacity appears to be adequate for the planning period. There are however, other storage concerns to consider. Both of the elevated tanks are aging and may need to be replaced before the end of the planning period. Without further study of the condition of the tanks, it is not possible to estimate their useful life.

The distribution system is divided into three systems; the north system, the south system and the southeast system. The Hydraulic Grade Line (HGL) for each of these systems is set by an elevated tank. The north system HGL is set by an elevated 20,000-gallon tank with an overflow elevation of 443 feet and the southeast system by an elevated 10,000-gallon tank with an overflow elevation of 464 feet. Pressure in the south system is maintained solely by the distribution pumps. Maintenance of these HGLs, and for the south and southeast systems the entire supply, is dependent on the reliability of the distribution pumps. The HGL for the south system is approximately 537 feet under normal conditions.

The south and southeast systems will be described in more detail in Chapter 3 but lack gravity storage volume of their own. Water is pumped continually from the main tanks to the elevated tank serving the southeast system. As long as pump reliability is maintained, the storage volume is not a problem, but future growth or pump reliability concerns may contribute to the need for additional storage to serve the south system. The preferred method of storage is a tank, or tanks, that can serve the area by gravity, as well as establish a suitable HGL.

Water Shortage Response

Heights Water maintains an intertie with neighboring Water District 19 for supply in case of an emergency. The aquifer from which Heights draws its water has been a

steady source of water since it was initially developed in 1931. A strong conservation program has been in effect for many years and Islanders are very aware of the limited nature of the water resources on the Island. Under normal operating conditions, pressure is slightly higher on the District 19 side of the closed valve, as maintained by District 19 pumps. Under emergency conditions, such as loss of power or a catastrophic water loss in District 19, the higher elevation of the Heights system allows water to transfer readily to District 19. In the converse situation, water must be pumped to Heights from District 19. There is no flow control valve at the intertie and hydraulic modeling of the intertie has not yet been undertaken.

Surface Water Treatment Rule Compliance

The United States Environmental Protection Agency (USEPA) developed the *Surface Water Treatment Rule (SWTR)* in 1989, in response to the *Safe Drinking Water Act (SDWA)*. The intent of the regulation is to protect end users from organic, inorganic, microbial and radionuclide contaminants in drinking water. It further establishes requirements for testing, filtration and disinfection of surface water sources and sources "under the influence of surface water". Surface water sources include lakes, rivers, some springs and other surface water. Sources under the influence are somewhat harder to define but also must be considered in any plan.

An example of a water source under the influence of surface water would be a well drilled in a aquifer that is directly connected to a river, lake or stream through a subsurface channel or lens of permeable soil, such as sand or gravel. Changes in the turbidity, temperature or quality of the water in the stream, lake or river are then transmitted through the connection to the subsurface intake point of the well.

The 1992 Update of the Heights Water Plan does not mention the SWTR even though the Rule was promulgated in 1989. The current regulatory environment requires that this issue now be addressed. Since much of the water source capacity of the system is derived from springs, the applicability of the SWTR is important in future planning for the system. The filtration and disinfection requirements for surface water sources are very stringent and can lead to the design and construction of extensive facilities for treatment of source water.

The applicability of the SWTR for each system is determined by the WSDOH. It is possible that the state may decide that the springs are not under the influence of surface water, after testing and investigation of the existing system. If the source is not considered to be under the influence of surface water, the treatment of the water may remain with only disinfection, as is now the case.

The most important consideration in the determination of whether the Heights springs are under the influence of surface water is the physical protection of the springs from potential contamination. The existing springs are located on the side of a very steep slope and are therefore not located in a shallow area; a great depth of native soil overlies the aquifer. The construction of the buildings is such that no animals or debris can enter the spring source. The spring collection buildings are

constructed of concrete blocks and wood framing and are covered by new green fiberglass panels. All openings are screened with a fine mesh screen and the buildings are kept locked.

The spring buildings are surrounded by a gravel-filled, plastic-lined ditch to divert surface water away from the buildings. The included drawing (Figure 8) shows the construction detail of this ditch, as well as the general construction of the spring buildings.

Spring Water Data Collection

Heights maintains a water temperature gauge, which is read three times per week. The temperature is usually $42\pm$ degrees Fahrenheit. pH is only occasionally tested, usually yielding a reading of $7.5\pm$. The stability of the temperature readings indicates that the aquifer is not under the influence of seasonally warmer or colder surface waters. Additionally, the stability of the pH reading indicates a steady, deep, ground-filtered source without fluctuations in pH. In some cases, fluctuations in pH levels could be indicators of decomposing vegetation or other pH-altering sources in connected ponds and streams. In the Heights system, there has been no indication of a need to monitor turbidity or conductivity, other potential indicators of surface water influence. Should the source temperature or pH begin to fluctuate, a need for this additional testing may then be indicated.

Based on a long history of excellent water quality and the information collected to date on temperature and pH, it appears reasonable to assume that the Heights aquifer is not under the influence of surface water.

Well No. 4 Manganese

Testing of Well No. 4 revealed a Manganese level of 0.15 mg/l, three times the Maximum Contaminant Limit (MCL) for this substance. DOH has given approval for blending of the new well source into the existing system and this well has been added to the source capacity of the system.

Chapter Three -- Existing Water System

Supply

The current water supply source for the system consists of two covered, adjacent springs and three drilled wells. All of the current water sources are supplied from a common aquifer recharged from the larger aquifer of the sands underlying the central portion of Vashon Island. Substantial buildings protect the springs, and the wells are individually fenced and locked. Hydrogeologic investigations by R. Rongey and Associates, April 1989 (Appendix C) describe the aquifer as having "the characteristics of a large gravel packed well in a regional sand aquifer".

Appendix D contains the Ground Water Contamination Susceptibility Assessment Survey Forms for both of the springs and for wells 1 through 4. The wells are described as having "evidence of confining layers". Appendix D also contains a letter from Ken Amer, a former Trustee of Heights Water, explaining that there are no septic systems within 1000 feet of either the springs or wells 1, 2 or 3.

Wells

The three original wells (1, 2 and 3) are located in a small valley between the Vashon Highway and the springs, along the eastern shoreline of the Island. Each wellhead is protected by a small cedar and concrete block enclosure and is fenced and locked. The wells are all located near each other in the valley and the entire wellfield area is gated and locked. The fourth, and newest, well (4) is located adjacent to the system office, immediately west of the building.

Wells 1, 2 and 3 pump directly to a small building with a 20,000-gallon clearwell, where the water is chlorinated. The wells are each metered inside the chlorination building at the point where the water flows into the clearwell. The building contains a large pump for transmission of the water up the hill to the main storage tanks and chlorination equipment. The transmission line for the wells is separate from the transmission line for the springs. Figure 6 shows the piping configuration of these three wells relative to the transmission and distribution systems.

Well 4 pumps directly into the storage tanks at the office site.

Springs

Each of the springs is covered by a locked building. The spring water flows by gravity from the spring buildings, through a sediment trap, and into a 26,000 gallon covered clearwell under the floor of the spring pump building. The water is chlorinated at the suction inlets of the transmission pumps as it is pumped into the transmission main. Figure 8 shows the construction of the spring buildings. Figure 9 shows the configuration of the spring pumping building.

Water Rights

Heights has water rights for all of its sources. The water rights for the wells are in addition to the rights for the springs. The water rights for wells 1, 2 and 3 are described in the April 1996 DOE Report of Examination (Appendix A). Well #1 has a right for 60 gpm instantaneous; well #2 for 85 gpm instantaneous; and well #3 for 40 gpm instantaneous. Well #4 has a right for 42 gpm instantaneous. The permitted quantity for the four wells is 283 acre-feet per year, or approximately 92.2 million gallons per year.

The actual measured pumping rates for the wells are as follows:

Well #1 - 60 gpm (equals instantaneous draw water right)

Well #2 - 110 gpm (exceeds instantaneous draw water right by 25 gpm, but is the last pump to turn on and the first to turn off)

Well #3 - 40 gpm (equals instantaneous draw water right)

Well #4 - 42 gpm (equals instantaneous draw water right)

The water rights for the two springs permit the withdrawal of 0.41 cubic feet per second (cfs) (184 gpm). For design calculation purposes, the production capability of the springs is 264,971 gpd, equal to 184 gpm, or 96.7 million gallons per year.

The combined total water rights are therefore 283 acre-feet per year for the wells, plus 273 acre-feet per year for the springs, for a total of 556 acre-feet, or 181 million gallons, per year. Based on the source requirement of 600 gpd per connection, the water rights appear to be adequate beyond the planning period.

Source Pump Configuration and Usage

Because there are multiple water sources, the order of pumps turning on and off is complex. The preferred source of supply is the springs, because no energy is required to collect the water from the aquifer. When distribution system usage lowers the water level in the main storage tanks at the top of the hill, a signal is sent to the first pump in the spring clearwell to start pumping water. If this pump can not keep up with demand, a second pump in the spring clearwell must be activated manually by placing the motor starter switch on "auto". This activates the "secondary" pumping system, which is designed to allow full utilization of the total available flow from the springs. This feature is not used during the winter, when distribution system demand is low.

The design of the "secondary" pumping system is based on the fact that no single pump at the springs can pump all the available spring flow. When total flow utilization is required during the summer, the "secondary" system is activated.

The system is operated by two sets of liquid level controls, one for pump #1 ("primary") and one for pump #2 ("secondary"). Once activated, the total flow from both pumps slightly exceeds the available flow from the springs, causing the water level in the clearwell to drop below the level of the highest set of electrodes,

deactivating pump #2. Pump #1 continues to run while the clearwell slowly refills to the high set of electrodes, which then re-starts pump #2. The two pumps continue to operate in this manner until the "secondary" system is de-activated by manually shutting off the motor starter to pump #2.

Pump #3 at the springs is an auxiliary only and is not connected to the control system.

If the system demand exceeds the 184 gpm capacity of the pumps in the spring clearwell, the "secondary" system turns on the 185 gpm pump in the wellfield clearwell. As the water level drops in the wellfield clearwell, the first well pump turns on, followed by the second and third if necessary. The well pumps turn on in the following order:

1. well #3 (5 HP)
2. well #1 (7.5 HP)
3. well #2 (10 HP)

Shutdown is in the reverse order, so that the highest horsepower pump, drawing the most electricity, is on for the shortest possible time, to conserve electricity. Since the well pumps deliver water at a higher rate than the source pump can remove the water from the clearwell, well pump #2 is only on for short periods of time. The wells are not piped together and each pumps directly to the wellfield clearwell.

Since the productivity of the wellfield is limited by the single 185 gpm pump in the clearwell, the production capability of the wells, with all three wells pumping, is 266,400 gpd, or 97.2 million gallons per year.

The Rongey report states "long term well use, as occurs during the summer and during the 1987-88 winter testing period results in a gradual aquifer water level decline which reduces spring flows by nearly a third". This statement is based on long-term use of both of the well pumps (wells 1 and 2 only) that were in place at that time. This reduction in spring capacity will be addressed in the next section describing the springs and is factored into the source capacity and storage volume calculations.

Well 4 is plumbed into the fill line for the 100,000 gallon concrete tank.

Pumps

The existing pumps in the system are as follows:

Transmission pumps from spring clearwell to storage tanks:

No. 1 - 20 hp electric Fairbanks Morse 11-stage vertical turbine pump, 135 gpm@385' head

No. 2 - 15 hp electric Pomona 7-stage vertical turbine pump, 105 gpm@378' head

No. 3 - 20 hp electric or 55 hp gas engine (dual drive) Worthington 9-stage deep-well pump, 112 gpm@370' head

Source pumps from the wells to the wellfield clearwell:

Well No. 1 (source 5) - 7.5 hp electric submersible pump, 60 gpm

Well No. 2 (source 5) - 10 hp electric submersible pump, 110 gpm

Well No. 3 (source 5) - 5 hp electric submersible pump, 40 gpm

Source pump from well #4 (source 6) to storage tanks.

The pump is a 7.5 hp submersible (F&W) capable of giving 42 gpm at 500' head.

Transmission pump from the wellfield clearwell to storage tanks:

15 hp electric Pomona vertical turbine pump, 185 gpm

Booster pumps at the office, which can pump to either the north or the south:

#1 - 7.5 hp electric Sta-Rite centrifugal pump, 2" x 1.5", 155 gpm at 120' head;

#2 - 5 hp electric Gould centrifugal pump, 1.5" x 1.25", 70 gpm at 160' head;

#3 - 5 hp electric Gould centrifugal pump, 1.5" x 1.25", 70 gpm at 160' head;

#4 - 15 hp electric Sta-Rite centrifugal pump, 4" x 3", 460 gpm at 100' head;

#5 - Auxiliary 16 hp Kohler gas engine with Goulds centrifugal pump, 2" x 1.5",
125 gpm at 235' head.

The normal operation scenario for the booster pumps at the distribution station is for a switch to select either the springs or the wells as the main source. The level controls in the 100,000 gallon tanks, depending on which is selected as the control tank. This is manually selected, allowing personnel to take tanks off line for cleaning. The lead system (springs or wells) then provides all supply, as long as it can keep up with demand. If the level in the control tank falls too low, the lag system turns on, providing considerably more inflow to the tank.

The choice of distribution pumps is based on system demand and operator experience and varies throughout the year.

Combined Total Source

Since the wells and springs all flow from the same aquifer, the effect of combined pumping from all five sources simultaneously is important. Since the springs are the primary source of water, with the wells only operating when the demand exceeds spring capacity, the reduction in spring flow mentioned above is only noticed during periods of peak demand. Since the system must plan for peak use, subsequent calculations are based on actual quantities that can be pumped from the aquifer. The one-third reduction in spring flow caused by using all of the wells means that the aquifer can not supply all the water the pumps are capable of pumping. During extended periods of pumping, the spring flow is reduced by one-third, while the wells pump at full capacity. The combined total flow is therefore:

- 185 gpm for wells 1, 2, and 3,
- 122 gpm for the springs, (2/3 of 184 gpm),

42 gpm for well 4,
for a total peak-demand source capacity of 349 gpm, or approximately 183.4 million gallons per year.

Well Head and Watershed Protection

Heights Water does not own the land upon which the springs and original well sources are located. The 1979 sale of the property includes language granting Heights Water rigid control of access to the well and spring area. The real estate contract also prohibits improvements or structures from the ridge to the pump house, effectively precluding any development from the wellhead area. The first of the three wells was drilled in 1979 and all of the wells are in a gated area. While the source area is gated and posted as a watershed area, no fences exist to keep people out of the area, but Heights has strict control of access to the area.

Frequent inspections of the area are conducted as part of routine maintenance of the system. Reading of source meters and maintenance of chlorination systems requires operator presence in the watershed area, as the chlorination facilities are located in the clearwell buildings associated with each source.

Heights completed a Ground Water Contamination Susceptibility Assessment Survey Form in 1994. This document is included as Appendix D. The only potential contaminant sources identified were residential septic tank systems (regulated by the local Health Department) and possible residential pesticide use.

Heights has begun preparation of a Watershed Control Program, to be completed after the Water System Plan is approved. A great deal of time can be involved in the research and creation of such a program. More time is involved in implementing the program. Heights wishes to complete the Water System Plan before completing the Watershed Control Program in order to use limited office staff time effectively and to spread the necessary expenditures over time. Creation of the Watershed Control Program will probably require the services of a groundwater specialist and the time involved in preparation of the Program would create an unnecessary delay for the Water System Plan.

Treatment

The treatment of the water is limited to precautionary chlorination. A 12.5% solution of sodium hypochlorite is stored in each building and mixed into the 55-gallon solution tank at 5 gallons of sodium hypochlorite (12.5%) to 50 gallons of water. A copy of the chlorination system detail is included as Figure 10. The metering pumps are designed to run whenever the lift pumps operate. The chlorination system is the same for the springs and the wells.

Transmission

Water from the well and spring clearwells is pumped through dual 4-inch diameter transmission mains up the hill to the storage tanks.

Water Production Capability

Extrapolating on the Rongey report, the combined available peak flow at the spring source is only 2/3 of the 184 gpm available when the three well pumps are not in use. This yields 122.7 gpm peak demand flow from the springs, equal to 176,688 gpd. The combined available flow from the four wells is 185 gpm, plus 42 gpm, equaling 227 gpm, or 326,880 gpd. The combined daily production capability is therefore 503,568 gallons. Based on 600 gpd per connection, there is currently enough production capacity for 839 connections.

Table 2-4 illustrates 1997 water consumption and gpd per connection for this time period.

Per recent DOH approval, the production capability should be at least 600 gpd per service connection. Since there are currently 590 connections, the DOH-required production capability is 354,000 gallons. Based on the existing production capability of 503,568 gpd, there is a surplus of 149,568 gpd, the equivalent requirement of 249 connections. This is more connections than are anticipated for the planning period. For the planning period, the system is capable of supplying all of the water demanded by its customers.

Water Storage

There are a total of five water storage tanks in the system. The property where the office is located has three 100,000-gallon ground-level tanks and a 20,000-gallon elevated tank (Figure 11). There is another 10,000-gallon tank located further south along the Vashon Highway. The total storage capacity of the system is therefore 330,000 gallons.

The distribution system, under normal operating conditions, is divided into three systems, known as the North, South and Southeast systems. Under these conditions, the 10,000 gallon tank fills from the south distribution main and discharges to the southeast system only. Therefore, the HGL of feet established by the 10,000 gallon tank is for the southeast system only.

In the event of power failure, the distribution pumps are inoperative and the elevated tank supplies both the south and southeast systems. This feature is due to a check valve in the tank's fill piping which is normally kept closed by the continuously-operating distribution pumps. When the pumps are inoperative, the check valve opens, thereby supplying both the south and southeast systems. The HGL for the south system is therefore set by the distribution pumps. A detailed drawing of the piping arrangement at the south elevated tank is included on sheet 2 of the drawing in the Coliform Monitoring Plan, in Appendix F.

The HGL for the North System is set by the 20,000-gallon elevated tank. Because of the small volume of the South System elevated tank, the maintenance of storage volume for this part of the system is based on the reliability of the pumps delivering

water to this tank. The North System can readily be served by gravity from the remaining 300,000 gallons of storage at the same location, although at a reduced pressure once the 20,000-gallon elevated tank is emptied. The overflow elevation of the North System tank is 443 feet.

Because of the relatively small volume of the tank serving the southeast system, a pump at the main storage area runs continuously to keep the elevated tank supplied. There is no separate storage for the south system beyond the shared volume of the 10,000 gallon tank as previously described. The overflow elevation of the tank serving the Southeast System is 464 feet. The HGL for the South system is approximately 537 feet and is maintained by the booster pumps.

Standby Storage

Since the current situation is based on a 600 gpd production requirement, application of the DOH Sizing Guidelines for 100 or more connections, with multiple sources yields.

$$\frac{226 \text{ gpm} \times 1440 \text{ min/day}}{612 \text{ ERUs}} = 532 \text{ gpd per ERU}$$

The basic storage requirement is $612 \times 600 = 337,200$ gallons. Assume source with the greatest capacity is out of service (loss of the wellfield clearwell pump at 185 gpm would remove 3 wells from service). The combined pumping capability of remaining sources is the springs plus well 4 = 184 gpm. Therefore, the minimum standby storage required = $(600-532) \times 612 = 41,616$ gallons, however, the absolute minimum standby storage is 200 gpd per connection is $612 \times 200 = 122,400$ gallons.

Since current storage capacity is 330,000 gallons, the existing standby storage capacity is sufficient.

Equalizing Storage

The equalizing storage calculation, again using the DOH Sizing Guidelines, is:

MID = Maximum Instantaneous Demand

Q = Source Production Rate

$$ES = (MID - Q) (150)$$

Applying the known reduction in source capacity to this equation yields:

$$MID = 153(\text{gpm for first 100 connections}) + (512 \times 0.7 \text{ gpm}) \text{ for remaining connections} = 511 \text{ gpm}$$

$$Q = (2/3 \times 184\text{gpm}) + 185\text{gpm} + 42 \text{ gpm} = 349 \text{ gpm}$$

$$ES = (511-349) (150) = 24,300 \text{ gallons}$$

Adding the standby storage requirement of 122,400 gallons to the equalizing storage requirement of 24,300 gallons yields a total storage requirement of

146,700 gallons, which is less than the existing storage capacity of 330,000 gallons

Distribution and Standards

The system has grown randomly over the years in response to immediate needs. As a result, the distribution system is comprised of 2", 2½", 3", 4", 6" and 8" PVC, 4" and 6" AC, and ¾", 1", 1¼", 1½", 2" and 2½" steel pipe. There is pipe in the ground dating back to 1931. The system is mostly linear, with long runs of four and six-inch main serving dead-end areas. In one case, an eight-inch main with a hydrant is fed by a four-inch main. The topography and existing road locations of the service area, combined with the relatively low density of the services, has led to very little looping of these small mains, as shown in Figure 6.

There is an on-going program of repairing leaking mains. This often involves upsizing the main. In an attempt to increase service flow to the system, the mains are slowly being upsized when finances permit.

As a general Heights Water policy, whenever repairs are necessary, an effort is made to replace old pipe with C-900 PVC piping and to increase pipe size to improve fire and service flow capabilities. The policy on fire flow is discussed in more detail below and in Chapters 2 and 7. There is currently no set of construction standards for all construction within the system. Meters are placed on all services and regular maintenance reveals situations which require attention.

Pressure Zones

There are several pressure zones within the system. The storage tanks are located on the highest land within the service area, while many of the service connections are on the beach. There are four pressure reducing valves in the distribution system. The system pressure is as high as 150 psi near the ferry pier. In areas where the system pressure exceeds 50 psi, individual pressure reducing valves are provided at the customer meter. In addition to reducing pressure, the subsequent reduced flow aids in water conservation. Figure 7 illustrates measured pressures throughout the system. A hydraulic model is necessary to more precisely define system pressure zones.

Telemetry System

The electrical float controls for the pumps at the wells and the springs are hard-wired to the pumps. There is also an automatic alarm dialer in case of power outage, phase loss, or low water in the three 100,000-gallon storage tanks. This system has a dedicated phone line and uses the local PTI Communications telephone lines to dial one trustee and the system operator. Upon receiving an alarm, the operator or trustee can respond to investigate and attempt to correct the situation.

Fire Protection

As a rural area, Heights is not required to provide fire flow. The system does try to provide water for firefighting to the best of its ability. There are 31 fire hydrants in the system that are currently used for this purpose.

No hydraulic model has been completed for the system. A potential problem is the residual pressure when the fire department connects to a hydrant served by an undersized main. Most areas of the system utilize pipe smaller than eight inches in diameter; many non-looped mains are only four inches in diameter.

It is recommended that a hydraulic model of the system be completed for determination of fire flow capabilities. If the system is not capable of providing fire flow, hydrants should not be installed. Where hydrants are installed in the system, they should be tested and shown capable of providing fire flow while maintaining the minimum required system pressure elsewhere in the system.

It should be periodically pointed out to system customers that the presence of fire hydrants in the area does not necessarily mean that adequate fire flow is provided. Since King County Code does not require fire flow in this area, Heights has no obligation to provide this flow. Customers should not misunderstand this situation, as a potential exists for legal action should someone lose property to a fire, having assumed Heights would provide fire flow to put the fire out.

The fire protection goals of the system are described more fully in Chapter Two.

Intertie

The existing intertie with Water District 19 consists of a valved 2-inch diameter pipe (Figure 6). The verbal agreement between District 19 and Heights provides for opening the valve(s) for emergency use. As described earlier in this Plan, Heights is negotiating with Water District 19 concerning a formal intertie agreement. The intertie should be examined if a hydraulic model is developed and the agreement approved by the DOH and DOE.

Opening of the intertie has implications for the maintenance of storage volume and pressure in the Heights system. Under normal conditions, the pump-maintained pressure on the District 19 side of the valve is slightly higher than on the Heights side. There are no control features or gauges on the intertie to monitor or control the flow of water in either direction.

The last time the intertie was opened, the lower pressure on the District 19 side of the valve caused much of the water to be drained out of the Heights distribution system.

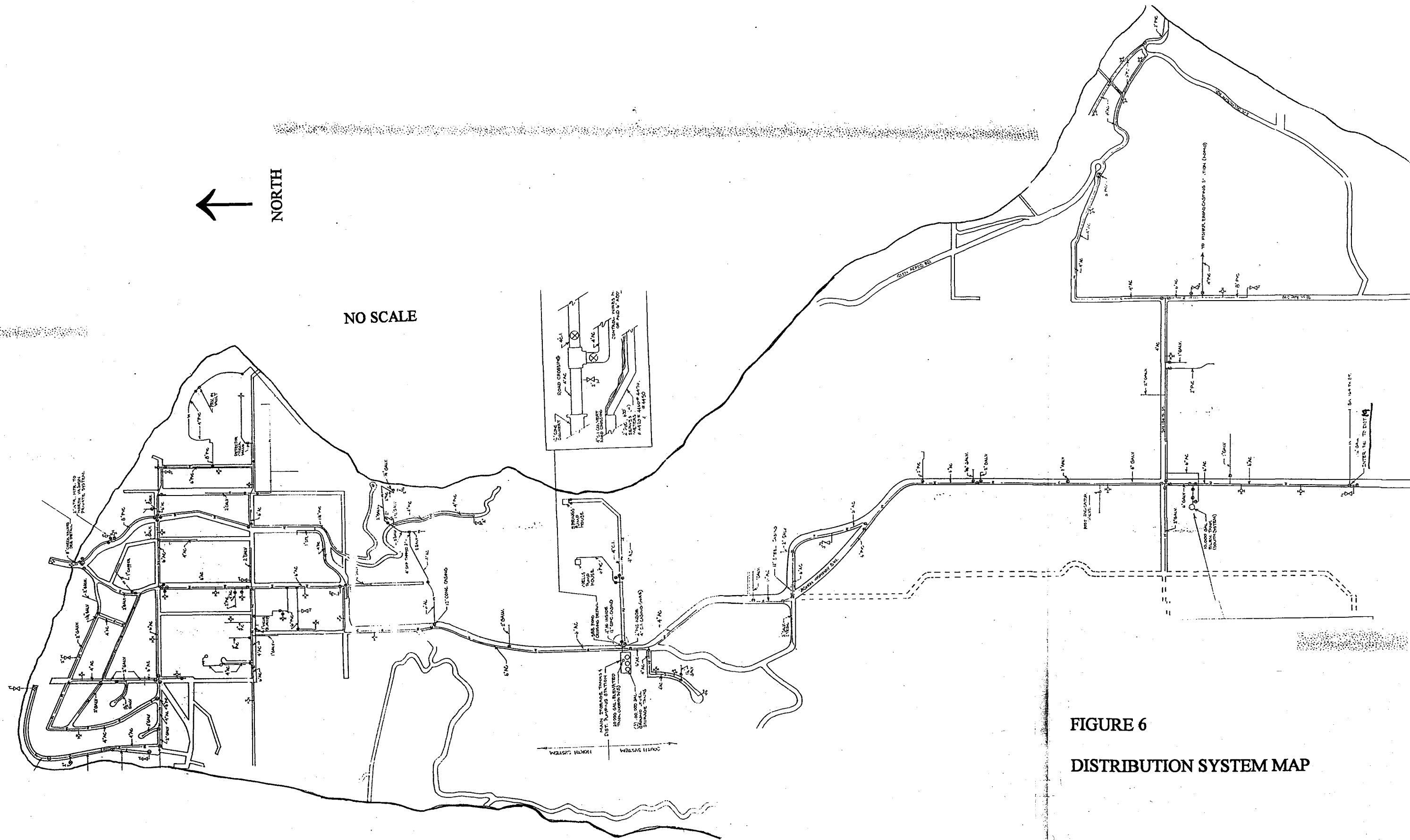
System Improvements Since Last Plan

Since the 1992 Plan, there have been many system improvements. Leaks have been repaired and 790 feet of 8-inch PVC main, with a 6-inch hydrant, were added along 91st Avenue SW in the vicinity of SW 159th Street. Numerous projects have been completed at the request of residents in specific areas. The majority of these improvements have been funded by the affected residents.

Lack of system financial resources limited the ability to undertake major system improvements. The reduction of the source capacity requirement to 600 gpd, along with the addition of the new well source, has allowed the system to provide new water shares, thereby increasing income and allowing for planning of substantial future system improvements.

A new well (well #4) has been completed and added to the source capacity of the system, thereby increasing source reliability.

In 1992, a perforated pipe was added to the drain around the spring collection buildings, as part of the maintenance of this important feature. Insect screening was added to the spring collection buildings in 1992. A 4mm tarp was placed over the collection area inside the buildings in 1992.



NORTH

NO SCALE

FIGURE 6
DISTRIBUTION SYSTEM MAP

SEE ALSO FIGURE 12
AND COLIFORM PLAN

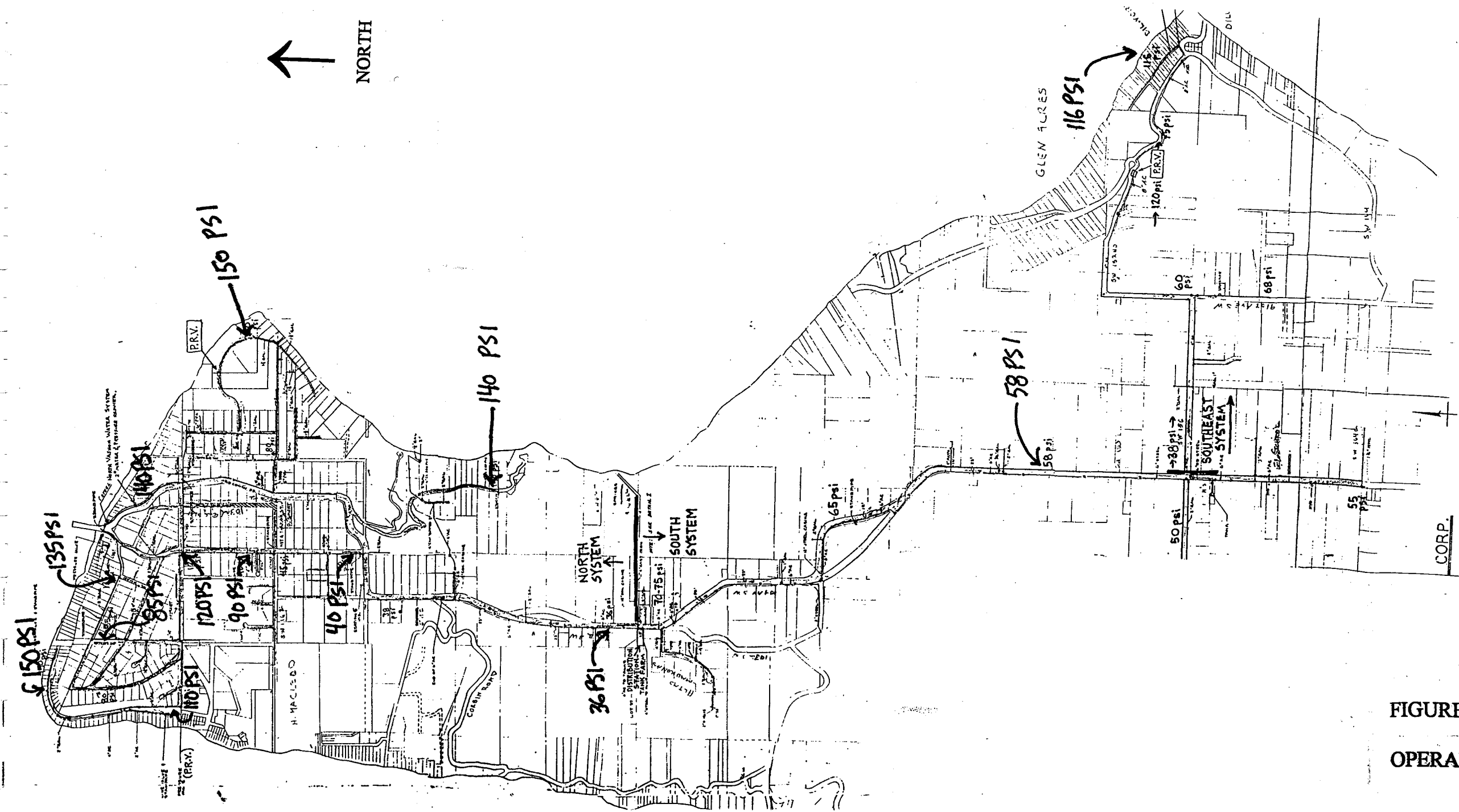
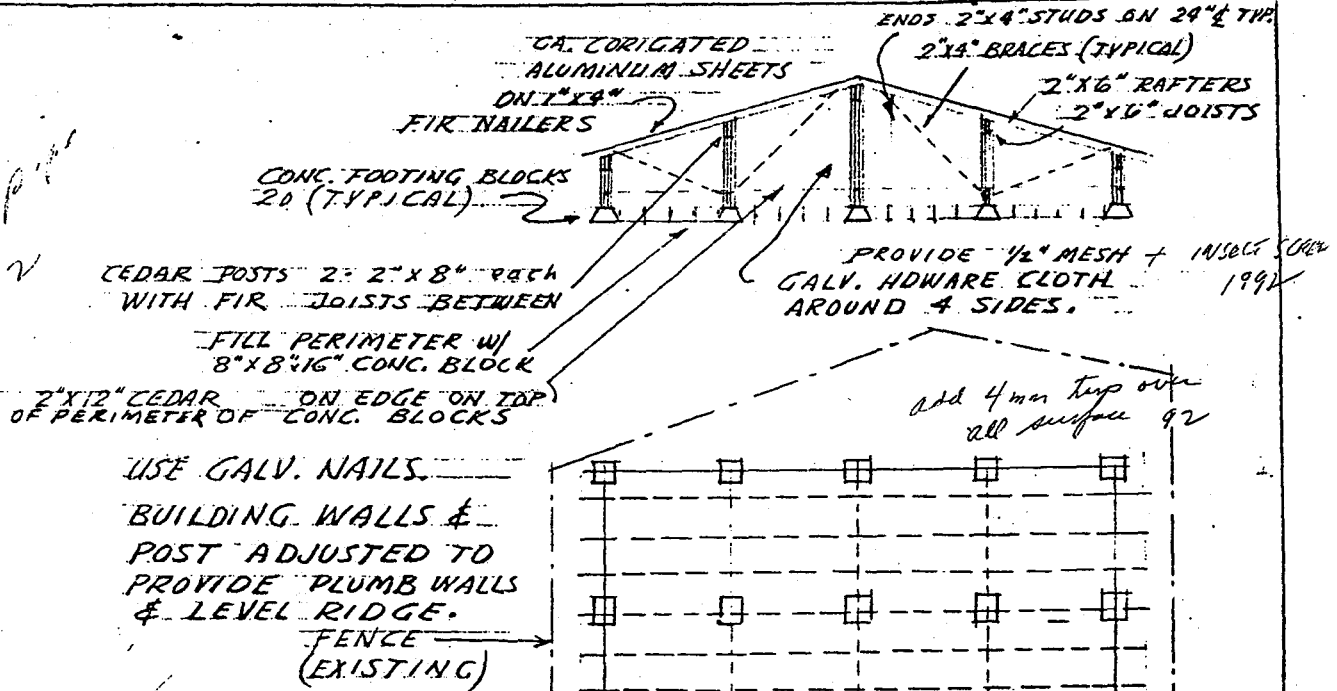
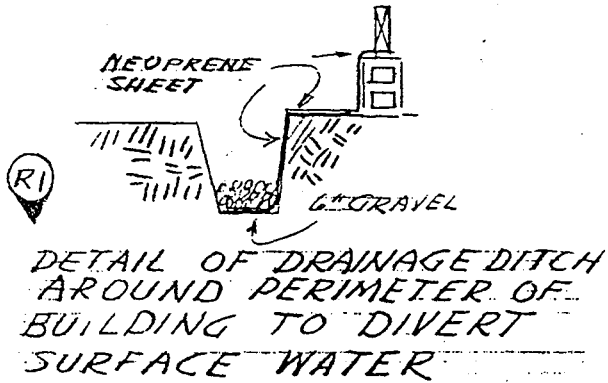


FIGURE 7
OPERATING PRESSURES

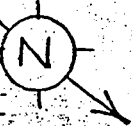
FIGURE 8

*added
Perforated
1992*



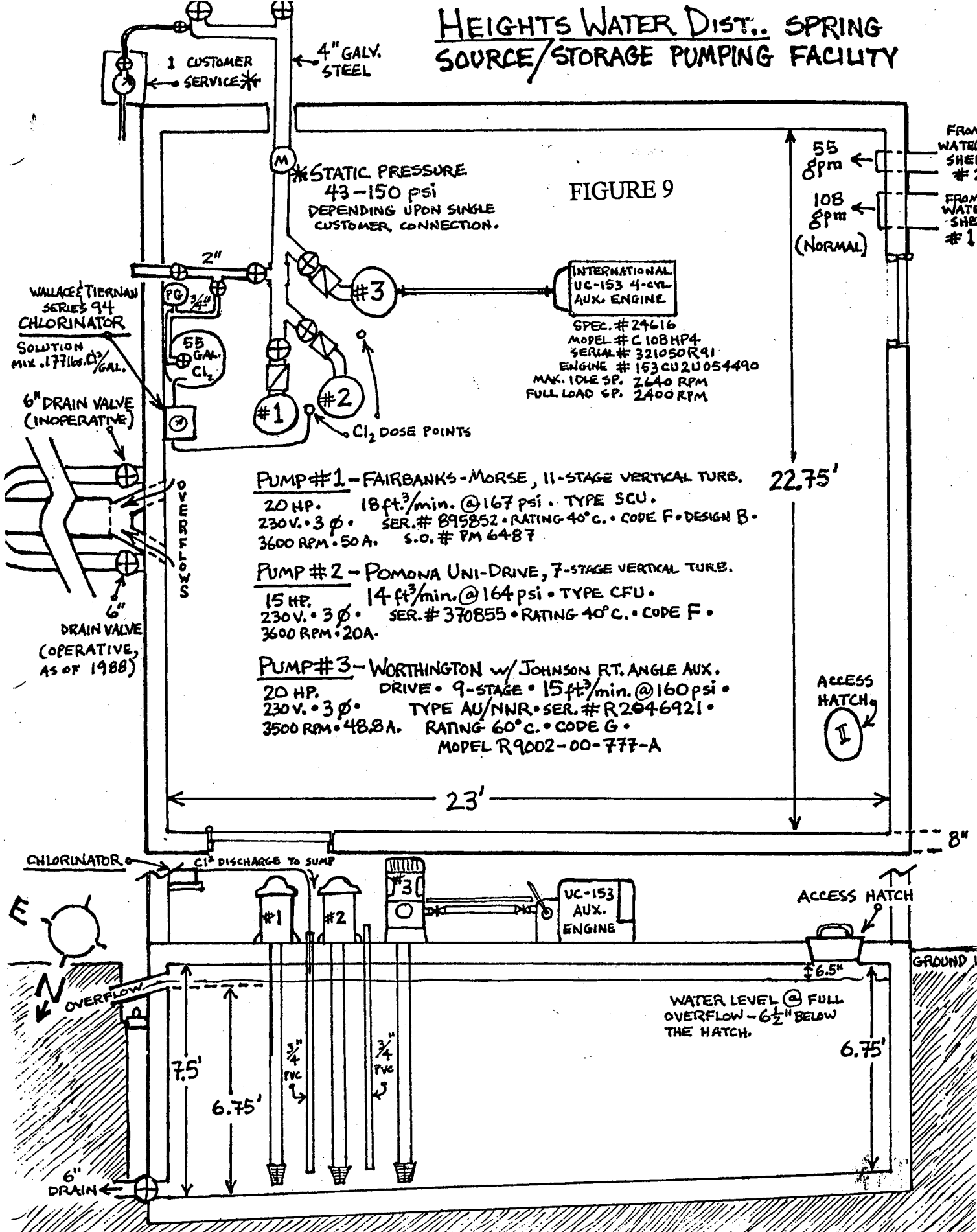
COVER FOR SPRING
 SCALE 1/8" = 1'-0"
HEIGHTS WATER CORP.

RI FEB 7 1966
 DEC. 20 1965



HEIGHTS WATER DIST. SPRING SOURCE/STORAGE PUMPING FACILITY

FIGURE 9



1 CUSTOMER SERVICE

4" GALV. STEEL

STATIC PRESSURE 43-150 psi DEPENDING UPON SINGLE CUSTOMER CONNECTION.

WALLACE TIERNAN SERIES 94 CHLORINATOR

SOLUTION MIX .177lb. Cl₂/GAL.

6" DRAIN VALVE (INOOPERATIVE)

55 GAL. Cl₂

#3

#1

#2

Cl₂ DOSE POINTS

INTERNATIONAL UC-153 4-CYL. AUX. ENGINE

SPEC. # 29616
MODEL # C 108 HP4
SERIAL # 321050R91
ENGINE # 153 CU2U054490
MAX. 1045 SP. 2640 RPM
FULL LOAD 6P. 2400 RPM

55 gpm ← FROM WATER SHEET #1

108 gpm ← FROM WATER SHEET #1 (NORMAL)

PUMP #1 - FAIRBANKS-MORSE, 11-STAGE VERTICAL TURB.
20 HP. 18 ft³/min. @ 167 psi. TYPE SCU.
230V. 3 φ. SER. # 895852. RATING 40°C. CODE F. DESIGN B.
3600 RPM. 50A. S.O. # PM 6487

PUMP #2 - POMONA UNI-DRIVE, 7-STAGE VERTICAL TURB.
15 HP. 14 ft³/min. @ 164 psi. TYPE CFU.
230V. 3 φ. SER. # 370855. RATING 40°C. CODE F.
3600 RPM. 20A.

PUMP #3 - WORTHINGTON w/ JOHNSON RT. ANGLE AUX. DRIVE.
20 HP. 9-STAGE. 15 ft³/min. @ 160 psi. TYPE AU/NNR. SER. # R2046921.
230V. 3 φ. RATING 60°C. CODE G.
3500 RPM. 48.8A. MODEL R9002-00-777-A

22.75'

23'

ACCESS HATCH

CHLORINATOR

Cl₂ DISCHARGE TO SUMP

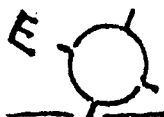
#1

#2

#3

UC-153 AUX. ENGINE

ACCESS HATCH



OVERFLOW

WATER LEVEL @ FULL OVERFLOW - 6 1/2" BELOW THE HATCH.

7.5'

6.75'

2 1/4" PVC

2 1/4" PVC

6.5"

6.75'

GROUND

6" DRAIN

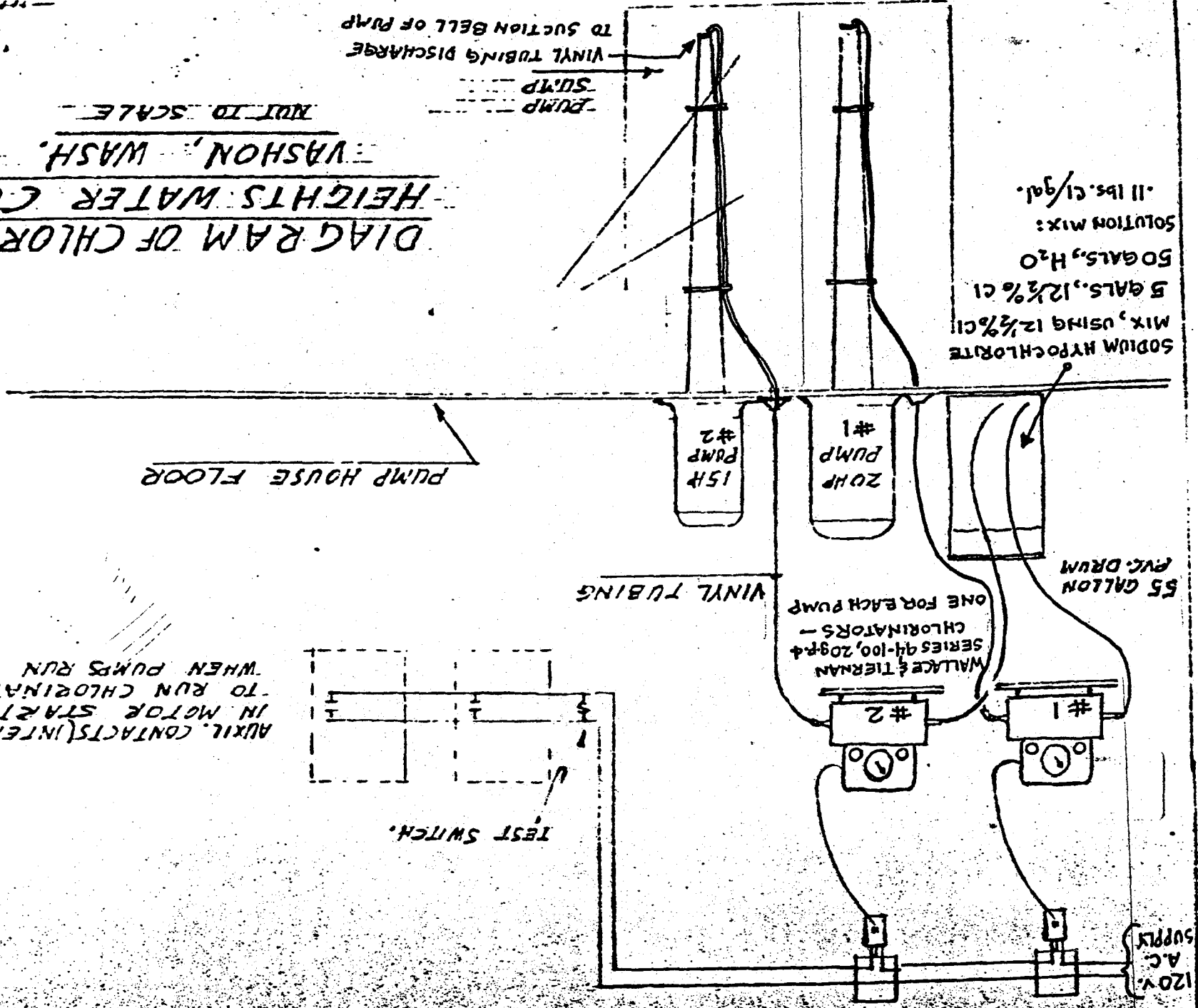
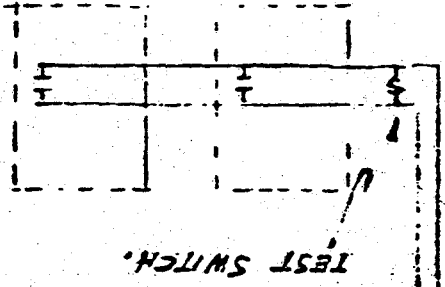
SCALE } = 1'

R.T. UEL 4/14/

DIAGRAM OF CHLORINATOR HEIGHTS WATER CORP. WASHON, WASH. NOT TO SCALE

FIGURE 10

AUXIL. CONTACTS (INTER-LOCKS) IN MOTOR STARTERS TO RUN CHLORINATOR WHEN PUMPS RUN



MAIN DISTRIBUTION STATION, OFFICE & GARAGE



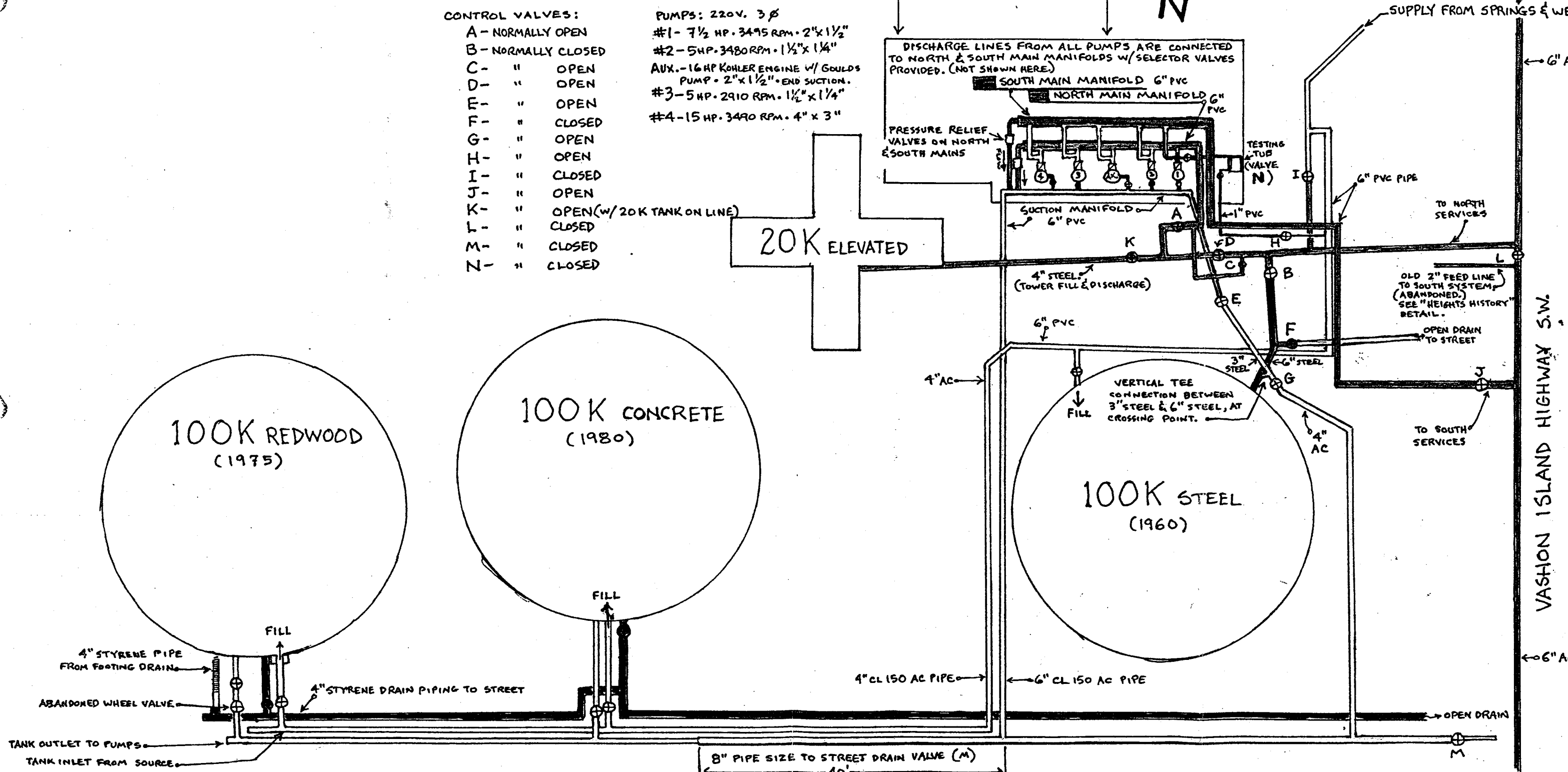
CONTROL VALVES:

- A - NORMALLY OPEN
- B - NORMALLY CLOSED
- C - " OPEN
- D - " OPEN
- E - " OPEN
- F - " CLOSED
- G - " OPEN
- H - " OPEN
- I - " CLOSED
- J - " OPEN
- K - " OPEN (w/ 20K TANK ON LINE)
- L - " CLOSED
- M - " CLOSED
- N - " CLOSED

PUMPS: 220V. 3Ø

- #1 - 7 1/2 HP. 3495 RPM. 2" x 1 1/2"
- #2 - 5 HP. 3480 RPM. 1 1/2" x 1 1/4"
- AUX. - 16 HP KOHLER ENGINE w/ GOULDS PUMP - 2" x 1 1/2" - END SUCTION.
- #3 - 5 HP. 2910 RPM. 1 1/2" x 1 1/4"
- #4 - 15 HP. 3490 RPM. 4" x 3"

DISCHARGE LINES FROM ALL PUMPS ARE CONNECTED TO NORTH & SOUTH MAIN MANIFOLDS w/ SELECTOR VALVES PROVIDED. (NOT SHOWN HERE)



- TANK DRAINS
- TANK FILL
- ▭ TANK OUTLET TO PUMPS (SUCTION)

8" PIPE SIZE TO STREET DRAIN VALVE (M)
40'

FIGURE 11

NO SCALE
R. TUEL 1985
UPDATED/REDRAWN 1991

Chapter Four -- Operations

Board of Trustees and Staff

Heights Water is managed by a subscriber-elected Board of Trustees. At present these are:

- Reed Fitzpatrick, President
- Earl Larsen, Vice-President
- George Kirkish, Treasurer
- Earl Knight, Secretary

Heights also employs Louise Ogilvy as the Office Manager/Bookkeeper, Phyllis Clark as the Office Assistant and Mark E. Tuel as the Water Distribution and Maintenance Manager. Mr. Tuel is Washington State certified as a Water Distribution Manager I, Certificate No. 4199. Additionally, Kevin Ward is training to replace Mark Tuel.

Mr. Tuel carries out all routine duties such as chlorine handling, collecting samples for water testing, logging of activities and test results, maintenance of equipment and meter servicing. Outside contractors are normally called in for major repairs and new installations.

Facilities

Heights property consists of two adjacent parcels of land on the Vashon Highway; the location of the office and main storage tanks. Each parcel is 100 feet wide by 264 feet long. The northerly parcel has been partially cleared and is scheduled to be completely prepared for new storage tanks and facilities.

The office contains the main booster pump and valving assemblies, as well as the service truck garage. There are several small pieces of power equipment also stored here, along with the necessary tools and equipment to maintain all of the facilities, grounds, pipes and appurtenances of the system. The files, records and office of the system are located in the back of the building and accessed through the garage/ valve area. There is no restroom facility associated with the office. Currently, there is a rented portable toilet behind the building, outside of the 100-foot well radius.

The springs are each covered by a building, with an associated sediment trap. There is a large building over the spring clearwell, containing backup power, chlorination equipment and chemical storage.

There is a small building over the wellfield clearwell, containing meters, a pump, chlorination facilities and chemical storage.

Routine Maintenance

Regularly scheduled routine maintenance consists of: building, grounds and vehicle maintenance; keeping the area near water meters free and clear of brush and debris; checking pumps; maintaining chlorination systems; servicing meters and inspecting the watershed area. Vehicle maintenance is performed off-site.

Cross-connection Control

The cross-connection control program is currently in development and a questionnaire has been sent out to Heights customers in an attempt to identify potential sources of contamination. Once identified, the customer will be required to install a specified DOH-approved device. Initial and annual testing of CCC devices will be conducted by A-1 Fire Equipment (12249 - 8th Street South, Seattle, WA 98168). Failure of the customer to comply with CCC requirements will result in cessation of water service until compliance is demonstrated. Each customer will have to sign a document outlining the policies and acknowledges their responsibility.

System Reliability

Heights has a number of reliability factors inherently built in:

1. There are multiple water sources.
2. There are multiple pumps for each pumping function - three interchangeable pumps from springs to storage and four interchangeable distribution pumps. There are also emergency backup pumps for the transmission and distribution pumps.
3. Dual energy source - most of the pumps are electrically operated, but one of the source pumps and one of the distribution pumps are operated with gas engines. There is also a 16 hp gas engine auxiliary pump at the distribution pump station.
4. Dual pressurizing means - elevated tanks on both North and South Systems as well as distribution pumps.
5. Emergency response telemetry - system failure transmitted to staff by phone dialer and pager.

Emergency Response

In the event of power or pump failure, a not-infrequent winter occurrence on Vashon Island, a phone dialer contacts the system operator and a Trustee. Staff can then start the emergency pumps or power source, as necessary, to keep the system operating. There are no automatic transfer switches; staff must manually operate the system.

In the event of a main break or a serious loss in water supply, the intertie with Water District 19 can be opened to provide water. The quantity and pressure of flow available from this source is unknown.

Backup Power

As mentioned before, there is a backup pump in the spring house, operated by a gas engine, which can pump the spring water up to the storage tanks. A non-electrical, gas-powered engine and pump combination is also available for auxiliary pumping capabilities at the distribution station. There is currently no generator to operate the chlorination facilities. A small gas-powered generator capable of operating the chlorination equipment is highly recommended.

Conservation

Heights Water is located in a Critical Water Supply Area and actively works to conserve water. Heights has a tiered water rate structure to encourage lower usage and works with Water District 19 to provide education in the local schools and newspaper alerts for both adults and children concerning water related issues on the Island. Heights Water customers have been exposed to the following water conservation tips: toilet tank displacement devices, low-flow toilets, toilet valve leak detection dye checks, shower head flow restrictors, sink aerators, efficient lawn watering techniques, low water use planting and economical car washing techniques.

Table 4-1 below describes the 1997 water usage and theoretical water conservation savings based on household size and possible usage up to the 600 gpd source requirement. This is a rather subjective measure of water conserved over a one-year period and a seven-year period. This table yields a theoretical annual conserved amount of over 86 million gallons and a seven-year savings of over 607 million gallons.

Table 4-1
 Water Usage and Conservation

1997 Billing Period	actual gpd/conn.	actual gpd/person	theoretical upper usage limit (gpd)(1)	theoretical water saved (gpd/person)	theoretical water saved this period (gal/person)	System-Wide gallons saved (millions)	2003 target per capita usage (gallons)(3)
January	158	64.2	243.9	179.7	5,570	8.215	61.6
Feb/Mar	170	69.1	243.9	174.8	10,313	15.212	66.3
Apr/May	132	53.7	243.9	190.2	11,602	17.113	51.6
June/July	183	74.4	243.9	169.5	10,340	15.252	71.4
Aug/Sept	258	104.9	243.9	139.0	8,479	12.506	100.7
Oct/Nov	313	127.2	243.9	116.7	7,119	10.500	122.1
December	171	69.5	243.9	174.4	5,406	7.974	66.7
				1997 Savings	58,829	86.772	
				7-year savings	411,803	607.404	

Notes:

1. Based on 600 gpd supply requirement and 2.46 persons per household.
2. Based on service population of 1,475 people.
3. 4% reduction from 1997 usage figure.

A conservation goal of a 4% reduction in per capita water usage over the next six years is listed in Table 4-1. This is a goal consistent with the 6% over nine years outlined in the Vashon Coordinated Water System Plan.

Heights does track quantities of water produced and quantities sold to determine the quantity of unaccounted-for water, which is currently at approximately 22%. The proposed Capital Improvement Plan has been designed to reduce the amount of unaccounted-for water by replacing most of the major distribution piping over the next five years.

Heights personnel regularly patrol for surface indications of pipeline leaks and system problems. Any problems reported by customers are investigated immediately. All services are metered and examination of water bills can easily reveal changes in reported water usage. Approximately 2% to 3% of the water meters are changed each year in an effort to maintain accurate water usage reporting.

Heights has in the past, and will continue to, mail out water conservation tips and technical literature with the water bills. Included in these bills are descriptions of the current and past water usage so the customer can track their own water usage.

Another strong aspect of the water conservation program is the plan to replace the majority of the primary water distribution mains over the next six years. The hydraulic analysis and community decision on provision of fire flow will affect the size and type of these mains, but any new mains can be reasonably expected to reduce unaccounted-for water.

In a conservation emergency, such as storage tank collapse or extended drought, Heights would actively contact all customers to encourage conservation. Heights Water has been successfully conserving water and will strive to continue this in the future.

Chapter Five -- Water Quality

Source Water Quality

Currently, all of the source water is derived from the same aquifer. The springs are naturally occurring and the water quality is excellent. Copies of the raw water tests are included in Appendix E.

Surface Water Treatment Rule (SWTR)

Ongoing testing of the spring source appears to indicate a strong possibility that the source is not under the influence of surface water. Filtration and turbidity monitoring are only required pursuant to the SWTR if the Washington State DOH rules that the source is under the influence of surface water.

Water Quality Monitoring for Chlorine and Coliforms

Currently, all water is automatically chlorinated in the collection clearwells. A level of 0.2 mg/l free chlorine is maintained throughout all parts of the system. Past water quality has been good enough that no treatment has been required.

Appendix F is the Coliform Monitoring Plan. Table 5-1 describes the locations of the Coliform sampling stations, which coincide with the chlorine residual testing points.

Chlorine residual testing occurs five days a week. Five locations are sampled on Monday, Wednesday and Friday and two locations are sampled on Tuesday and Thursday. Table 5-1 describes the methodology for all sampling.

Watershed Control

The watershed control program is discussed in detail in Chapter Three.

Cross-Connection Control

The cross connection control program is described in detail Chapter Four.

Lead and Copper Rule

Heights undertook a detailed investigation of the entire system in 1993 in order to define lead and copper in the system. The results of this investigation are included as Appendix G and showed compliance with applicable standards.

Asbestos Rule

Heights Water has not monitored for asbestos in the past. In the future, Heights will monitor for asbestos on a regular basis, per WAC 246-290-300(1-v) and per CFR 141.23 of the Federal Register.

item #9

TABLE 5-1

FLOW TESTS @ CI RESIDUAL TEST POINTS. (5 LOCATIONS, MONDAY, WEDNESDAY; FRI. 1 LOCATION, TUES. & FRI.)

1.) 156th St. & Vashon Hwy. BLOWOFF-

Start flow @ 11:46; stop 11:51.

5 mins. = 42.5 gals. (8.5 gpm)

Start CI testing @ 10 mins.; hose left running during testing. Water shut off @ 12:05.

Total, 19 mins. x 8.5 gpm = 161.5 gals.

2.) Van Olinda Rd. & Glenacres Intersection- PRV vault

Start flow @ 12:10; stop 12:15.

5 mins. = 41 gals. (8.2 gpm)

Start CI testing @ 20 mins.; hose left running during testing. Water shut off @ 12:35.

Total, 25 mins. x 8.2 gpm = 205 gals.

3.) 112th St. & Point Vashon Drive PRV vault

Start flow @ 11:30; stop @ 11:35.

5 mins. = 33.5 gals. (6.6 gpm)

Start CI testing @ 10 mins.; hose left running during testing. Water shut off @ 11:50.

Total, 20 mins. x 6.6 gpm. = 132 gals.

4.) 122nd Place & Cunliffe Rd. BLOWOFF

Start flow @ 12:10; stop 12:15.

5 mins. = 44 gals. (8.8 gpm)

Start testing @ 10 mins.; hose left running during testing. Water shut off @ 12:25.

Total, 15 mins. x 8.8 gpm. = 132 gals.

Total usage @ 4 test points for one day:

1.) 161.5 gal.

2.) 205 gal.

3.) 132 gal.

4.) 132 gal.

630.5 gal.

x 3 days = 1,891.5 gal. per week

x 52 weeks/ year = 98,358 gal./ year. (13,147 ft³)

5.) 13205 VASHON HIGHWAY

Rick Tuel, Heights Water, Ops. & Maint.,

2/23/96

For Technical Review Committee.

Chapter Six -- Financial Program

Introduction

Heights Water has a relatively simple financing system. All improvements are financed out of user charges. There is a meter charge for new connections and a multi-tiered rate structure for water used. For larger project financing, the Trustees are empowered to arrange commercial bank loans, if this is deemed necessary.

Rate Structure

There is a three-tier rate structure for water usage, with different rates based on type of service. The following table describes the rate structure:

Table 6-1
 1997 Water Rates and Fees (Bi-Monthly)

Non-User Maintenance	flat rate	\$14.00
Single Residential	0-1400 cu.ft.	\$36.00 flat rate
	1400-5000 cu.ft.	\$1.40/100 cu.ft.
	5000+ cu.ft.	\$1.60/100 cu.ft.
Dual Residential and Commercial	0-2800 cu.ft.	\$72.00 flat rate
	2800-6500 cu.ft.	\$1.40/100 cu.ft.
	6500+ cu.ft.	\$1.60/100 cu.ft.
Multi-Unit	0-4200 cu.ft.	\$108.00 flat rate
	4200-7000 cu.ft.	\$1.40/100 cu.ft.
	7000+ cu.ft.	\$1.60/100 cu.ft.

In addition to usage rates, there are other fees in effect:

- \$20.00 meter clean-up fee (brush, debris)
- \$50.00 tampering fee (such as lock-outs for non-payment)
- \$50.00 shut-off service restoration fee for delinquent accounts
- \$5.00/month late charge for past-due accounts
- \$20.00 Not-Sufficient-Funds (NSF) check charge
- \$25.00 call-back charge for locked gates, inaccessible meters
- \$5.00 meter marking fee
- Time and Materials charges for repair of facilities damaged through negligence
- New water share cost - \$6,340 per share (see paragraph below)
- House numbering fee, house numbering required in King County - to be determined
- Capital Improvement Fees - per project basis
- Assessments - per project for entire system or for areas improved by a project

The rate structure is intended to cover operating and maintenance costs as well as excess for repairs and upgrading the system. Several charges are currently under review by Heights, including the new meter charge. In the past, this charge has risen from \$250 in 1931 to \$6300 now. No new shares in the system have been

available for several years. The recent increase in the number of connections has come from activation of existing water shares through new home construction.

An additional source of income may be the rental of system property such as antenna space for wireless communications systems. The legal and procedural implications of any property rental should be examined by the Trustees.

Working Capital

Heights by-laws require the maintenance of a minimum working capital of \$10,000 for system requirements. An analysis of this limited reserve should be conducted to allow for emergency expenditures.

Water Share Cost

The cost of a new water share currently stands at \$6,300, with an additional \$1,200 activation charge. A General Facility Charge (GFC) study should be undertaken as a high priority to evaluate system costs and set prices. A careful examination of all of the factors and projects involved in the Capital Improvement Plan (CIP) must take place for this future study.

Heights is currently considering an increase in the cost of a water share and is in the beginning stages of a GFC study. Approval of this Plan, and a possible reduction in the source quantity requirement would lead to the ability to sell new water shares and collect a large amount of revenue to fund repairs, capital improvements and needed studies. The cost of these repairs, improvements and studies are being factored into the GFC study.

Financial Viability Test

Heights has completed a Financial Viability Test, which is included in Appendix H.

Chapter Seven – System Requirements and Recommended Improvements

System Requirements

Planned system improvements are based on DOH requirements for storage, source, reliability, distribution and the need for efficient and cost-effective delivery of water. Source and storage quantities are based on previously predicted growth rates.

There are many improvements related to the efficiency of the system which are not directly related to water source and distribution. These include physical improvements to the office, vehicle and chemical storage, rate and facility studies, new water rights and other issues of this type. The following subsection order does not imply the level of importance of the items within the section. Table 7-1 describes the recommended improvements and priorities assigned to each.

Office

The existing office building serves many functions, not all of them compatible. The office is ideally located for monitoring of the valves, booster pumps and storage tanks of the system. The location right on the Vashon Highway makes for easy access, even in poor weather. Conservation notification by use of the roadside signboard effectively reaches most of the system users. The office is also centrally located within the service area.

The office has several drawbacks that should be addressed. The access to the office is solely through the garage, valve and booster pump area. While there no is gasoline and oil stored in the garage area, there are several electric pumps in the same area. In the event of a fire, the only egress is through the area most likely to be the cause of the fire. There is no restroom facility in the office; the current toilet facilities consist of a rented construction-area type toilet. It should be possible to design a new facility to address these issues. A new parking area has recently been constructed on the west side of the highway for Heights staff, so employees are no longer required to park on the east side of the highway and cross on foot.

Well 4 is located about thirty feet west of the office building. A Well Site Inspection was recently completed by the King County Health Department (KCHD); the Inspector listed several concerns about the site. There were chemicals stored within 100 feet of the well, which have since been removed. There is a vehicle principally stored within 100 feet of the well; this should be garaged elsewhere. Also, the back-up gas-engine pump is within 100 feet of the well. A separate building is necessary to house chemicals and items inconsistent with the well and office operations.

Vehicle Storage

Any new building should incorporate garage facilities for vehicle and equipment maintenance. There should be enough parking on the site to accommodate

employees and expected visitors, to avoid requiring visitors or employees to walk across the highway.

Chemical and Equipment Storage

Since the recent discovery that Heights owns a second parcel of land adjacent to the office parcel, the potential for storage of non-compatible items, vehicles and chemicals is greatly improved. As mentioned above, constructing new facilities for chemical storage, garage space and employee parking area should be investigated. This would remove hazardous or non-compatible chemicals from the well radius (100 feet), as well as increasing the general safety of the office.

Source Protection

While Heights does not own the land where the springs and the original three wells are located, the Association has strict control of access to the area. This control includes the exclusion of all structures and improvements from the ridge to the pump house, effectively preventing development in the wellhead area.

Water Rights

Heights Water has recently received two additional water rights. One is for an increase in the spring appropriation rate and the other is for the new well (Well No. 4), adjacent to the office. Other long-term increases in water rights, or transfer of rights from other systems should not be necessary during the planning period, however, given the limited quantity of available water on Vashon Island, future sources of supply should be secured if the opportunity arises.

Source Diversity

While there are currently six distinct source points for the system, they are all drawn from the same large aquifer. A policy of diversification should be pursued to protect the system in the event of source contamination or disturbance. The Heights service area is very large and presents the opportunity to find other geographic locations for sources, such as wells or springs. There have been preliminary contacts with the owners and operators of small Group B systems inside the service area concerning Satellite System Management. Any investigation of this option should include the possibility of transfer of water rights or the placement of existing wells into the service of the Heights system. These discussions have not progressed and Heights is currently involved in enough other projects to fill the time of the system operators without adding satellite management tasks.

Expansion of System

Heights Water is looking to the future and wishes to grow to meet existing and future demand. Expansion should be within the guidelines of the Vashon Community Plan, the Vashon Coordinated Water System Plan and other planning documents and guidelines.

The distribution piping of the Heights Water system does not fill the service area. There are many areas where the existing residents obtain their water from private wells or small public water systems. Because there is only small potential for the creation of new building lots inside the service area, most new growth of the Heights system will come from building on existing lots and transfer of existing lots from private systems to the Heights system.

Satellite System Management

Heights has been contacted about management of small water systems in the area. Many of these systems are operated under various states of approval, by homeowners or small groups lacking expertise in the operation of water systems. Taking over the operation of these systems for the owners may be a revenue source for Heights Water. It may be possible for some of these systems to be incorporated into the Heights system as part of the growth of the system. Some of these systems may have source capacities beyond the needs of the existing members served by the system, presenting the opportunity for Heights to incorporate the smaller system and utilize the extra source capacity for the larger system. It is consistent with DOH policy for larger systems to consolidate with smaller systems.

The eight small water systems currently operating in the Heights service area obtain water from both springs and wells. Management and possible incorporation of any of these systems should include a detailed investigation of the water rights and water quality of the systems.

While Heights is open to the investigation of Satellite Management of smaller systems within its service area, the Association's preference is to provide direct service to the systems instead of managing the existing small systems.

Surface Water Treatment Rule

Since the source is not entirely pumped from wells, Heights should continue to maintain and improve the protection of the spring collection system. Continued monitoring of the source water quality is required to confirm that the source is not under the influence of surface water.

Water Quality Monitoring

The current water quality monitoring program is acceptable and need only be altered if the size or sources of the system are substantially altered. If additional sources are incorporated into the system, appropriate changes to the source and distribution system water quality monitoring will be required.

If DOH were to agree that the three wells currently in use qualified as a wellfield, it may be possible to reduce the level of testing currently undertaken. Heights should pursue this issue with DOH.

not progressed and Heights is currently involved in enough other projects to fill the time of the system operators without adding satellite management tasks.

Expansion of System

Heights Water is looking to the future and wishes to grow to meet existing and future demand. Expansion should be within the guidelines of the Vashon Community Plan, the Vashon Coordinated Water System Plan and other planning documents and guidelines.

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The eight small water systems currently operating in the Heights service area obtain water from both springs and wells. Management and possible incorporation of any of these systems should include a detailed investigation of the water rights and water quality of the systems.

It is recommended that Heights investigate the possibility of Satellite Management both as a possible source of new water and to generate revenue. The current policy is to investigate each request for satellite management services on an individual basis, with any costs for such services to be borne by the small system receiving the service.

Surface Water Treatment Rule

Since the source is not entirely pumped from wells, Heights should continue to maintain and improve the protection of the spring collection system. Continued monitoring of the source water quality is required to confirm that the source is not under the influence of surface water.

Water Storage

The Heights Water system appears to have enough water storage capacity to provide for immediate future demand. There are, however, non-volume-related storage issues that should be addressed. Both of the elevated wooden tanks date from 1948 and should be evaluated by a licensed Structural Engineer, including for seismic stability. Should the tanks prove unstable or require repair or reinforcement, the Capital Improvement Plan should be adjusted accordingly.

Storage tank locations should also be considered. As new sources are added, it may be prudent to add storage facilities nearby to reduce pumping costs and improve geographical distribution of storage volume. For sources distant from the existing tank locations, this can reduce the need for long-distance pumping. The southeast part of the distribution system is served by a single elevated 10,000-gallon storage tank and the south system is supplied with water by pumps alone, with no storage capacity except in the case of a power outage, when it shares the 10,000 gallon tank with the southeast system. Provision for additional storage in this area may be prudent for improvement of system reliability, though it does not appear necessary from a volume point of view.

Heights is considering a 250,000 gallon storage tank adjacent to the existing south elevated 10,000 gallon tank for better storage volume distribution and system reliability. This cost and use of this tank may be shared with Water District 19, although no arrangements have been made for this to happen. Heights has reported that their lack of south-end storage coincides with District 19's lack of north-end storage. Clearly, both systems could benefit from additional storage, but the design and other aspects of such a shared tank would be very important.

Fire Flow

Heights Water should clarify to its customers the official Heights policy on provision of fire flow. As a rural water system, fire flow is not required, but a homeowner with a hydrant in his/her front yard might expect fire flow capability that is not actually provided by the hydrant. Heights should clarify the fire flow policy with the Fire Marshal and make it clear to the homeowners within the service area. If fire flow is to be provided, hydraulic modeling and an accelerated program of main replacement and water storage improvements will be necessary to meet the hydraulic demands of such flow. Heights will contact the membership during the 1998 budget analysis to elicit input on customer desires for fire flow.

Rate Structure

The existing rate structure is designed to encourage conservation, pay salaries and the direct expenses of operating and maintaining the Heights Water system, while maintaining a minimum of \$10,000 in the Working Capital Fund. A rate study should be undertaken to plan for future development and to evaluate the financial viability of the system. Heights has the Small System Financial Viability Manual and is completing this work outside the scope of this Plan.

Capital Improvement Plan

Proposed water system reliability, main improvements, source and water quality improvements and other substantial projects are shown in Table 7-1. This includes the replacement of existing pipes and structures, as well as the construction of new facilities and extension of mains into areas not currently served, but within the service area. The table includes a preliminary project priority, opinion of probable cost, and possible funding sources. This information is tentative in nature and "project-specific" cost projections should be created prior to beginning any project.

Priority listing of projects is tentative because unforeseen circumstances can arise which require the re-allocation of scarce funds to immediate needs, thereby postponing other projects. An example of this would be the immediate need to repair a water main lost in a landslide. Funds would be diverted from more discretionary projects to repair this problem. The table does not include regular operating costs of the system.

Priority Class 1: Projects in this category include: immediate needs such as repair/replacement of leaking mains; repair of landslide damage; procurement of new water sources; replacement of undersized mains; extension of mains into areas with failing water systems; and any project currently in planning or construction or for which project funding has been set aside or procured. Priority Class 1 items should be completed within five years.

Priority Class 2: Projects in this category include replacement of undersized mains, support buildings or structures, source protection improvements, backup generator(s) for system reliability, hydraulic modeling and tank reliability studies and new source procurement. Priority Class 2 items should be completed within eight years.

Priority Class 3: Projects in this category include storage tank improvements, pressure reducing valve stations, distribution piping replacement and new source procurement. Priority Class 3 items are unscheduled but may occur within ten to fifteen years.

The opinions of probable cost are approximate costs based on experience with similar projects in the Heights system, preliminary proposals from contractors or consultants and the experience of Hedges and Roth Engineering.

Heights 1997 CIP

Heights Water
1997 Comprehensive Water System Plan

Table 7-1
Capital Improvement Plan

Pipe items based on \$20-\$40 per lineal foot, depending on size and length of pipe

Tanks based on \$1 per gallon, plus allied costs

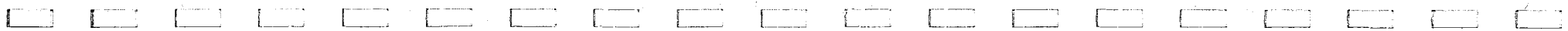
All prices include tax, design and inspection

No.	Improvement Item	Priority	Size	Length	Cost	User Funding	Comments
1	Complete Well 4 Development	1			\$ 10,000		scheduled/funded
2	Landslide Damage Repair near Springs	1			\$ 25,000		scheduled/funded
3	Cowan Road w/ hydrants	2	6"	2100	\$ 63,000	\$ 63,000	as requested by residents in area
4	on 107th Ave from 112th to Cowan Rd.	2	6"	1400	\$ 42,000	\$ 42,000	as requested by residents in area
5	Transmission across Vashon highway	1	6"	80			completed
6	SW 156th Street w/ hydrants	1	6"	5200	\$ 156,000	\$ 50,000	as requested by residents in area
7	Vashon Point Drive w/ hydrants	1	6"	3200			completed
8	Glen Acres Road w/ hydrants and PRV	1	8"	5000	\$ 200,000	\$ 150,000	as requested by residents in area
9	pressurize north end / regulators on 103rd	1	2 ea		\$ 20,000		
10	Hawthorne Lane w/ hydrants	1	6"	800			completed
11	SW 122nd Street west of Cunliffe Road	2	6"	700	\$ 21,000	\$ 21,000	as requested by residents in area
12	SW 110th Street west of 103rd SW	2	6"	3000	\$ 90,000	\$ 50,000	as requested by residents in area
13	new southend tank 250,000 gallons	1			\$ 400,000		Possibly joint with Dist 19
14	Portable emergency generator	3			\$ 25,000		
15	Vashon Hwy south of Southend tank	1	12"	2500	\$ 125,000		Possibly joint with Dist 19
16	Replace north elevated tank - 250,000 gallons	1			\$ 400,000		replace old wooden tank
17	Hydraulic Analysis to identify deficiencies	2			\$ 6,000		
18	Vashon Hwy piping upgrade	2	12"	9200	\$ 460,000	\$ 50,000	annual upgrade program
19	Alternative spring transmission line	1	8"	3000	\$ 120,000		reliability project

Totals

\$ 2,163,000	\$ 426,000
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APPENDIX A



REPORT OF EXAMINATION
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

- Surface Water** (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water** (Issued in accordance with the provisions of Chapter 203, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE July 14, 1993	APPLICATION NUMBER S1-27258	PERMIT NUMBER	CERTIFICATE NUMBER
--------------------------------	--------------------------------	---------------	--------------------

NAME Heights Water District			
ADDRESS (STREET) P.O. Box 820	(CITY) Vashon	(STATE) Washington	(ZIP CODE) 98070

PUBLIC WATERS TO BE APPROPRIATED

SOURCE Unnamed Springs		
TRIBUTARY OF (IF SURFACE WATERS) Puget Sound		
MAXIMUM CUBIC FEET PER SECOND 0.11	MAXIMUM GALLONS PER MINUTE	MAXIMUM ACRE-FEET PER YEAR 56

QUANTITY, TYPE OF USE, PERIOD OF USE
Multiple domestic supply - continuously

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
Government Lot 5, NE $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 18

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) NE $\frac{1}{4}$ NE $\frac{1}{4}$	SECTION 18	TOWNSHIP N. 23	RANGE, (E. OR W.) W.M. 3E	W.R.L.A. 15	COUNTY King
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RECORDED PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
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LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

The Heights Water District service area consisting of all or parts of Sections 5, 6, 7, 8, 18, 19, 20, 21, 29, and 30, Township 23N, Range 3E, W.M., King County, Washington.

DESCRIPTION OF PROPOSED WORKS

Spring collection system, 20,000 gallon collection reservoir, three 100,000 gallon storage tanks.

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE: Complete	COMPLETE PROJECT BY THIS DATE: In use	WATER PUT TO FULL USE BY THIS DATE: 1 year from permit issuance
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REPORT

BACKGROUND:

Application S1-27258 was filed by the Heights Water District (the District) on July 14, 1993 requesting an additional diversion of surface water from springs in the amount of 0.11 cubic feet per second (cfs) for a public water supply. The legal notice was published in The Vashon-Maury Island Beachcomber, a legal newspaper of King County, Washington on September 30 and October 7, 1993. The 30-day protest period prescribed by law has expired without protests or objections.

INVESTIGATION:

The investigation of this application consists of a review of office records; a review of the District's 1992 updated Comprehensive Water Plan; research and review of State Water Code, USGS and GWMA groundwater studies, and Ecology's records on water rights and claims appurtenant to this area. Also considered were telephone conversations with the District representatives, Mr. Larry Higley, as well as this reporters past familiarity with this area and specifically this water system.

Historical Background:

This water district was originally incorporated in 1921 as a non-profit mutual support organization for the residents on the upper plateau of the northern end of Vashon Island. Early water use was from dug wells. But in the early 30's in searching for a suitable common water source, water rights were obtained from two adjacent natural springs. This first right was for 0.05 cfs and has a priority date of September 18, 1930. Later rights were obtained from these springs for 0.10 cfs (3/16/31) and for 0.15 cfs (9/3/64). The District assumed they had the rights to all the water these natural springs would produce. By 1979 they started developing wells into the aquifer from which the springs were fed. The following table shows the District's water rights, including two applications, this one for additional surface water and the other for a groundwater well under application G1-27686A. Both pending applications are being processed concurrently as the State Department of Health recently requested that G1-27686A be given priority (see discussion on this under "Current and Projected Use").

Water Right #	Source	Instant	Annual (AFY)
862	Spring	0.05 cfs	36.17
1558	Spring	0.10 cfs	72.33
9781	Spring	0.15 cfs	108.50
G1-23186C	Well #1	60 gpm	(96.0)
G1-24577C	Well #2	85 gpm	(95.0)
G1-26494C	Well #3	40 gpm	(45.0)
S1-27258A	Spring	0.11 cfs	56
G1-27686A	Well #4	42 gpm	47
Total Cumulative Annual Quantity = 217 + apps = 320 AFY			

Heights Water District current water rights.

Annual quantities in parentheses are supplemental - not cumulative.

Report Continued**Current System Description:**

This water system consists of these two sidehill springs and 3 Wells. The springs flow by gravity to an enclosed 26,000 gallon collection reservoir. The water is then pumped uphill to three 100,000 gallon storage tanks. The wells pump into a 20,000 gallon collection reservoir and from there water is pumped to the storage tanks. The three existing water rights for these springs total 0.30 cfs. Through more accurate measurement the District has now determined that during peak flow these springs produce a maximum Qi of 0.41 cfs. The intent of this application is to obtain the right to capture and utilize the additional 0.11 cfs of water.

Current and Projected Water Use:

The District serves much of the northern end of Vashon Island in King County, Washington. The service area is primarily a low-density rural residential area with six commercial/institutional type users. The population varies during the year due to the annual migration of people from off-island to their summer homes.

Excluding the six commercial/institutional users, the current (1996) number of residential water service connections is 568. The District's 1992 Water System Plan projects a service area of 657 by 2002 (10 years). Recently the State of Washington Department of Health asked the District to provide water service to the existing customers of the Morningside Water System. This will result in an immediate increase of 75 customers. The placing of the main distribution line to Morningside, will also open an opportunity for other customers (mostly existing small inadequate systems) to connect to this service. Because of this, a 20 year projection (2016) of 800 services would be realistic.

Conservation:

The District has a successful water conservation program as evidenced, in part, by their per capita usage rate of less than 100 gpd (seasonal summer occupancy is also a factor). The District has encouraged water conservation through public education since 1979 and the ongoing conservation program is designed to eliminate wasteful and non-essential water uses and provide a mechanism for monitoring water consumption and program effectiveness. Some of the elements of the conservation plan include water meters for all connections, billings showing consumption history, step rate structure, leak detection and repair program, pressure zone regulation, and retrofit kits. This is beyond the minimum requirements of the Guidelines for Public Water Systems in regards to conservation measures for a system of this size. Annual average use of less than 100 gallons/capita/day is well below the national average of 150 gallons/capita/day.

Water Availability:

These springs have been the principal water supply of the District since 1931 and have been fully utilization since 1966. Water not appropriated is wasted into Puget Sound. There are existing surface water rights in the area, however, their source of water is not connected to these springs. Aquifer tests on District wells which tap the aquifer supplying these springs show that other shallow wells in the area do not tap this spring source. During peak flow periods this 0.11 cfs is available for this requested beneficial appropriation and should have no effect on existing rights.

Water Allocation:

When identifying an annual quantity on a permit this quantity is the maximum allowed and therefore may be higher than actual consumption. Annual allocation of water currently granted on water right permits to similar water systems in King and Kitsap Counties is 0.4 acre foot per year (af/y) per service. As 20 year growth is projected at 800 services, the District will need an annual quantity of 320 acre feet by the year 2016.

Assuming this additional 0.11 cfs of water is available 70% of the time this would give the district an additional yield of 56 acre-feet per year.

CONCLUSION:

In accordance with chapter 90.03, I find that there is water available for this beneficial appropriation from the source in question and that the appropriation as recommended will not impair existing rights or be detrimental to the public welfare. Therefore, a permit should be issued subject to existing rights and indicated provisions.

RECOMMENDATIONS:

A permit should be issued for 0.11 cfs instantaneous; 56 acre-feet per year, for a multiple domestic supply, for the community served by the Heights Water District on Vashon Island, subject to existing rights and the following provisions:

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through 508-64-040 (Installation, operation and maintenance requirements enclosed). Meter readings shall be recorded monthly and this data shall be maintained and be made available to the Department of Ecology upon request.

This permit is subject to the implementation of the minimum requirements established in the Conservation Planning Requirements: Guidelines for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology and Conservation Programs, March 1994, which are enclosed.

Nothing in this permit shall be construed as excusing the permittee from compliance with any applicable federal, state or local statutes, ordinances, or regulations. Specifically, Washington State Department of Health has regulations that may require permitting for the proposed activity.

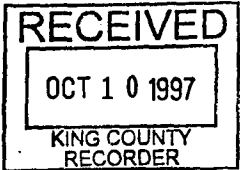
A certificate of water right will not be issued until a final investigation is made.

REPORT BY:

Roy Rusby

DATE:

4/15/96



Heights Water District
P.O. Box 820
Vashon, WA 98070

971022-0214 08:10:00 AM KING COUNTY RECORDS 302 TMS

9.00



STATE OF WASHINGTON
CERTIFICATE OF WATER RIGHT

9710220214

Document Title: Certificate of Water Right

Agency: Department of Ecology
Northwest Regional Office
3190 160th Avenue Southeast
Bellevue, WA 98008-5452

Applicant: Heights Water District
P.O. Box 820
Vashon, WA 98070

Reference Number: N/A

PRIORITY DATE July 14, 1993	APPLICATION NUMBER S1-27258	PERMIT NUMBER S1-27258 P	CERTIFICATE NUMBER S1-27258 C
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This is to certify that the herein named applicant has made proof to the satisfaction of the Department of Ecology of a right to the use of the public waters of the State of Washington as herein defined, and under and specifically subject to the provisions contained in the Permit issued by the Department of Ecology, and that said right to the use of said waters has been perfected in accordance with the laws of the State of Washington, and is hereby confirmed by the Department of Ecology and entered of record as shown, but is limited to an amount actually beneficially used.

PUBLIC WATERS TO BE APPROPRIATED

SOURCE Unnamed Springs		TRIBUTARY OF (IF SURFACE WATERS) Puget Sound	
MAX. CUBIC FEET PER SECOND 0.11	MAX. GALLONS PER MINUTE N/A	MAX. ACRE-FEET PER YEAR 56	

QUANTITY/TYPE OF USE/PERIOD OF USE
Multiple domestic supply/continuously

LEGAL DESCRIPTION OF LOCATION OF DIVERSION/WITHDRAWAL

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
NE NE	18	23	3E	15	King

PARCEL # N/A

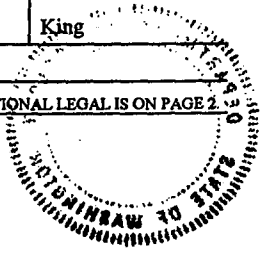
ADDITIONAL LEGAL IS ON PAGE 2

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

1/4 1/4	SECTION	TOWNSHIP N.	RANGE (E. OR W.) W.M.	W.R.I.A.	COUNTY
N/A	N/A	23	3E	15	King

PARCEL # N/A

ADDITIONAL LEGAL IS ON PAGE 2



9710220214

CONTINUED LEGAL DESCRIPTION FOR LOCATION OF DIVERSION/WITHDRAWAL

Government Lot 5, NE quarter of the NE quarter of Section 18.

CONTINUED LEGAL DESCRIPTION FOR PROPERTY ON WHICH WATER IS TO BE USED

The Heights Water District service area consisting of all or parts of Sections 5, 6, 7, 8, 18, 19, 20, 21, 29, and 30, Township 23N, Range 3E, W.M., King County, Washington.

PROVISIONS

All conditions and requirements contained in reports of examination or permits previously issued apply to this certificate unless specifically noted below.

An approved measuring device shall be installed and maintained in accordance with RCW 90.03.360, WAC 508-64-020 through 508-64-040. (Installation, operation and maintenance requirements). Meter readings shall be recorded monthly and this data shall be maintained and be made available to the Department of Ecology upon request.

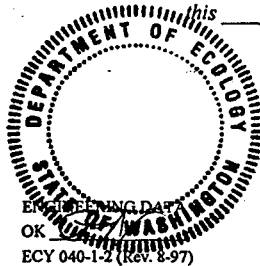
This certificate is subject to the implementation of the minimum requirements established in the Conservation Planning Requirements: Guidelines for Public Water Systems Regarding Water Use Reporting, Demand Forecasting Methodology and Conservation Programs, March, 1994.

Nothing in this certificate shall be construed as excusing the permittee from compliance with any applicable federal, state or local statutes, ordinances, or regulations. Specifically, Washington State Department of Health has regulations that may require permitting for the proposed activity.

The right to use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in RCW 90.03.380, 90.03.390, and 90.44.020.

This certificate of water right is specifically subject to relinquishment for non-use of water as provided in RCW 90.14.180.

Given under my hand and the seal of this office at Bellevue, Washington,
this 4th day of Oct., 1997.



Tom Fitzsimmons
Department of Ecology

By [Signature]
Ray Hellwig, Section Supervisor



Environmental Health

WATER FACILITIES INVENTORY (WFI)

Read Instructions on back before completing

DATE UPDATED: 11/02/95

1. SYSTEM ID NO. J2300L	2. COUNTY KING	GROUP A	TYPE COMM	WRHA 515
3. SYSTEM NAME HEIGHTS WATER				
STREET ADDRESS				
P.O. BOX (IF APPLICABLE) P. O. BOX 820				
CITY VASHON		STATE WA	ZIP CODE 98070	
4. OWNER'S NAME (LAST, FIRST) HEIGHTS WATER				OWNER NO. 2490
STREET ADDRESS				
P.O. BOX (IF APPLICABLE) P.O. BOX 820				
CITY VASHON		STATE WA	ZIP CODE 98070	
5. SYSTEM CONTACT PERSON FITZPATRICK, KEED - TRUSTEE				
DAY TELEPHONE 206-567-4855		EVENING TELEPHONE		
OWNERSHIP (CHECK ONE ONLY)		PREDOMINANT CHARACTER (CHECK ONE ONLY)		
<input checked="" type="checkbox"/> PRIVATE: NON-PROFIT <input type="checkbox"/> PRIVATE: FOR-PROFIT <input type="checkbox"/> LOCAL GOVERNMENT (COUNTY/CITY/PUD/WATER DISTRICT) <input type="checkbox"/> STATE <input type="checkbox"/> FEDERAL		<input checked="" type="checkbox"/> RESIDENTIAL <input type="checkbox"/> RECREATIONAL <input type="checkbox"/> BUSINESS / INDUSTRIAL / AGRICULTURAL / COMMERCIAL <input type="checkbox"/> LODGING / FOOD SERVICE <input type="checkbox"/> SCHOOL / DAY CARE <input type="checkbox"/> OTHER (CHURCHES, ETC.)		

WFI COMPLETED BY Keed Fitzpatrick		TITLE Trustee	
DAY TELEPHONE		DATE	
8. SUBMITTED FOR	NEW SYSTEM	NO CHANGE	REACTIVATE
	SYSTEM NAME CHANGE	UPDATE	DELETE
* OLD SYSTEM NAME - ENTER ONLY IF CHANGING WITH THIS WFI			
SYSTEMS SERVING ANY RESIDENTS (PEOPLE LIVING IN A DWELLING SERVED BY THE SYSTEM) COMPLETE THIS SECTION			
9. NUMBER ACTIVE RESIDENTIAL CONNECTIONS 527 596		10. NUMBER ACTIVE RESIDENTIAL POPULATION 1,468 1475	
SYSTEMS SERVING ANY NON-RESIDENTS (IE, TRAVELERS, EMPLOYEES, STUDENTS, ETC.) COMPLETE THIS SECTION			
11. NUMBER NON-RESIDENTIAL CONNECTIONS			
12. ENTER AVERAGE DAILY NON-RESIDENTIAL POPULATION SERVED FOR EACH MONTH. MAKE ENTRY FOR EACH MONTH			
APR	MAY	JUNE	JUL
AUG	SEP	OCT	NOV
DEC	13. DOES THE SYSTEM SERVE AT LEAST 25 OF THE SAME NON-RESIDENTS FOR 4 OR MORE DAYS PER WEEK FOR AT LEAST 180 DAYS PER YEAR? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
14. TOTAL NUMBER CONNECTIONS METERED 587		15. DISTRIBUTION RESERVOIR(S) TOTAL CAPACITY 330,000 GALLONS	

WELL ID	WELL NAME	SOURCE CATEGORY	WELL DEPTH (FEET)	SOURCE CAPACITY (GPM)	SOURCE LOCATION												
LIST UTILITY'S NAME FOR SOURCE. IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S ID# AND NAME USING FOLLOWING FORMAT: XXXXXX / NAME EXAMPLE: 77050Y / SEATTLE		WELL BLD	WELL SURFACE	WELL SPRING	RAINFY / INF GAL	INTERIE	PURCHASE/TREATED	PURCHASE/UNTREATED	PERMANENT	SEASONAL	EMERGENCY	DEPTH (FEET)	CAPACITY (GPM)	1/4, 1/4 SEC.	SEC. NO.	TWP	RNG.
S01	SPRINGS												125	NE/SE	18	23N	03E
S02	WELL #1								X			170	50	NE/SE	18	23N	03E
S03	WELL #2								X			150	60	NE/SE	18	23N	03E
S04	WELL #3								X			153	40	NE/SE	18	23N	03E
S05	WELLS # 1,2,3								X			150	150	NE/SE	18	23N	03E

MINIMUM REQUIRED BACTERIOLOGICAL SAMPLING SCHEDULE																	
25.	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DE					
	2	2	2	2	2	2	2	2	2	2	2	2					
D. APPROVED SERVICES (PER PLANS) 0						DATE OF LAST SANITARY SURVEY 00 00 0000						BY DOH	LHD				
SYSTEM IN CRITICAL WATER SUPPLY SERVICE AREA?		YES	NO	GW MGMT AREA?		YES	NO	FOR LHD USE ONLY									
EFFECTIVE DATE RETRO. CHANGES			SIGNATURE OF DOH REVIEWER										DATE				

Well # 1

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE August 15, 1978	APPLICATION NUMBER G1-23186	PERMIT NUMBER G1-23186P	CERTIFICATE NUMBER
----------------------------------	--------------------------------	----------------------------	--------------------

NAME
THE HEIGHTS WATER CORPORATION

ADDRESS (STREET) Route 1, Box 417	(CITY) Vashon	(STATE) Washington	(ZIP CODE) 98070
--------------------------------------	------------------	-----------------------	---------------------

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE
Well (8"x177')

BOUNDARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 200	MAXIMUM ACRE-FEET PER YEAR 217 - Supplemental to existing rights
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QUANTITY, TYPE OF USE, PERIOD OF USE
Community domestic supply, continuously, 217 acre-feet - supplemental

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
1150 feet west and 900 feet south of NE corner of Sec. 18

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) NE 1/4 NE 1/4	SECTION 18	TOWNSHIP N. 23	RANGE, (E. OR W.) W.M. 3 E	W.R.I.A. 15	COUNTY King
--	---------------	-------------------	-------------------------------	----------------	----------------

RECORDED PLATTED PROPERTY

BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)
-------	------------------------------------

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by The Heights Water Corporation.

DEVELOPMENT SCHEDULE		
BEGIN PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: July 31, 1981	WATER PUT TO FULL USE BY THIS DATE: July 31, 1982
PROVISIONS		

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department, documenting such compliance.

Given under my hand and the seal of this office at Redmond Washington, this 31st day of July, 1980

ENGINEERING DATA
OK... *[Signature]*

Department of Ecology
by *[Signature]*
ROBERT K. MCCORMICK, Regional Manager

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

#1 WELL
(SO.2)

PERMIT

TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON

- Surface Water (Issued in accordance with the provisions of Chapter 117, Laws of Washington for 1917, and amendments thereto, and the rules and regulations of the Department of Ecology.)
- Ground Water (Issued in accordance with the provisions of Chapter 263, Laws of Washington for 1945, and amendments thereto, and the rules and regulations of the Department of Ecology.)

PRIORITY DATE August 15, 1978	APPLICATION NUMBER G1-23186	PERMIT NUMBER G1-23186P	CERTIFICATE NUMBER
----------------------------------	--------------------------------	----------------------------	--------------------

NAME THE HEIGHTS WATER CORPORATION			
ADDRESS (STREET) Route 1, Box 417	(CITY) Vashon	(STATE) Washington	(ZIP CODE) 98070

The applicant is, pursuant to the Report of Examination which has been accepted by the applicant, hereby granted a permit to appropriate the following described public waters of the State of Washington, subject to existing rights and to the limitations and provisions set out herein.

PUBLIC WATER TO BE APPROPRIATED

SOURCE Well (8'x177')	TRIBUTARY OF (IF SURFACE WATERS)
--------------------------	----------------------------------

MAXIMUM CUBIC FEET PER SECOND	MAXIMUM GALLONS PER MINUTE 200	MAXIMUM ACRE-FEET PER YEAR 217 - Supplemental to existing rights
-------------------------------	-----------------------------------	---

QUANTITY, TYPE OF USE, PERIOD OF USE
Community domestic supply, continuously, 217 acre-feet - supplemental

LOCATION OF DIVERSION/WITHDRAWAL

APPROXIMATE LOCATION OF DIVERSION-WITHDRAWAL
1150 feet west and 900 feet south of NE corner of Sec. 18

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) NE 1/4 NE 1/4	SECTION 18	TOWNSHIP N. 23	RANGE, 1E. OR W. J. W.M. 3 E	W.R.I.A. 15	COUNTY King
--	---------------	-------------------	---------------------------------	----------------	----------------

RECORDED PLATTED PROPERTY		
LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)

LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED

Area served by The Heights Water Corporation.

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

BEGIN PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: July 31, 1981	WATER PUT TO FULL USE BY THIS DATE: July 31, 1982
--	---	--

PROVISIONS

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

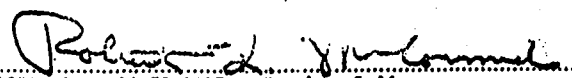
This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting such compliance.

Given under my hand and the seal of this office at Redmond Washington, this 31st day
 July 19 80

ENGINEERING DATA

.....
 ff

Department of Ecology

by 
 ROBERT K. McCORMICK, Regional Manager

DESCRIPTION OF PROPOSED WORKS

DEVELOPMENT SCHEDULE

START PROJECT BY THIS DATE: Started	COMPLETE PROJECT BY THIS DATE: July 31, 1981	WATER PUT TO FULL USE BY THIS DATE: July 31, 1982
--	---	--

PROVISIONS

All water wells constructed within the state shall meet the minimum standards for construction and maintenance as provided under RCW 18.104 (Washington Water Well Construction Act of 1971) and Chapter 173-160 WAC (Minimum Standards for Construction and Maintenance of Water Wells).

Installation and maintenance of an access port as described in Ground Water Bulletin No. 1 is required. An air line and gauge may be installed in addition to the access port.

This permit shall be subject to cancellation should the permittee fail to comply with the above development schedule and/or fail to give notice to the Department of Ecology on forms provided by that Department documenting compliance.

Given under my hand and the seal of this office at Redmond Washington, this 31st day of July, 1980

Department of Ecology

ENGINEERING DATA


by 
 ROBERT K. McCORMICK, Regional Manager

FILED for Record at Request of
J. B. Bennett
Wash

Permit No. 2482

Certificate of Water Right

Recorded in the office of State Supervisor
of Hydraulics, Olympia, Washington, in
Book No. 4 of Water Right
Certificates, on Page 1558, on
the 24th day of March,
A. D. 1917

STATE OF WASHINGTON,
County of King ss.
I certify that the within was received
and duly recorded by me in Volume
of Book of Water Right Certificates, Page
the 10 day of March

Earl W. Link
EARL W. LINK, AUDITOR
KING COUNTY, WASH.
DEPUTY

RECORDED
VOLUME 3 OF WATER RIGHTS
PAGE 251 REQUEST FOR
1917

STATE PRINTING PLANT

73

CERTIFICATE RECORD No. 4, PAGE No. 1558

SPRI

STATE OF WASHINGTON, COUNTY OF King

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits.)

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and the regulations of the State Supervisor of Hydraulics thereunder.)

This is to certify, that Heights Water Corporation of Vashon, State of Washington, has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of An unnamed spring, a tributary of Puget Sound for the purposes of Domestic supply under APPROPRIATION Permit No. 2482 issued by the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume 4, at Page 1558, on the 24th day of March, 1941; that the right hereby confirmed dates from March 16, 1931; that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 0.10 cubic feet per second. = 41,88 gpm

A description of the lands under such right to which the water hereby confirmed is appurtenant, and the place where such water is put to beneficial use, is as follows:

PLACE OF USE			LEGAL SUBDIVISION	FOR IRRIGATION	
Section	Township	Range		No. Acres Described in Permit	No. Acres Actually Irrigated

LOCATION OF POWER PLANT			LEGAL SUBDIVISION	FOR POWER	
Section	Township	Range		H. P. Described in Permit	H. P. Actually Developed

Section	Township	Range	LEGAL SUBDIVISION	FOR OTHER USES
<u>5, 6, 7 & 8</u>	<u>23 N.</u>	<u>3 E.W.M.</u>	<u>Vashon Heights community</u>	<u>Domestic supply</u>

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Section 39, Chapter 117, Session Laws 1917.

WITNESS the seal and signature of the State Supervisor of Hydraulics affixed this 24th day of March, 1941



Clay B. Bartholomew
State Supervisor of Hydraulics.

2/31

This is to certify that I have examined the foregoing application and do hereby grant the same, subject to the following limitations and conditions: This permit is issued subject to existing rights; if for irrigation, permittee shall construct and maintain at his own expense a weir or other suitable device for measuring the water granted herein and this appropriation shall be subject to such reasonable rotation system as may be ordered by the State Supervisor of Hydraulics.

The amount of water appropriated shall be limited to the amount which can be applied to beneficial use and not to exceed 0.1 cubic feet per second, or its equivalent in case of rotation.

The priority date of this permit is March 16, 1931

Actual construction work shall begin on or before November 1, 1930

and shall thereafter be prosecuted with reasonable diligence and be completed on or before

November 1, 1932

Complete application of the water to the proposed use shall be made on or before

November 1, 1940

Given under my hand and the seal of this office at Olympia, Washington, this 26th day of October, 1937

Elias J. Barthelet
State Supervisor of Hydraulics.

Application No. 5324

Permit No. 2482

PERMIT

To Appropriate Public Waters of the State of Washington
King County

Filed by Reights Water Corp.

County of King

This instrument was first received in the office of the State Supervisor of Hydraulics, Olympia, Washington, on the 16th day of March, 1931, at 10:30 o'clock A.M.

Approved October 26th, 1937

Recorded in Book No. 10 of

Permits, on Page 2482

CHAS. J. BARTHELET

State Supervisor of Hydraulics.

Before your certificate of water right is issued it will be necessary for you to file with the State Supervisor of Hydraulics a copy of each of the following reports:

- 1st. Progress reports (in case temporary permit is issued).
- 2nd. Affidavit of publication of notice of water right application.
- 3rd. Notice of beginning of construction.
- 4th. Notice of completion of construction.
- 5th. Notice of application of water to a beneficial use.
- 6th. Proof of appropriation of water.

Upon a satisfactory showing that the appropriation has been perfected as provided by statute the State Supervisor of Hydraulics will issue a water right certificate.

(Plans will be furnished by the office of State Supervisor of Hydraulics)

STAINING

VOL 3 PAGE 8

FILED for Record at Request of
H. W. McCallister
H. W. McCallister

2846848

Permit No. 1677

Certificate of Water Right

Recorded in the office of State Supervisor
of Hydraulics, Olympia, Washington, in
Book No. Two of Water Right
Certificates, on Page 862, on
the 30th day of March

19-35-

RECORDED	1935
VOL	2
PAGE	862
REQUEST	1677

STATE OF WASHINGTON,
COUNTY OF KING
I certify that the within was received
and recorded by me in Volume
of Book of Water Right Certificates, Page
on the _____ day of _____, 19____.

11
2760
1218 28

S. F. No. 309-1922, 1926.

CERTIFICATE RECORD No. TWO, Page No. 862

STATE OF WASHINGTON, COUNTY OF King

CERTIFICATE OF WATER RIGHT

(For rights perfected under original, enlargement or secondary permits.)

(In accordance with the provisions of Chapter 117, Laws of Washington for 1917, and the regulations of the State Supervisor of Hydraulics thereunder.)

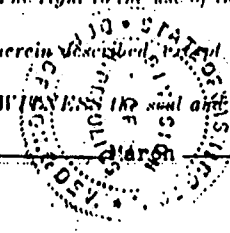
This is to certify, that Heights Water Corporation of Vashon, State of Washington, has made proof to the satisfaction of the State Supervisor of Hydraulics of Washington, of a right to the use of the waters of an unnamed spring, a tributary of, for the purposes of domestic supplies under Appropriation Permit No. 1677, issued by the State Supervisor of Hydraulics, and that said right to the use of said waters has been perfected in accordance with the laws of Washington, and is hereby confirmed by the State Supervisor of Hydraulics of Washington and entered of record in Volume Two, at Page 862, on the 30th day of March, 1935, that the right hereby confirmed dates from September 18th, 1930; that the amount of water to which such right is entitled and hereby confirmed, for the purposes aforesaid, is limited to an amount actually beneficially used for said purposes, and shall not exceed 0.05 cubic feet per second.

A description of the lands under such right, and to which the water hereby confirmed is appurtenant, or if for other purposes, the place where such water is put to beneficial use, is as follows:

Table with columns: PLACE OF USE (Section, Township, Range), LOCAL SUBDIVISION, No. of acres beneficially irrigated, No. of acres actually irrigated. Row 1: 18, 23 N., 3 E., Vashon Heights Community and East half of North portion of Vashon Island.

The right to the use of the water aforesaid hereby confirmed is restricted to the lands or place of use herein described, except as provided in Section 39, Chapter 117, Session Laws 1917.

WITNESSETH the seal and signature of the State Supervisor of Hydraulics affixed this 30th day of March, 1935.



Handwritten signature of Chas. D. Borchert, State Supervisor of Hydraulics.

MUNICIPAL SUPPLY—

16. To supply the city of North End of Vashon Island
(Name)
King County, having a present population of 500
and an estimated population of _____ in 19____
(a) Estimated present requirement 15,000 gallons per day
(b) Estimated future requirement 25,000 gallons per day

17. Construction work will begin on or before _____

18. Construction work will be completed on or before _____

Duplicate maps of the proposed ditch or other works, prepared in accordance with the rules of the State Supervisor of Hydraulics accompany this application.

Heights Water Corporation
(Name of applicant) By R.A. Wise Pres.

Signed in the presence of us as witnesses:

- (1) _____
(Name) (Address of witness)
- (2) _____
(Name) (Address of witness)

Remarks: This spring is located in a gulch on land of the Puget Mill Co. about 200' from the beach and flows into the sound in a large volume. There are apparently no permanent users of this water supply.

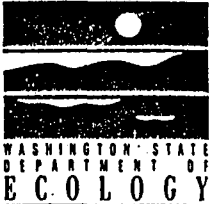
STATE OF WASHINGTON, } ss.
COUNTY OF THURSTON.

This is to certify that I have examined the foregoing application together with the accompanying maps and data, and return the same for correction or completion, as follows: _____

In order to retain its priority, this application must be returned to the State Supervisor of Hydraulics, with corrections, on or before _____, 19____

WITNESS my hand this _____ day of _____, 19____

State Supervisor of Hydraulics.



**APPLICATION FOR PERMIT
TO APPROPRIATE PUBLIC WATERS OF THE STATE OF WASHINGTON**

SURFACE WATER GROUND WATER

\$10.00 MINIMUM STATUTORY EXAMINATION FEE REQUIRED WITH APPLICATION

(GRAY BOXES FOR OFFICE USE ONLY)

(4/84)

**SPRING:
(50.1)**

APPLICATION NO.	W.R.I.A.	COUNTY King	PRIORITY DATE	TIME	ACCEPTED
-----------------	----------	-----------------------	---------------	------	----------

APPLICANT'S NAME — PLEASE PRINT
**Heights Water District
By: Reed Fitzpatrick, Trustee & Pres.**

Bus. Tel. **Ofc 567 4855**
Home Tel. **463 3900**
Other Tel. _____

ADDRESS (STREET) (CITY) (STATE) (ZIP CODE)
P. O. Box 820, Vashon, Wa 98070

DATE & PLACE OF INCORPORATION IF APPLICANT IS A CORPORATION
1931 King County

1. SOURCE OF SUPPLY

IF SURFACE WATER	IF GROUND WATER
SOURCE (NAME OF STREAM, LAKE, SPRING, ETC.) (IF UNNAMED, SO STATE) Unnamed springs	SOURCE (WELL, TUNNEL, INFILTRATION TRENCH, ETC.)
TRIBUTARY	SIZE AND DEPTH

2. USE
USE TO WHICH WATER IS TO BE APPLIED (DOMESTIC SUPPLY, IRRIGATION, MINING, MANUFACTURING, ETC.)
Rural Group A Community (Residential) Water System 566 members

ENTER QUANTITY OF WATER REQUESTED USING UNITS OF: 0.41	CUBIC FEET PER SECOND (CFS) OR	GALLONS PER MINUTE (GPM) 184	ACRE FEET PER YEAR
--	---------------------------------------	--	--------------------

TIMES DURING YEAR WATER WILL BE REQUIRED
All year

IF IRRIGATION, NUMBER OF ACRES	IF DOMESTIC USE, NUMBER OF UNITS BY TYPE, E.G. 1-HOME, 1-MOBILE HOME, 2-CAMPSITES, ETC. 566	IF MUNICIPAL USE, ESTIMATED POPULATION 20 YEARS FROM TODAY
DATE PROJECT WAS OR WILL BE STARTED Existing since 1931	DATE PROJECT WAS OR WILL BE COMPLETED 1931	

3. LOCATION OF POINT OF DIVERSION/WITHDRAWAL

3A. IF IN PLATTED PROPERTY

LOT	BLOCK	OF (GIVE NAME OF PLAT OR ADDITION)	SECTION	TOWN	RANGE	ALSO, PLEASE ENCLOSE A COPY OF THE PLAT AND MARK THE POINT(S) OF WITHDRAWAL OR DIVERSION
-----	-------	------------------------------------	---------	------	-------	--

3B. IF NOT IN PLATTED PROPERTY
ON ACCOMPANYING SECTION MAPS, ACCURATELY MARK AND IDENTIFY EACH POINT OF DIVERSION. SHOW NORTH-SOUTH AND EAST-WEST DISTANCES FROM NEAREST SECTION CORNER OR PROPERTY CORNER

ALSO, ENTER BELOW THE DISTANCES FROM THE NEAREST SECTION OR PROPERTY CORNER TO THE DIVERSION OR WITHDRAWAL.

LOCATED WITHIN (SMALLEST LEGAL SUBDIVISION) Govt Lot 5, NE 1/4 of NE 1/4 of	SECTION 18	TOWNSHIP N. 23 N	RANGE (E. OR W.) W.M. 3 E	COUNTY King
---	----------------------	----------------------------	-------------------------------------	-----------------------

4. DO YOU OWN THE LAND ON WHICH THIS SOURCE IS LOCATED. IF NOT, INSERT NAME & ADDRESS OF OWNER
Own deeded exclusive rights to water & sanitary control area

5. LEGAL DESCRIPTION OF PROPERTY ON WHICH WATER IS TO BE USED
ATTACH A COPY OF THE LEGAL DESCRIPTION OF THE PROPERTY (ON WHICH THE WATER WILL BE USED) TAKEN FROM A REAL ESTATE CONTRACT, PROPERTY DEED OR TITLE INSURANCE POLICY, OR, COPY CAREFULLY IN THE SPACE BELOW.

See attached

WHAT IS YOUR INTEREST IN THE PROPERTY ON WHICH THE WATER IS TO BE USED (PROPERTY OWNER, LESSEE, CONTRACT PURCHASER, ETC.)

needed exclusive rights to water and sanitary control area

ARE THERE ANY EXISTING WATER RIGHTS RELATED TO THE LAND ON WHICH THE WATER IS TO BE USED (INCLUDING WATER PROVIDED BY IRRIGATION DISTRICTS OR DITCH COMPANIES.)

YES NO

IF YES, FROM WHAT SOURCE (i.e. SURFACE OR GROUND WATER) AND UNDER WHAT AUTHORITY

Two springs and three wells in common aquifer. Dept of Ecology

6. DESCRIPTION OF SYSTEM PROPOSED OR INSTALLED

(FOR EXAMPLE: SIZE OF PUMP, CAPACITY OF PUMP, PUMP MOTOR HORSE POWER, PIPE DIAMETER, NUMBER OF SPRINKLERS, ETC.)

No change of existing installation. Increase existing water appropriation

rights from Unnamed Springs from 0.15 cfs to 0.41 cfs to reflect current

actual peak water availability from these two springs (adjacent). Note:

Any water not appropriated simply overflows into Puget Sound. During peak

summer demand period, all of this water can now be utilized, especially since

Washington State Ferry System is now taking water, via our hook-up to the

Vashon north-end pier facility, to serve several ferry boats.

Note: Output from these springs varies with the season but has run from 0.3 cfs

0.41 cfs since we have been keeping records.

8. Domestic use only

COMPLETE THIS SECTION ONLY IF THIS APPLICATION INCLUDES IRRIGATION AS A USE

IN ORDER TO IMPLEMENT THE PROVISIONS OF INITIATIVE MEASURE NUMBER 59, THE FAMILY FARM WATER ACT WHICH WAS PASSED BY THE VOTERS ON NOVEMBER 3, 1977, WE MUST ASK THE FOLLOWING QUESTIONS:

DOES THE TOTAL NUMBER OF ACRES IN WHICH YOU HAVE CONTROLLING INTEREST IN THE STATE OF WASHINGTON EXCEED 2000 ACRES FOR THE FOLLOWING THREE CATEGORIES:

- | | | |
|---|------------------------------|-----------------------------|
| 1. LANDS THAT ARE BEING IRRIGATED UNDER WATER RIGHTS ACQUIRED AFTER DECEMBER 8, 1977. | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 2. LANDS THAT MAY BE IRRIGATED UNDER APPLICATIONS NOW ON FILE WITH THE DEPARTMENT OF ECOLOGY. | YES <input type="checkbox"/> | NO <input type="checkbox"/> |
| 3. LANDS THAT MAY BE IRRIGATED UNDER THIS APPLICATION. | YES <input type="checkbox"/> | NO <input type="checkbox"/> |

IF 10 ACRE-FEET OR MORE OF WATER IS TO BE STORED AND/OR IF THE WATER DEPTH WILL BE 10 FEET OR MORE AT THE DEEPEST POINT, A STORAGE PERMIT MUST BE FILED IN ADDITION TO THIS PERMIT. THESE FORMS CAN BE SECURED, TOGETHER WITH INSTRUCTIONS, FROM THE DEPARTMENT OF ECOLOGY.

SIGNATURES

Reed Fitzpatrick
APPLICANT'S SIGNATURE

Reed Fitzpatrick, Pres. & Trustee

LEGAL LANDOWNER'S NAME
(PLEASE PRINT)

Heights Water District

LEGAL LANDOWNER'S SIGNATURE (OWNER OF PROPERTY DESCRIBED IN ITEM NUMBER 5)

P.O. Box 820, Vashon, Wa 98070

LEGAL LANDOWNER'S ADDRESS

FOR OFFICE USE ONLY

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

ss.

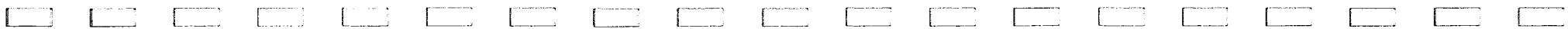
This is to certify that I have examined this application together with the accompanying maps and data, and am returning it for correction or completion as follows:

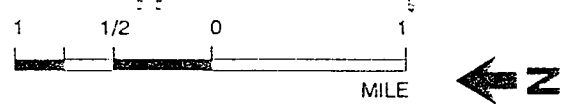
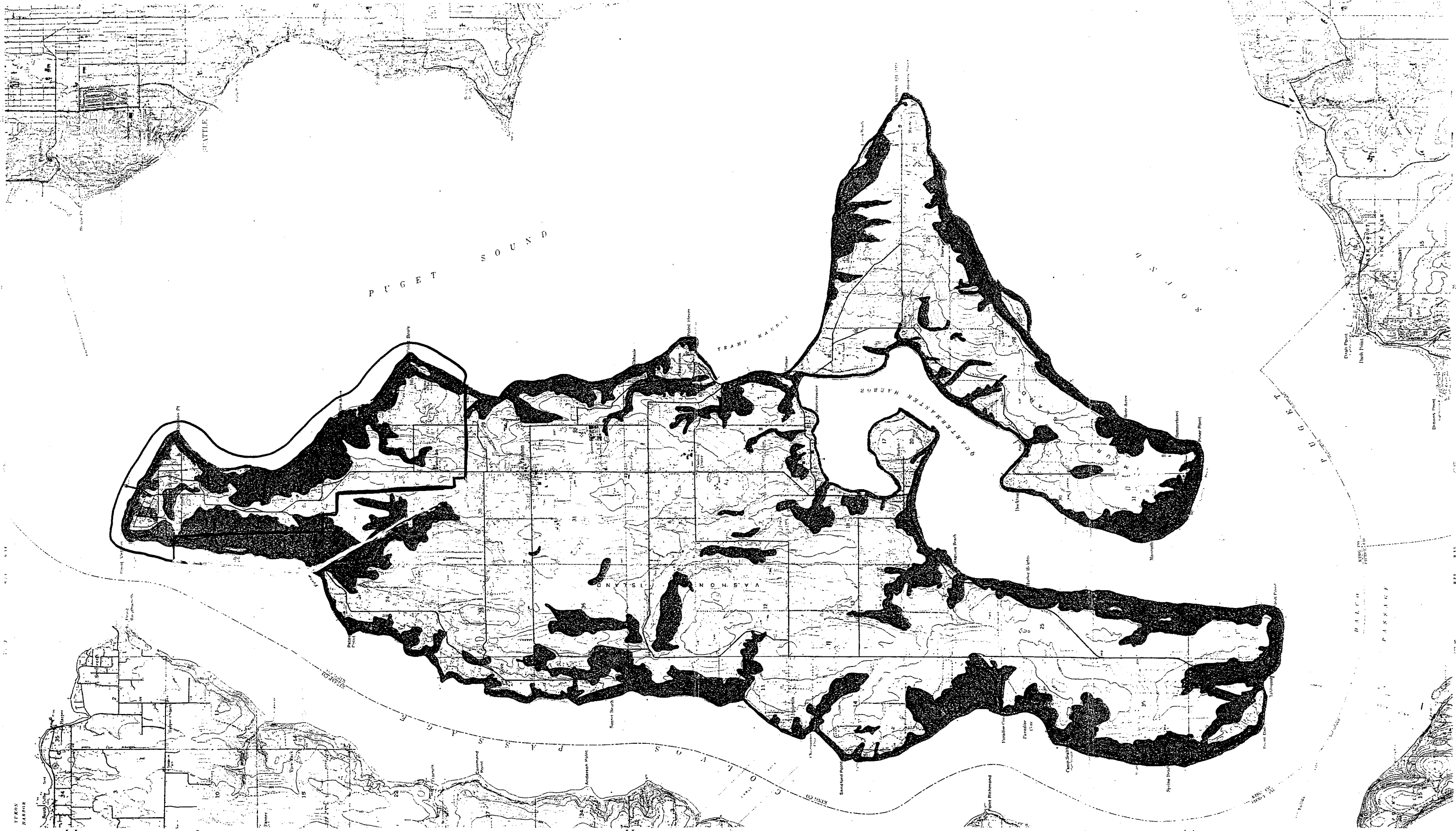
In order to retain its priority date, this application must be returned to the Department of Ecology, with corrections, on or before..... 19.....

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

Department of Ecology

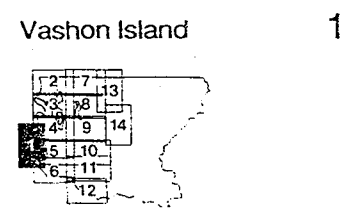
APPENDIX B

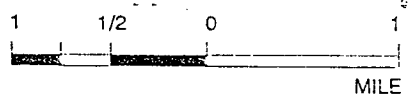




The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

Erosion Hazard Areas

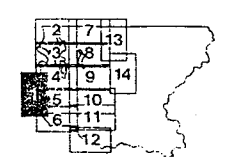


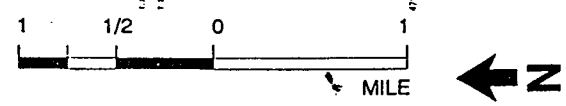
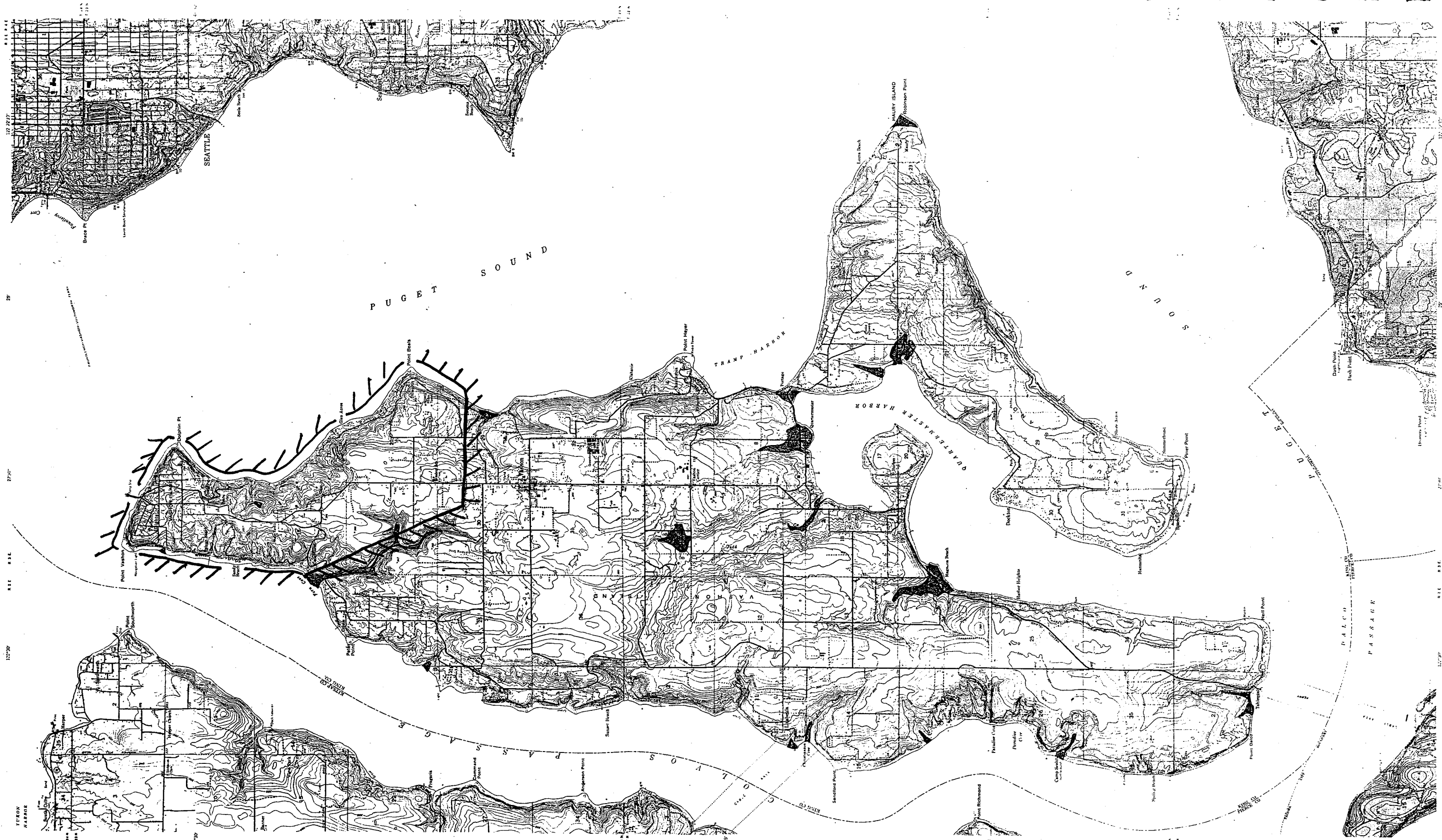


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Landslide Hazard Areas

Vashon Island



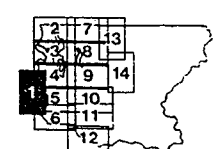


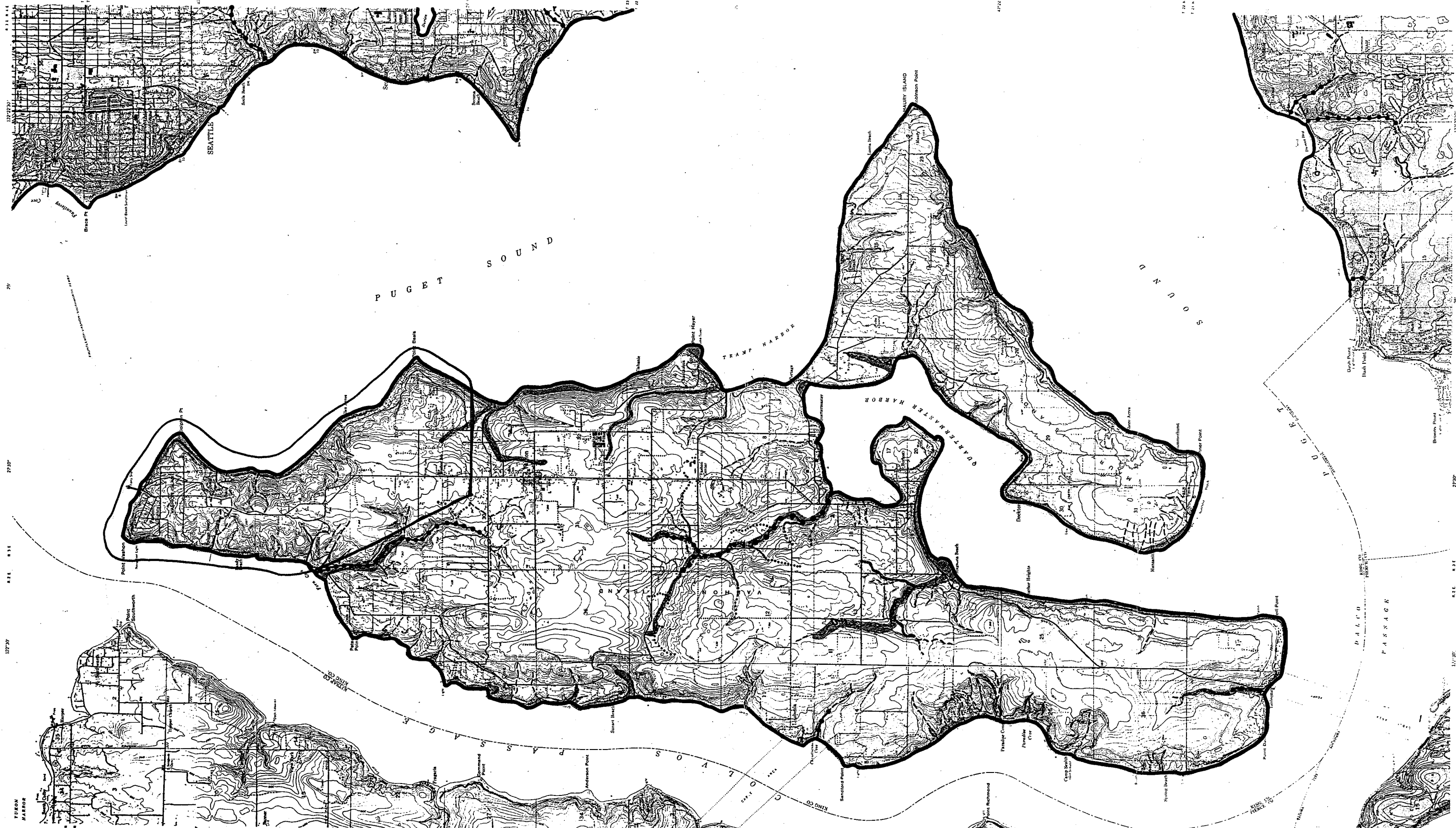
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See wetlands and landslide hazard maps for additional potential seismic hazard areas. Wetlands and landslide areas are susceptible to failure during earthquakes. Other seismic hazard areas not shown on this map are shorelines underlain by lacustrine sediments; these are susceptible to liquefaction.

Seismic Hazard Areas

Vashon Island










The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

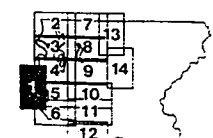
One-hundred-year floodplains extend beyond those shown on maps. Flood Insurance Rate Maps do not always show the floodplain to the headwaters of streams.

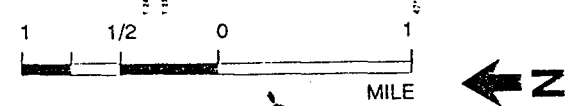
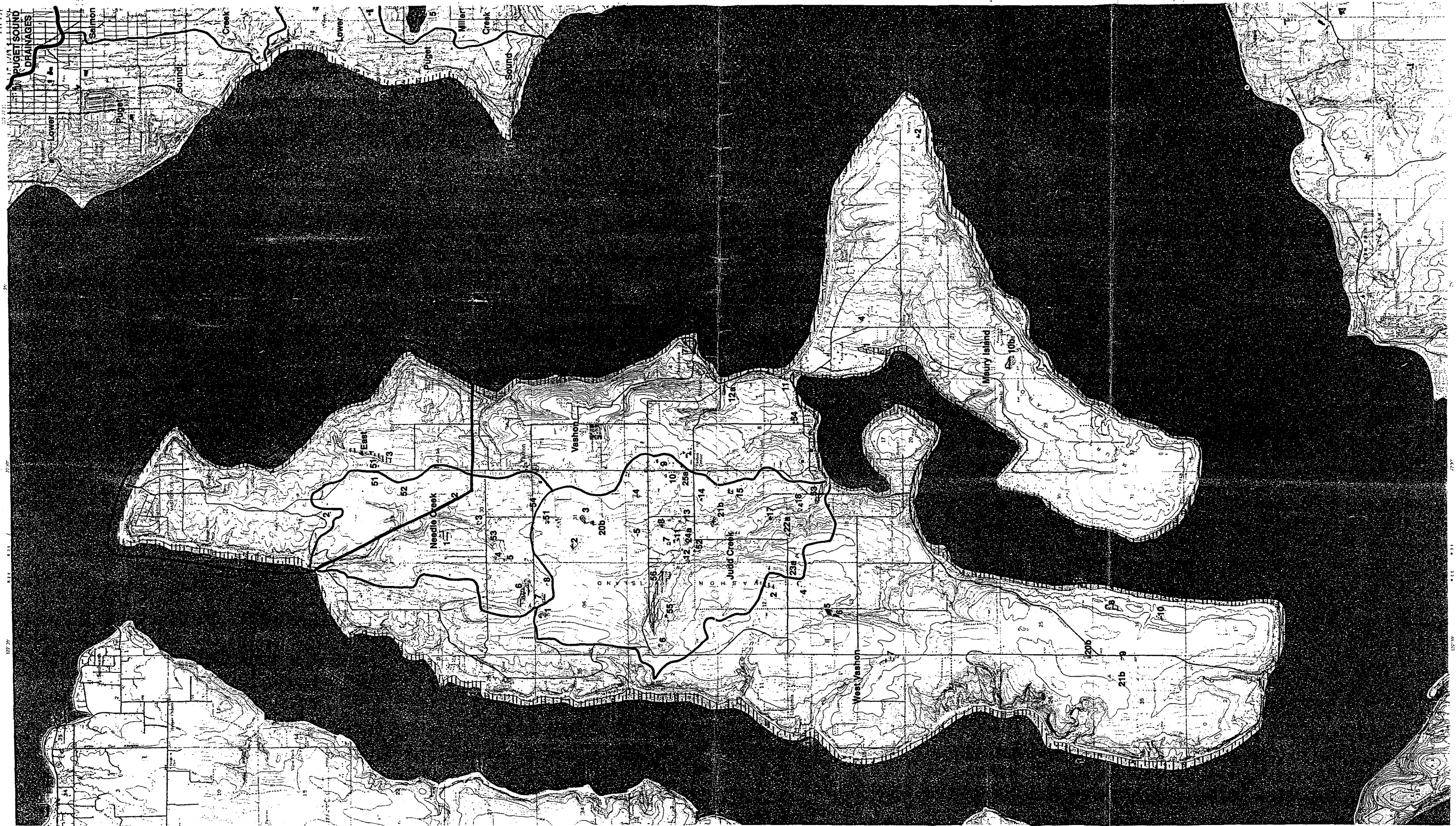
 100-Year Floodplains

Streams and 100-Year Floodplains

-  Class 1
-  Class 2 (with salmonids)
-  Class 2 (perennial; salmonid use undetermined)
-  Class 3
-  Unclassified

Vashon Island









The boundaries of the sensitive areas displayed on these maps are approximate. Additional sensitive areas that have not been mapped may be present on a development proposal site. Where differences occur between what is illustrated on these maps and the site conditions, the actual presence or absence on the site of the sensitive area - as defined in the Sensitive Area Ordinance - is the legal control.

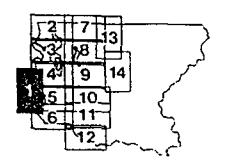
Numbered wetlands, except those with an "a" or "b" designation are included in the *King County Wetlands Inventory*. The locations of wetlands designated "a" have been verified on the site by a variety of sources. Wetlands designated "b" are mapped in the U.S. Fish and Wildlife Service *National Wetlands Inventory*, but their locations have not been field verified.

There may be gaps in the numbering sequence within individual drainage basins.

Wetlands

-  Wetlands
-  Open Water
-  Basin Boundaries
-  Sub-basin Boundaries

Vashon Island



APPENDIX C





ITEM #3

HYDROGEOLOGIC INVESTIGATIONS

HEIGHTS WATER CORPORATION

APRIL 1989

INTRODUCTION

This report presents the results of a hydrogeologic study in the area of the spring and production wells supplying the Heights Water Corporation, Section 18, T. 23 N., R. 3 E. As outlined by the proposal of 9/21/88 the study aimed to evaluate the capabilities of the aquifer contributing to the existing corporation spring and wells.

Investigational procedures included a review of pertinent corporation well and spring records, together with the pump testing of both wells. Geologic surface mapping conducted in the past by various state and federal agencies was field reviewed. Flow estimates were made for all springs in the area generally as outlined on plate 1. Geophysical investigations utilizing electrical resistivity equipment evaluated the extent of the Heights aquifer and probed to near the minus 250 foot elevation for potential deeper aquifers.

HYDROGEOLOGY

Geology

The Heights aquifer is a unique geologic entity, occurring as it does in a very restricted area but having a very large volume of annual recharge. The extent and structure of this aquifer is illustrated by the attached map and section, plates 1 and 2. As shown the aquifer is restricted to the basal portion of a glacial recessional outwash deposit lying against the eastern edge of the island. Finer sands and silts comprising the core of the island feed recharge to the aquifer via lateral groundwater movement through truncated permeable horizons, plate 2.

This recharge is perched on less permeable pre glacial deposits, consisting in part of volcanic mudflow debris of probable Mt. Rainier origin. Topographic irregularities across the upper surface of this latter unit channel this ground water through the aquifer to the springs.

The possibility of deeper aquifers within the pre Vashon section was evaluated by geophysical methods and does not appear to be likely, at least to the minus 250 foot elevation. As shown by the subsurface section, plate 2, sand intervals occur but appear to have limited permeability and not capable of supplying community type wells.

Hydrology

Recharge to the Heights aquifer is believed to originate largely from seepage through basal sands of the Colvos formation. Ground-water movement in the Colvos tends to be northerly from the central and southern portions of the Heights service area, guided largely by the gradual north dipping surface of underlying pre Vashon clay, plates 1 and 2.

The large extent and lesser permeability of the Colvos ground-water reservoir results in a steady but slow release of ground water to the adjacent, more highly permeable, Heights aquifer. As a result, seasonal water level fluctuations are small and spring flows are relatively constant throughout the year.

The Heights aquifer is areally very limited. Geophysical data suggests it probably does not extend more than 500 feet radially south, east or west from the Heights wells. As a result the aquifer has the characteristics of a large diameter gravel packed well in a regional sand aquifer. This is illustrated by the pumping characteristics of the wells and their influence on the springs. A pump test conducted for this study, plate 3, indicated negligible pumping interference between the wells, consistent with an unconfined highly permeable water table aquifer.

Long term well use, as occurs during the summer and during the 1987-88 winter testing period results in a gradual aquifer water level decline which reduces spring flows by nearly a third. The amount of this decline as interpreted from the theoretical change in ground-water gradient, spring to wells, is on the order of 6 to 7 feet. This lowering of the aquifers water level has the effect of increasing recharge from the adjacent Colvos sands. This is illustrated by plate 4 which plots cumulative well and spring discharge records against spring only discharge (assumed at 146 gpm). During a 42 day period of stabilized spring flow, late January to early March, this additional recharge is estimated at about 40 gpm. Comparable measurements during a period of stability in the late summer of 1988 indicate an 80 gpm addition to the normal recharge rate. It is concluded that the wells not only act as an efficient means of providing a peaking supply, they do create an added annual recharge benefit.

Note from plate 3 that the period of increasing spring flow following well shutdown approximates the total period of well operation. This suggests that the ground-water storage withdrawal created by pumping extends well into the more extensive Colvos sand formation.

OPERATIONS AND FUTURE DEVELOPMENT

Available data indicate that the current method of spring and well use is performing technically as desired. Fine tuning these supply sources including a decision concerning an additional well will require further information, however.

Currently, weekly well production is recorded. An analysis of how this production affects well and aquifer efficiency will require added weekly pumping water level records in both wells and a twice monthly static water level measurement in at least one well. The above should be matched with weekly checks on the individual well yields as measured through the flow meters.

The weekly spring flow measurements have been excellent to establish general trends but hopefully some added precision can be obtained in the measuring method. As illustrated by plate 4 a large scatter of measured rates occur during very short time periods, often less than a day apart. In several instances where more than one measurement was made during a one or two hour period the scatter has exceeded 9 gpm. It appears unlikely that this occurs naturally, surface disturbances in the clear well and/or hang up of the float appear a more likely explanation.

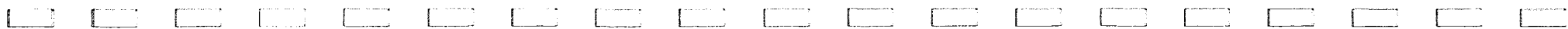
I recommend further data collection through a full well use and spring recovery season before making a decision on a third well. Theoretically a third well initially pumping 65 gpm would result in a decreased spring discharge of about 25 gpm; i.e., 75 gpm summer flow rate. In the wells the resulting further static water level decline, above that indicated in the summer of 1988, would be three feet which would result in a combined pumping rate from all wells of about 140 gpm. The total available supply from the wells and spring then would be on the order of 215 gpm. This compares with an estimated maximum of about 190 gpm for the combined wells and spring near the end of the 1988 pumping season. Under these conditions the economics of a third well at this site might be questionable. Certainly more detailed consideration is warranted.

Concerning off season use of the wells as a method of water salvage, theoretically this would work if a significant portion of the pumped water could create a storage withdrawal that could act to trap recharge which could be later drafted during the peak use period. In this case this cannot occur because the aquifer is too areally limited and the available drawdown too small. Assuming the aquifer with an extent approximately as shown on plate 1, a seasonal drawdown of 6 feet would result in a storage withdrawal of only 8 to 10 million gallons or an 8 to 10 day supply for the system.

An additional storage withdrawal undoubtedly occurs in the

lesser permeable Colvos formation but the draindown is too slow to increase the available daily withdrawal much beyond the observed 40 plus gpm rate. Note that this is a preliminary appraisal of this problem. The acquisition of the recommended additional water level data will provide much needed information to permit a more detailed analysis.

Note also that these same relationships likely will defeat any attempt to salvage spring water by artificial injection in the well area. The very limited aquifer simply will not hold enough water to create a significant addition to storage.



APPENDIX D





20 June 1994

Division of Drinking Water
Technical Services Section
Olympia, Wa

Subject: Susceptibility Assessment Forms
Heights Water District Sources No. 1, 2, 3, & 4
(Springs and Wells No.1, 2, & 3)

Gentlemen:

Enclosed are the subject forms together with related maps and other reference data. Since all the above sources are close together and on the same aquifer, some of the reference data is applicable to all four and are therefore submitted in single copy.

These sources are located in a sparsely populated secondary woodland area with rural zoning 2.5, 5, and 10 acre tracts the minimum. Due to the lack of any new sources of water, growth is not expected. This water district is not issuing any new water shares.

All homes on the north end of Vashon Island use septic systems with drain fields, however none of these are within 1000 ft of these sources (most are much farther away).

Herbicides are not used on the Vashon roadsides, only mowers and brushcutters.

Please call the undersigned if you have any questions.

Ken Amer, Trustee HWD

Tel: 567-5189

NCL:

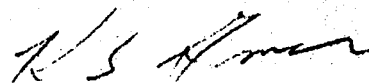
WELL LOGS

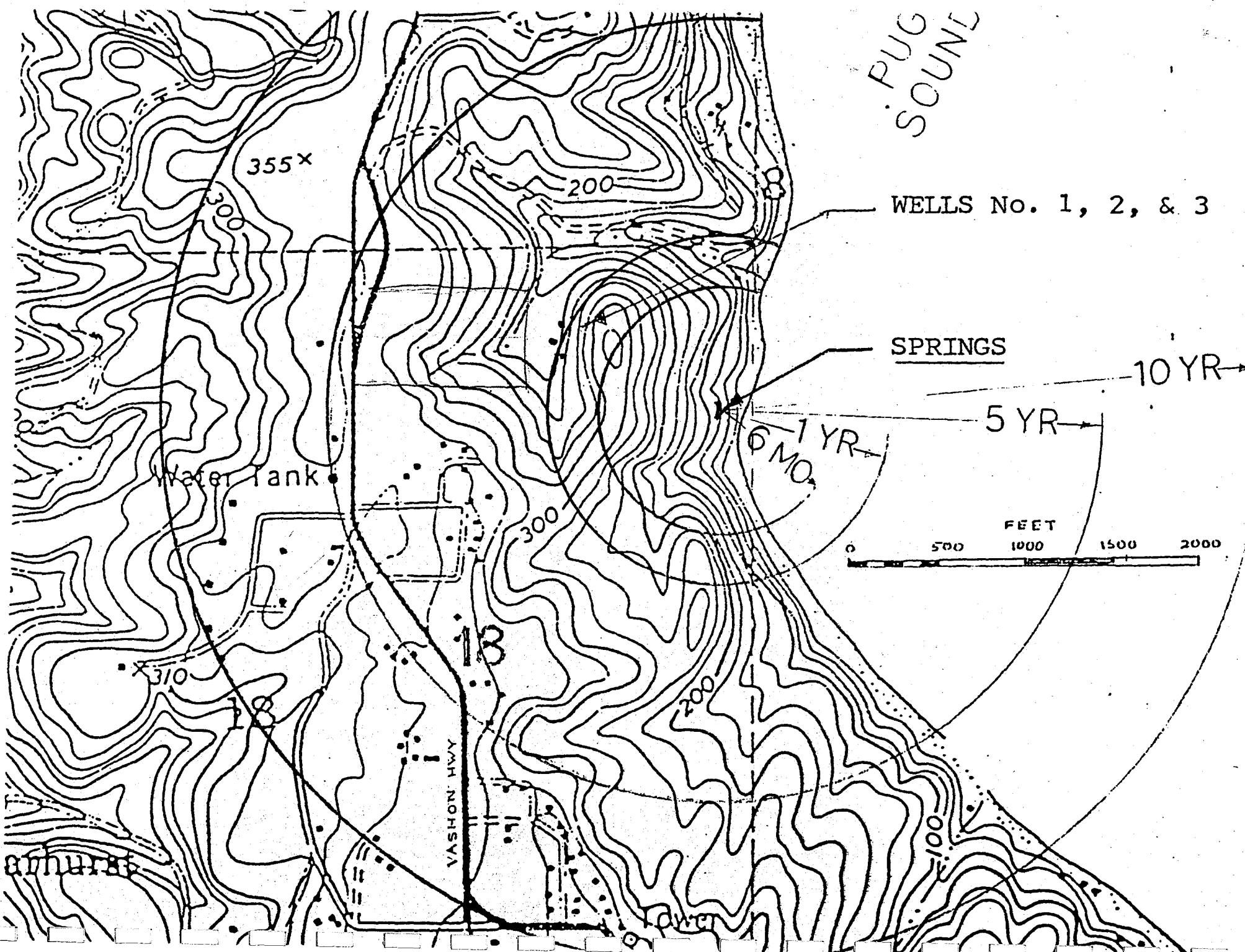
AERIAL VIEW

TOPOG. VIEWS (SPRINGS, WELLS)

GEOLOGICAL VIEW

RANGEY'S COMMENTS





PUG
SOUND

355x

200

WELLS No. 1, 2, & 3

SPRINGS

10 YR →

5 YR →

1 YR →
D.M.O.

Water tank

FEET

500

1000

1500

2000

x310

300

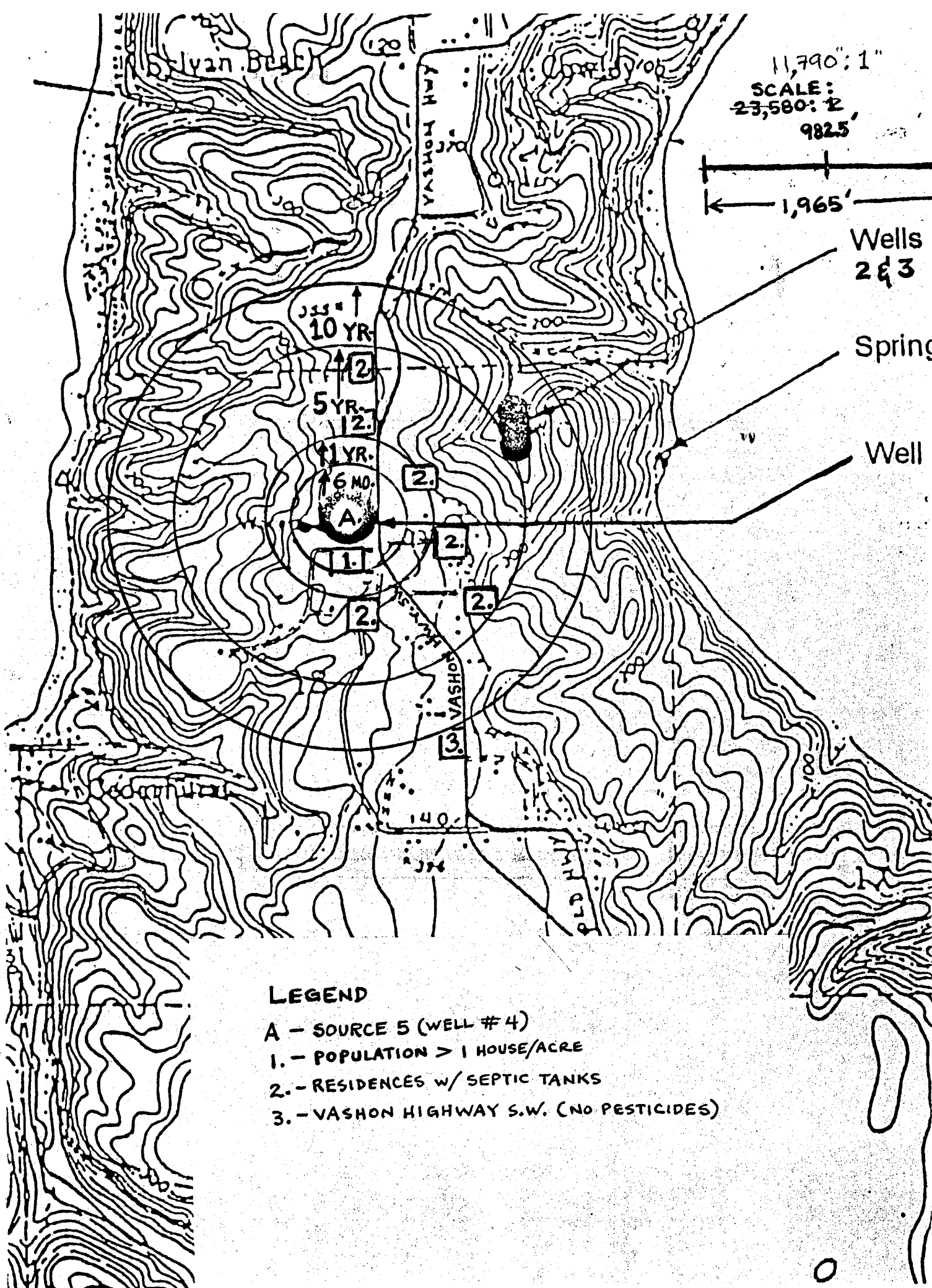
200

VASHON HWY

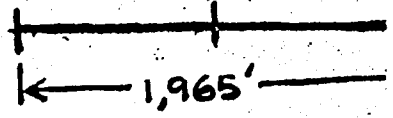
100

lower

87111111



11,790" : 1"
 SCALE:
 23,580" : 2"
 982.5'



Wells
 2 & 3

Spring

Well

LEGEND

- A - SOURCE 5 (WELL # 4)
- 1. - POPULATION > 1 HOUSE/ACRE
- 2. - RESIDENCES W/ SEPTIC TANKS
- 3. - VASHON HIGHWAY S.W. (NO PESTICIDES)

Springs
50-1

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.

N/A = Not applicable

PART I: System Information

Well owner/manager : Heights Water District (private, non-profit mutual corp.)

Water system name : Heights Water District

County: King

Water system number: 32300L Source number: 50-1

Well depth: N/A (ft.) (From WFI form)

Source name: Spring

WA well identification tag number: _____

well not tagged

Number of connections: 592 Population served: 1417

Township: 23 North Range: 3 East

Section: 18 1/4 1/4 Section: NE 1/4 of NE 1/4

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 ~~was~~ originally constructed: / / 13 / month/day/year

last reconstruction: / / / month/day/year

_____ information unavailable

2) Well driller: N/A

well driller unknown

3) Type of well:

Drilled: rotary bored cable (percussion) Dug

Other: spring(s) lateral collector (Ranney)

driven jetted other: _____

Additional comments: _____

4) Well report available? 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: 125 to 180 (gallons/min)

Source of information: Metered

If not documented, how was pumping rate determined? Meter on TRANSFER

PUMP DISCHARGE

Pumping rate unknown

6) Is this source treated? Yes

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):

Precautionary bacteriological control

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

Residual level: 0.5 mg/L (At the point closest to the source.)

PART III: Hydrogeologic Information

1) Depth to top of open interval: [check one] *N/A*

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

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

2) Depth to ground water (static water level): *N/A*

< 20 ft 20-50 ft 50-100 ft > 100 ft

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: *Unknown.*

(Springs flowing from side of hills.)
_____ 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 *Underground collection reservoir.*

5) Wellhead elevation (height above mean sea level): 75 (ft)

How was elevation determined? 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.)

N/A

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? 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:

wellhead enclosed in a wellhouse (SPRING HOUSE)

controlled access (describe): COVERED LOCKED ENCLOSURE

other uses for wellhouse (describe): NONE

no wellhead control

9) Surface seal: N/A

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):

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

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 50 mil (gallons)

How was this determined?

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 : 700 (ft)

1 year ground water travel time : 980 (ft)

5 year ground water travel time: 2200 (ft)

10 year ground water travel time: 3110 (ft)

Information available on length of screened/open interval?

YES NO

Length of screened/open interval: < 10 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? 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 / 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:

	700'	950'	2200'	
	6 month	1 year	5 year	unknown
likely pesticide application	_____	_____	_____	_____
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	_____	_____	X	_____
Wastewater treatment lagoons	_____	_____	_____	_____
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:

RESIDENTIAL SEPTIC SYSTEMS, POSSIBLE RESIDENTIAL
USE OF PESTICIDES

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. <u>Nitrate</u> : (Nitrate MCL = 10 mg/l)		
Results greater than MCL		<input checked="" type="checkbox"/>
< 2 mg/liter nitrate	<input checked="" type="checkbox"/>	
2-5 mg/liter nitrate		
> 5 mg/liter nitrate		
___ Nitrate sampling records unavailable		

	YES	NO
B. <u>VOCs</u> : (VOC detection level 0.5 ug/l or 0.0005 mg/l.)		
Results greater than MCL or SAL		<input checked="" type="checkbox"/>
VOCs detected at least once		<input checked="" type="checkbox"/>
VOCs never detected	<input checked="" type="checkbox"/>	
___ VOC sampling records unavailable		

	YES	NO
C. <u>EDB/DBCP</u> : (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		<i>N/A (King County)</i>
EDB/DBCP detected above MCL at least once		
EDB/DBCP never detected		
___ EDB/DBCP tests required but not yet completed		
___ EDB/DBCP tests not required		

	YES	NO
D. <u>Other SOC (Pesticides)</u> :		
Other SOC detected (pesticides and other synthetic organic chemicals).		<input checked="" type="checkbox"/>
___ Other SOC tests performed but none detected (list test methods in comments)		
<input checked="" type="checkbox"/> Other SOC tests not performed		

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

YES NO

E. Bacterial contamination:

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 these 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:

Hilly terrain fronting on Puget Sound

2) Aquifer Material: (springs)

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? No

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

	YES	NO	unknown
< 6 month travel time	_____	<u> X </u>	_____
6 month-1 year travel time	_____	<u> X </u>	_____
1-5 year travel time	_____	<u> X </u>	_____
5-10 year travel time	_____	<u> X </u>	_____

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

	YES	NO	unknown
< 1 year travel time	_____	<u> X </u>	_____
1-5 year travel time	_____	<u> X </u>	_____
5-10 year travel time	_____	<u> X </u>	_____

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.

 SEE HYDROGEOLOGIST'S COMMENTS ATTACHED

Suggestions and Comments

Did you attend one of the susceptibility workshops? YES / NO

Did you find it useful? YES / NO

Did you seek outside assistance to complete the assessment? 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.

DRAFT

50-2
WELL #1

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 : _____

Water system name : Heights Water District

County: King

Water system number: 32300L Source number: 50-2

Well depth: 177 (ft.) (From WFI form)

Source name: HWD WELL No. 1

WA well identification tag number: _____

well not tagged

Number of connections: 582 Population served: 1417

Township: 23N Range: 3E

Section: 18 1/4 1/4 Section: NE 1/4 of NE 1/4

Latitude/longitude (if available): 1

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: 9/30/79 month/day/year

last reconstruction: 1/1 month/day/year

_____ information unavailable

2) Well driller: Evergreen Drilling Co.
Maple Valley, Wz

well driller unknown

3) Type of well:

Drilled: rotary bored cable (percussion) Dug

Other: spring(s) lateral collector (Ranney)

driven jetted other: _____

Additional comments: _____

4) Well report available? 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: 55 (gallons/min)

Source of information: WELL LOG & METER

If not documented, how was pumping rate determined? _____

Pumping rate unknown

6) Is this source treated? Yes

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):

Precautionary bacteriological control

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

Residual level: 0.50 mg/l (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 > 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

flowing well/spring (artesian)

How was water level determined?

well log other: SOUNDINGS

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 N/A

5) Wellhead elevation (height above mean sea level): 230 (ft)

How was elevation determined? 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.)

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? 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:

wellhead enclosed in a wellhouse

controlled access (describe): concrete box, with hinged &
locked cover, in fenced & locked enclosure.

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)

> 18 ft ('>' means greater than)

depth of seal unknown

no surface seal

10) Annual rainfall (inches per year):

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

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 1.4 mil (gallons)

How was this determined?

meter \neq

estimated: pumping rate (55 gpm intermit.)

pump capacity (_____)

other: _____

2) "Calculated Fixed Radius" estimate of ground water movement:

(see Instruction Packet)

6 month ground water travel time : 220 (ft)

1 year ground water travel time : 310 (ft)

5 year ground water travel time: 700 (ft)

10 year ground water travel time: 980 (ft)

Information available on length of screened/open interval?

YES NO

Length of screened/open interval: 10 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? 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 / 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:

	220' 6 month	310' 1 year	700' 5 year	unknown
likely pesticide application	_____	_____	_____	_____
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	_____	_____	X	_____
Wastewater treatment lagoons	_____	_____	_____	_____
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:

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.)

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

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

	<u>YES</u>	<u>NO</u>
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	___	___
___ EDB/DBCP tests required but not yet completed		
___ EDB/DBCP tests not required		

N/A (King County)

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

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

YES

NO

E. Bacterial contamination:

Any bacterial detection(s) in the past 3 years in samples taken from the source (not distribution sampling records).

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.

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 these 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?) 980

YES NO

Describe with references to map produced in Part IV:

Hilly Terrain

- 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 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 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? *No*

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

	YES	NO	unknown
< 6 month travel time	_____	<u> X </u>	_____
6 month-1 year travel time	_____	<u> X </u>	_____
1-5 year travel time	_____	<u> X </u>	_____
5-10 year travel time	_____	<u> X </u>	_____

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

	YES	NO	unknown
< 1 year travel time	_____	<u> X </u>	_____
1-5 year travel time	_____	<u> X </u>	_____
5-10 year travel time	_____	<u> X </u>	_____

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.

REFER TO HYDROGEOLOGIST'S COMMENTS ATTACHED

Suggestions and Comments

Did you attend one of the susceptibility workshops?

YES / NO

Did you find it useful?

YES / NO

Did you seek outside assistance to complete the assessment?

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.

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: _____

Water system name: Heights Water District

County: King

Water system number: 32300L Source number: 50-3

Well depth: 148 (ft.) (From WFI form)

Source name: HWD WELL No. 2

WA well identification tag number: _____

well not tagged

Number of connections: 582

Population served: 1417

Township: 23 N

Range: 3 E

Section: 18

1/4 1/4 Section: NE 1/4 of NE 1/4

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: 6/6/54 month/day/year

last reconstruction: 6/24/93 month/day/year (upgraded pump)

_____ information unavailable

2) Well driller: Evergreen Drilling Co
Maple Valley, WA

well driller unknown

3) Type of well:

Drilled: rotary bored cable (percussion) Dug

Other: spring(s) lateral collector (Ranney)

driven jetted other: _____

Additional comments: _____

4) Well report available? 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: 100 (gallons/min)

Source of information: Meter

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 other

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

Precautionary bacteriological control

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

Residual level: 0.50 mg/l (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 > 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

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:

_____ 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): 29.4 (ft)

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

other: By survey from No. 1 Well

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.)

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? 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:

wellhead enclosed in a wellhouse
 controlled access (describe): concrete box with hinged & locked cover inside fenced & locked enclosure.
 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)
 > 18 ft ('>' means greater than)
 depth of seal unknown
 no surface seal

10) Annual rainfall (inches per year):

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

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 1.6 mil (gallons)

How was this determined?

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 : 220 (ft)

1 year ground water travel time : 310 (ft)

5 year ground water travel time: 700 (ft)

10 year ground water travel time: 980 (ft)

Information available on length of screened/open interval?

YES NO

Length of screened/open interval: 9 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? 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 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	_____	_____	_____	_____
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	_____	_____	X	_____
Wastewater treatment lagoons	_____	_____	_____	_____
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: 980'

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)

- Results greater than MCL
- < 2 mg/liter nitrate
- 2-5 mg/liter nitrate
- > 5 mg/liter nitrate
- Nitrate sampling records unavailable

YES	NO
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)

- Results greater than MCL or SAL
- VOCs detected at least once
- VOCs never detected
- VOC sampling records unavailable

YES	NO
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>

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
- EDB/DBCP tests required but not yet completed
- EDB/DBCP tests not required

YES	NO
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

N/A (King County)

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)
- Other SOC tests not performed

YES	NO
<input type="checkbox"/>	<input type="checkbox"/>

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 these 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:

HILLY TERRAIN

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 NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs? *NO*

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

	YES	NO	unknown
< 6 month travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 month-1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

	YES	NO	unknown
< 1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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.

SEE HYDROLOGISTS COMMENTS ATTACHED

Suggestions and Comments

Did you attend one of the susceptibility workshops?

YES

NO

Did you find it useful?

YES

NO

Did you seek outside assistance to complete the assessment?

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.

VRAT 1

50-4
WELL #3

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 : _____

Water system name : Heights Water District

County: King

Water system number: 32300 L Source number: 50-4

Well depth: 155 (ft.) (From WFI form) (Cased to 145')

Source name: HWD WELL No. 3

WA well identification tag number: _____

X well not tagged

Number of connections: 582 Population served: 1417

Township: 23 N Range: 3 E

Section: 18 1/4 1/4 Section: NE 1/4 of NE 1/4

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 1 12 1993 month/day/year

last reconstruction: 1 1 month/day/year

_____ information unavailable

2) Well driller: Richardson Drilling Co.

well driller unknown

3) Type of well:

Drilled: rotary bored cable (percussion) Dug

Other: spring(s) lateral collector (Ranney)

driven jetted other: _____

Additional comments: _____

4) Well report available? 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: 40 (gallons/min)

Source of information: Meter

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 other

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

Precautionary bacteriological control

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

Residual level: 0.50 (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 > 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

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: *N/A*

_____ 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 *N/A*

5) Wellhead elevation (height above mean sea level): 211.5 (ft)

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

other: By survey from #1 Well

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.)

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? 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:

wellhead enclosed in a wellhouse
 controlled access (describe): Concrete box with hinged & locked cover inside fenced & locked enclosure!
 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)
 > 18 ft ('>' means greater than)
 depth of seal unknown
 no surface seal

10) Annual rainfall (inches per year):

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

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 1.0 mil (gallons)

How was this determined?

meter ~~±~~

estimated: pumping rate (40 gpm intermit)

pump capacity (_____)

other: _____

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

6 month ground water travel time : 220 (ft)

1 year ground water travel time : 310 (ft)

5 year ground water travel time: 700 (ft)

10 year ground water travel time: 980 (ft)

Information available on length of screened/open interval?

YES NO

*SCREEN ONLY
(EXCLUDES PERFORATIONS)*

Length of screened/open interval: 10 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? 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 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:

	770'	980'	6 month	1 year	5 year	unknown
likely pesticide application			_____	_____	_____	_____
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			_____	X	X	_____
Wastewater treatment lagoons			_____	_____	_____	_____
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:

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)

Results greater than MCL

< 2 mg/liter nitrate

2-5 mg/liter nitrate

> 5 mg/liter nitrate

___ Nitrate sampling records unavailable

YES NO

___ X

X ___

___ ___

___ ___

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)

Results greater than MCL or SAL

VOCs detected at least once

VOCs never detected

___ VOC sampling records unavailable

YES NO

___ X

___ X

X ___

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

___ EDB/DBCP tests required but not yet completed

___ EDB/DBCP tests not required

YES NO

___ ___

___ ___

___ ___

___ ___

N/A (King County)

D. Other SOCs (Pesticides):

Other SOC's 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

YES NO

___ ___

If any SOC's in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOC's 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). YES NO

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source. YES NO

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 these 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 NO

Describe with references to map produced in Part IV:

Adjacent steep hillside

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 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 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 NO

4) Are there other high capacity wells (agricultural, municipal and/or industrial) located within the CFRs? *No*

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

	YES	NO	unknown
< 6 month travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 month-1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

	YES	NO	unknown
< 1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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 NO

Did you find it useful?

YES NO

Did you seek outside assistance to complete the assessment?

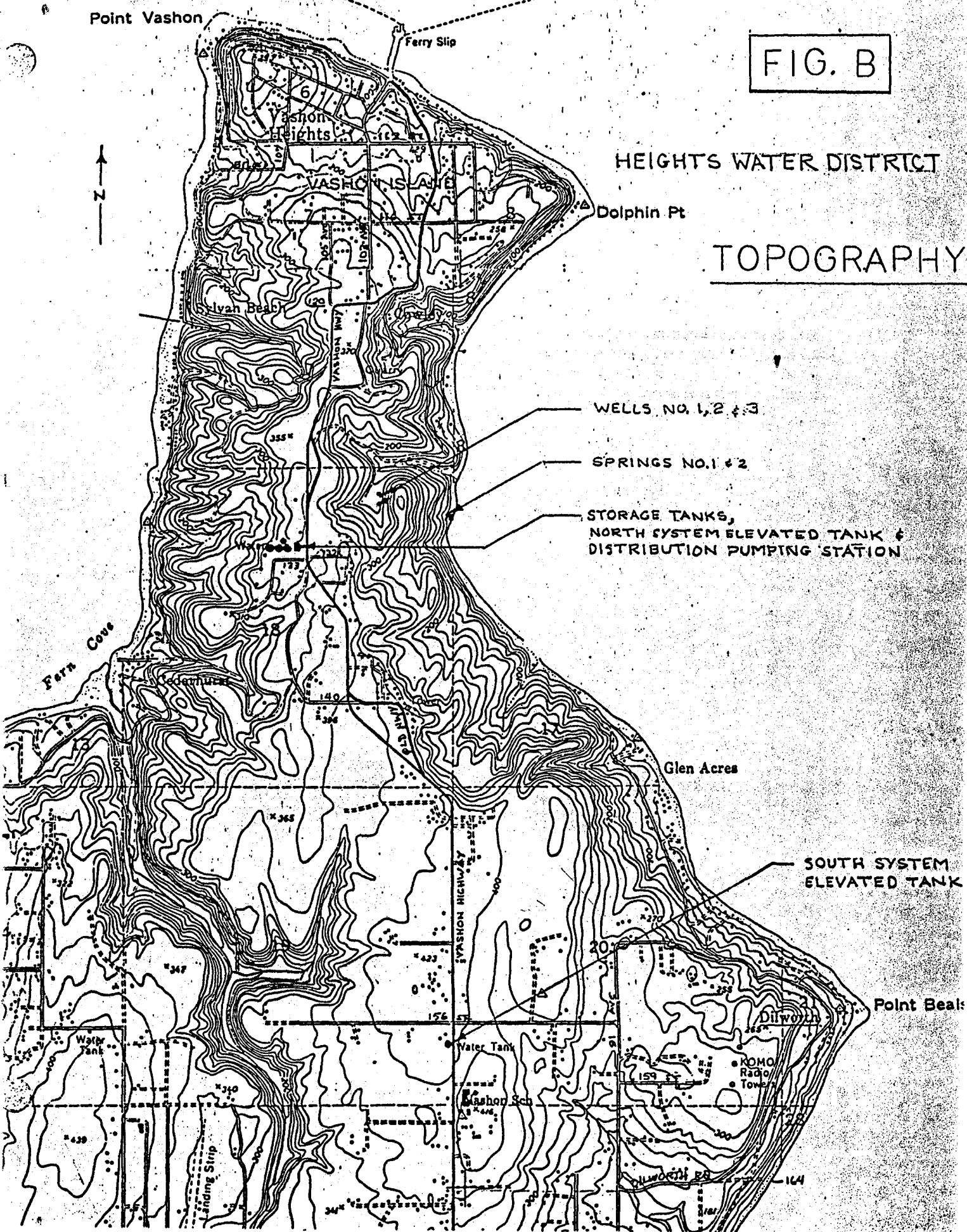
YES NO
(DOH)

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.

FIG. B

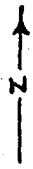
HEIGHTS WATER DISTRICT

TOPOGRAPHY



Point Vashon

Ferry Slip



Dolphin Pt

WELLS NO. 1, 2 & 3

SPRINGS NO. 1 & 2

STORAGE TANKS,
NORTH SYSTEM ELEVATED TANK &
DISTRIBUTION PUMPING STATION

Fern Cove

Glen Acres

SOUTH SYSTEM
ELEVATED TANK

Point Beach

Water Tank

Water Tank

KOMO
Radio
Tower

Vashon Sch

Dilworth

DILWORTH RD

164

Landing Strip

430

340

347

365

306

332

355

200

100

100

100

100

100

200

200

200

200

200

200

200

200

200

200

200

200

200

200

200

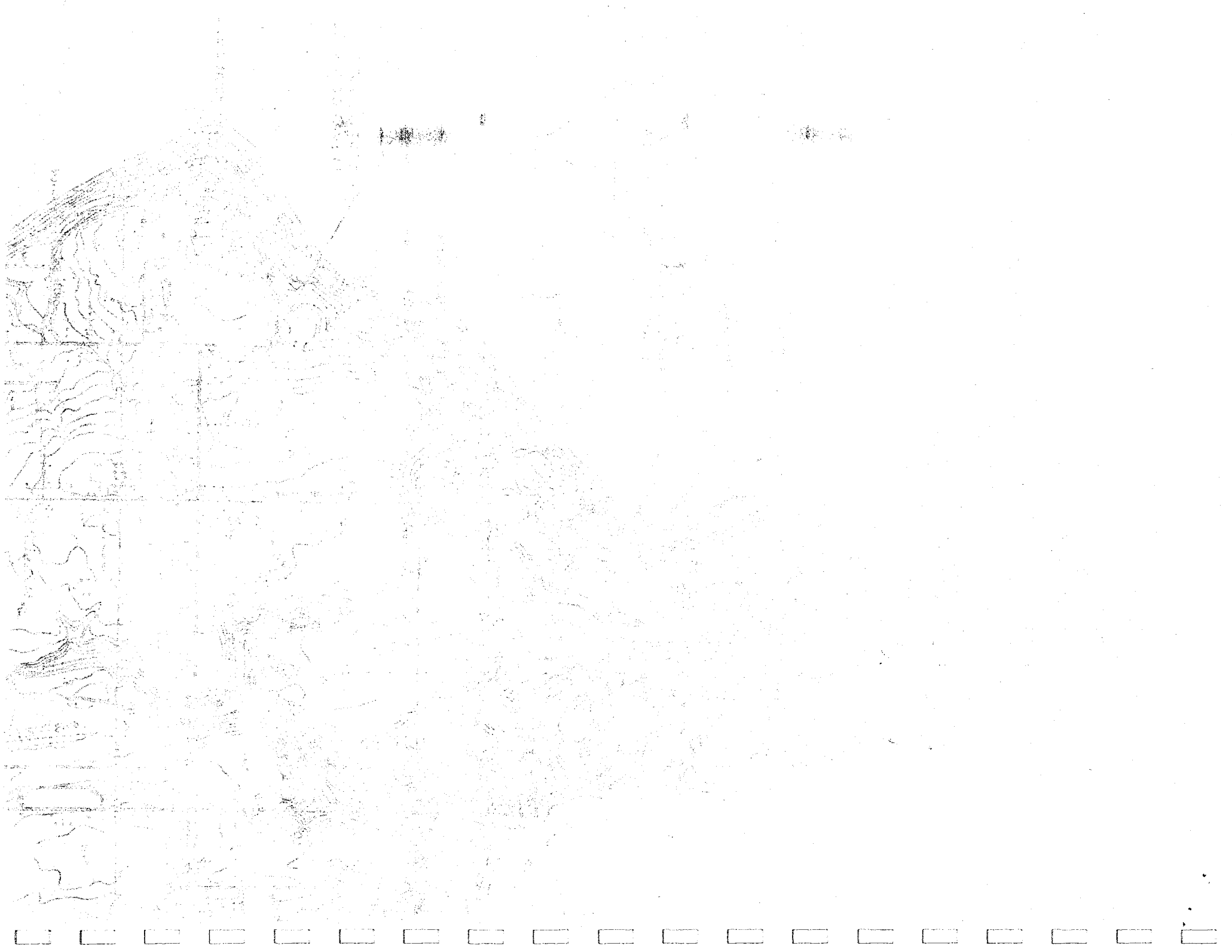
200

200

200

200

200



Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.1

HEUGES & HOIT ENGINEERING, INC.
BELLEVUE, WA

MAY - 6 1997

RECEIVED

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: REED FITZPATRICK

Water system name: HEIGHTS WATER

County: KING

Water system number: 32300L Source number: 50.5v

Well depth: 350' (ft.) (From WFI form)

Source name: WELL #4

WA well identification tag number: _____

well not tagged

Number of connections: 588 Population served: 1470

Township: 23 N Range: 3 E

Section: 18 1/4 1/4 Section: N.E. 1/4

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: 9/27/77 month/day/year

last reconstruction: 9/27/96 month/day/year

information unavailable

UNIQUE I.D. NUMBER

97-0337

2) Well driller: 1977 - RICHARDSON WELL DRILLERS
1996 - STATEWIDE DRILLING (LARRY JOHNSON)

well driller unknown

3) Type of well:

Drilled: rotary bored cable (percussion) Dug

Other: spring(s) lateral collector (Ranney)

driven jetted other: _____

Additional comments: THE ORIGINAL 8" CASING WAS DRILLED IN 1977
AND NOT FINISHED. COMPLETED IN 1996 BY INSTALLING 6" CASING.

4) Well report available? 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: 42 (gallons/min)

Source of information: 24-HR. PUMP TEST CONDUCTED DEC. 4-5, 1996

If not documented, how was pumping rate determined? _____

Pumping rate unknown

6) Is this source treated? NOT AT PRESENT.

If so, what type of treatment: WHEN PUT ON LINE, WELL WILL BE TREATED BY:

disinfection filtration carbon filter air stripper other

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

PRECAUTIONARY.

7) If source is chlorinated, is a chlorine residual maintained: YES 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 > 200 ft (328'-345')

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 (268.5')

flowing well/spring (artesian)

How was water level determined?

well log other: ACTAT MODEL 300 - OLYMPIC WELL PROBE.

depth to ground water unknown

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

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 N.A.

5) Wellhead elevation (height above mean sea level): 360 (ft) (APPROX.)

How was elevation determined? 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.)

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? 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:

wellhead enclosed in a wellhouse
 controlled access (describe): BEHIND CHAIN LINK & BARBED WIRE FENCING.
 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*)
 depth of seal unknown
 no surface seal

10) Annual rainfall (inches per year):

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

3/31/97

PART IV: Mapping Your Ground Water Resource

changed to

1) Annual volume of water pumped: 15 mg (gallons)

How was this determined?

meter

estimated: pumping rate (42 gpm)

pump capacity ()

other: 47 acre feet per year ← added

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

6 month ground water travel time : 440' (ft)

1 year ground water travel time : 620' (ft)

5 year ground water travel time: 1,390' (ft)

10 year ground water travel time: 1,970' (ft)

Information available on length of screened/open interval?

YES NO

Length of screened/open interval: 17 (ft)

3) Is there a river, lake, pond, stream, or other obvious surface water body within the 6 month time of travel boundary? 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 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	_____	_____	_____	_____
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 ✓	✓	✓	✓	_____
Wastewater treatment lagoons	_____	_____	_____	_____
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:

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)

- Results greater than MCL
- < 2 mg/liter nitrate ✓
- 2-5 mg/liter nitrate
- > 5 mg/liter nitrate
- ___ Nitrate sampling records unavailable

YES NO

✓

aka "no"
to < 2 mg/liter nitrate

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l.)

- Results greater than MCL or SAL
- VOCs detected at least once
- VOCs never detected
- ___ 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
- ___ EDB/DBCP tests required but not yet completed
- ✓ EDB/DBCP tests not required

YES NO

N.A.

D. Other SOC (Pesticides):

- Other SOC detected
- (pesticides and other synthetic organic chemicals)

YES NO

- ___ Other SOC tests performed but none detected

(list test methods in comments)

- ✓ Other SOC tests not performed

If any SOC in addition to EDB/DBCP were detected, please identify and date. If other SOC tests were performed, but no SOC 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). ✓

Has source (in past 3 years) had a bacteriological contamination problem found in distribution samples that was attributed to the source.

 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 these 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

 ✓ 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

 ✓ 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

 ✓ 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 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	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6 month-1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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

	YES	NO	unknown
< 1 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1-5 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5-10 year travel time	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

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.

NONE

Suggestions and Comments

Did you attend one of the susceptibility workshops?

YES

NO

Did you find it useful?

YES

NO

Did you seek outside assistance to complete the assessment?

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.

THE INSTRUCTION PACKAGE WAS VERY HELPFUL AND
INFORMATIVE. SOME OF THE MATH FORMULAS WERE CONFU-
SING AT FIRST GLANCE, SPECIFICALLY APPENDIX B - CON-
VERTING INCHES TO FEET. THIS APPEARS TO BE A TYPO-
GRAPHICAL ERROR - $24,000 \text{ in.} \times 12 \text{ in./ft} = 288,000 \text{ in.}$, not
2,000'. THIS A DIVISION PROBLEM; $\frac{24,000 \text{ in.}}{12 \text{ in./ft}} = 2,000 \text{ ft.}$

LIKEWISE, MAP LENGTH DETERMINATION OF 923' ON THE GROUND
CAN BE SIMPLIFIED THUS: $\frac{923 \text{ ft.}}{2,000 \text{ ft./in.}} = .46 \text{ in.}$

LOCATING THE NECESSARY INFORMATION, MAKING ENLARGEMENTS, ET
TOOK UP MUCH OF THE TIME NECESSARY TO COMPLETE THE ASSESSMENT
(ABOUT 14 HOURS). NO ADDITIONAL EXPERTISE WAS AVAILABLE SO
ATTENDING THE WORKSHOP WOULD HAVE BEEN HELPFUL. NONETHELESS,
THE ASSESSMENT WAS A GOOD LEARNING EXPERIENCE.

RICHARDSON WELL DRILLING CO.

DAILY DRILLING REPORT

Sec..... Twp..... Rge..... Date... 9-26 thru 27-77

Contract... THE HEIGHTS WATER CORP. Driller... ⁵⁷MEHR

Address..... 23/3-18B

ELEV. 300' Topo

Total depth last report..... Well No..... Size hole... 8" Test hole.....

List Below

FORMATION PENETRATED TODAY

- 0-2 Top Soil
- 2-5 Gravel & Clay
- 5-12 Gravel, Sand & Clay
- 12-23 Clay & Gravel
- 23-31 Hardpan
- 31-48 Gray Clay & Gravel
- 48-53 Sandy Clay & Beapage
- 53-68 Gravel & Clay
- 68-86 Gravel, Sand & Clay
- 86-123 Dry Gravel & Sand
- 123-125 Sand
- 125-168 Gravel & Sand
- 168-171 Sand & Some Gravel
- 171-230 Blue Sandy Clay

230-236 Soft Sandy Gray Clay

236-247 Hard Packed Sandy Clay

247-262 Brown Clay & Sand

262-316 Brown Sand

316-345 Clay, Sand & Gravel

Total depth at end of day..... 345'

Remarks:

Total Casing 321'. Drilled open Hole from 321' to 345'.

This Report Must Be Made Out IN FULL Each Day

APPENDIX E





WATER BACTERIOLOGICAL ANALYSIS

SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY

If instructions are not followed, sample will be rejected.

DATE COLLECTED			TIME COLLECTED		COUNTY NAME
MONTH	DAY	YEAR			
11	7	97	2:30	PM	KING

TYPE OF SYSTEM	IF PUBLIC SYSTEM, COMPLETE:				
<input checked="" type="checkbox"/> PUBLIC					
<input type="checkbox"/> INDIVIDUAL (serves only 1 residence)	I.D. No.	CIRCLE GROUP			
	323004	(A) B			

NAME OF SYSTEM
HEIGHTS WATER

SPECIFIC LOCATION WHERE SAMPLE COLLECTED	TELEPHONE NO.
RV VAULT @ INTERSECTION Vanolinda Rd. & Glen res Rd. SW	DAY (206) 567-4696
	EVENING ()

SAMPLE COLLECTED BY: (Name)	SYSTEM OWNER (MGR.): (Name)
RICK TUEL	REED FITZPATRICK

SOURCE TYPE GROUND WATER UNDER SURFACE INFLUENCE
 SURFACE WELL or WELL FIELD SPRING PURCHASED or INTERTIE COMBINATION or OTHER

SEND REPORT TO: (Print Full Name, Address and Zip Code)
HEIGHTS WATER
P.O. Box 820
VASHON WASHINGTON 98070

TYPE OF SAMPLE (check only one in this column)

<input type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input checked="" type="checkbox"/> Chlorinated (Residual: <u>4.52</u> Total <u>4.2</u> Free)
	<input type="checkbox"/> Filtered
	<input type="checkbox"/> Untreated or Other
<input type="checkbox"/> REPEAT SAMPLE Previous coliform presence	Lab # _____ Date _____
<input type="checkbox"/> RAW SOURCE WATER	Source # <u>S</u> <input type="checkbox"/> Total Coliform
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS	<input type="checkbox"/> Fecal Coliform
<input type="checkbox"/> OTHER (Specify)	

REMARKS: **PA. DW**

(LAB USE ONLY) DRINKING WATER RESULTS

<input type="checkbox"/> UNSATISFACTORY, Coliforms present	<input checked="" type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED	<input type="checkbox"/> E. Coli present <input type="checkbox"/> E. Coli absent
	<input type="checkbox"/> Fecal present <input type="checkbox"/> Fecal absent

OTHER LABORATORY RESULTS

TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100 ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml

ANOTHER SAMPLE REQUIRED

SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

LAB NO. (7 DIGITS)	DATE, TIME RECEIVED	RECEIVED BY
08142510	11.9.97 (M)	AN
DATE REPORTED	LABORATORY: 11.45 AM	
119	183	

WATER BACTERIOLOGICAL ANALYSIS

SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY

If instructions are not followed, sample will be rejected.

DATE COLLECTED			TIME COLLECTED		COUNTY NAME
MONTH	DAY	YEAR			
12	12	96	4:30	PM	KING

TYPE OF SYSTEM	IF PUBLIC SYSTEM, COMPLETE:				
<input type="checkbox"/> PUBLIC					
<input type="checkbox"/> INDIVIDUAL (serves only 1 residence)	I.D. No.	CIRCLE GROUP			
	323004	(A) B			

NAME OF SYSTEM
HEIGHTS WATER

SPECIFIC LOCATION WHERE SAMPLE COLLECTED	TELEPHONE NO.
HOSE BIB @ PRY VAULT - INTERSECTION OF 112th St, SW & SW Pt. Vashon Drive	DAY (206) 567-4696
	EVENING (206) 463-33

SAMPLE COLLECTED BY: (Name)	SYSTEM OWNER (MGR.): (Name)
M.E. TUEL	REED FITZPATRICK

SOURCE TYPE GROUND WATER UNDER SURFACE INFLUENCE
 SURFACE WELL or WELL FIELD SPRING PURCHASED or INTERTIE COMBINATION or OTHER

SEND REPORT TO: (Print Full Name, Address and Zip Code)
HEIGHTS WATER, P.O. Box 820
VASHON WASHINGTON 98070

TYPE OF SAMPLE (check only one in this column)

<input type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input checked="" type="checkbox"/> Chlorinated (Residual: _____ Total _____ Free)
	<input type="checkbox"/> Filtered
	<input type="checkbox"/> Untreated or Other
<input type="checkbox"/> REPEAT SAMPLE Previous coliform presence	Lab # _____ Date _____
<input type="checkbox"/> RAW SOURCE WATER	Source # <u>S</u> <input type="checkbox"/> Total Coliform
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS	<input type="checkbox"/> Fecal Coliform
<input type="checkbox"/> OTHER (Specify)	

REMARKS:

(LAB USE ONLY) DRINKING WATER RESULTS

<input type="checkbox"/> UNSATISFACTORY, Coliforms present	<input checked="" type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED	<input type="checkbox"/> E. Coli present <input type="checkbox"/> E. Coli absent
	<input type="checkbox"/> Fecal present <input type="checkbox"/> Fecal absent

OTHER LABORATORY RESULTS

TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100 ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml

ANOTHER SAMPLE REQUIRED

SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

LAB NO. (7 DIGITS)	DATE, TIME RECEIVED	RECEIVED BY
08142055	12.13.96	AN
DATE REPORTED	LABORATORY: 12:40 PM	
12/14	410	

Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

To Louise O

507-4391

CLIENT: Heights Water Corporation
P.O. Box 820
Vashon, WA. 98070-0820

Certificate of Analysis

Work Order# : 96-10-213
DATE RECEIVED : 10/08/96
DATE OF REPORT: 10/22/96

ATTN : Larry Higley/Rick Tuel

Work ID : New Well #4 (50.5)
Taken By : Client
Transported by: Hand Delivered
Type : Drinking Water, ID #32300L-A

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date
01	Wellhead #4 (50.5)	10/08/96 09:00

KEY

< indicates "less than"

Unless otherwise instructed all samples will be discarded on 12/06/96

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J. M. Owens



This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9610213-01
Client Sample ID: Wellhead #6

Date Received : 10/08/96 Collection Date : 10/08/96

Test	MCL	Results	Units
Antimony	0.006	<0.0050	mg/L
Arsenic	0.05	0.043	mg/L
Barium	2.0	<0.10	mg/L
Beryllium	0.004	<0.0020	mg/L
Cadmium	0.005	<0.0020	mg/L
Chromium	0.1	<0.010	mg/L
Copper	1.0*	<0.02	mg/L
Iron	0.3	0.08	mg/L
Lead	0.05*	<0.002	mg/L
* Manganese	0.05	0.150	mg/L
Mercury	0.002	<0.0005	mg/L
Nickel	0.1	<0.040	mg/L
Selenium	0.05	<0.005	mg/L
Silver	0.1	<0.010	mg/L

Test	MCL	Results	Units
Sodium		23	mg/L
Thallium	0.002	<0.0010	mg/L
Zinc	5.0	0.09	mg/L
Hardness		130	mg/L as CaCO ₃
Conductivity	700	340	Microhmhos/cm 25 deg
Turbidity	1.0	0.4	NTU
Color	15.0	10.0	Color Units
Chloride	250	<20.0	mg/L
Cyanide	0.2	<0.1	mg/L
Fluoride	2.0	<0.50	mg/L
Nitrate	10.0	<0.5	mg/L
Nitrite	1.0	<0.5	mg/L
Sulfate	250	<10.	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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COMPOSITE
TICs

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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

Certificate of Analysis

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

Work Order# : 93-10-028
DATE RECEIVED : 10/01/93
DATE OF REPORT: 10/19/93

ATTN : R. Fitzpatrick

Work ID : Drinking Water 524.2
Taken By : Client
Transported by: Client
Type : Water

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date
01.	Deep Sink Tap @ Pump Sta.	09/30/93 06:30
02	Trip Blank	09/30/93

GENERAL COMMENTS ON VOLATILE ORGANICS TICs:

Tentatively Identified Compounds, or TICs, are reported on a separate page if you requested this additional analytical work or if a regulatory agency requires that TICs be reported. (for instance, the State of Washington requires TIC reporting for all official 524.2 analyses.) In the heading information on the TIC report, the number of tentatively identified compounds found is noted. If no TICs were found, the report will say so and there will be no further information on the report. If TICs were found, they will be listed and an estimated concentration will be shown for each.

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.



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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9310028-01A

Client Sample ID: Deep Sink Tap @ Pump Sta.

Date Received : 10/02/93

Collection Date : 09/30/93

Test Code : TIC_V

Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc
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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-01

Client Sample ID: 1 Spring 13205 Vashon SW

Date Received : 01/23/97 Collection Date : 01/23/97

Test	MCL	Results	Units
Antimony	0.006	<0.0050	mg/L
Arsenic	0.05	<0.01	mg/L
Barium	2.0	<0.10	mg/L
Beryllium	0.004	<0.0020	mg/L
Cadmium	0.005	<0.0020	mg/L
Chromium	0.1	<0.010	mg/L
Copper	1.0*	<0.02	mg/L
Iron	0.3	<0.05	mg/L
Lead	0.05*	<0.002	mg/L
Manganese	0.05	<0.01	mg/L
Mercury	0.002	<0.0005	mg/L
Nickel	0.1	<0.040	mg/L
Selenium	0.05	<0.005	mg/L
Silver	0.1	<0.010	mg/L

Test	MCL	Results	Units
Sodium		7	mg/L
Thallium	0.002	<0.0010	mg/L
Zinc	5.0	<0.05	mg/L
Hardness		78	mg/L as CaCO ₃
Conductivity	700	230	Michromhos/cm 25 deg
Turbidity	1.0	<0.1	NTU
Color	15.0	<5.0	Color Units
Chloride	250	<20.0	mg/L
Cyanide	0.2	<0.1	mg/L
Fluoride	2.0	<0.50	mg/L
Nitrate	10.0	2.4	mg/L
Nitrite	1.0	<0.5	mg/L
Sulfate	250	17	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology and Technical Services

REPORT ON SAMPLE: 9701587-02
Client Sample ID: Source 2 Well #1

Date Received : 01/23/97 Collection Date : 01/23/97

Test	MCL	Results	Units
Antimony	0.006	<0.0050	mg/L
Arsenic	0.05	<0.01	mg/L
Barium	2.0	<0.10	mg/L
Beryllium	0.004	<0.0020	mg/L
Cadmium	0.005	<0.0020	mg/L
Chromium	0.1	<0.010	mg/L
Copper	1.0*	<0.02	mg/L
Iron	0.3	<0.05	mg/L
Lead	0.05*	<0.002	mg/L
Manganese	0.05	<0.01	mg/L
Mercury	0.002	<0.0005	mg/L
Nickel	0.1	<0.040	mg/L
Selenium	0.05	<0.005	mg/L
Silver	0.1	<0.010	mg/L

Test	MCL	Results	Units
Sodium		7	mg/L
Thallium	0.002	<0.0010	mg/L
Zinc	5.0	<0.05	mg/L
Hardness		85	mg/L as CaCO3
Conductivity	700	180	Michromhos/cm 25 deg
Turbidity	1.0	0.2	NTU
Color	15.0	<5.0	Color Units
Chloride	250	<20.0	mg/L
Cyanide	0.2	<0.1	mg/L
Fluoride	2.0	<0.50	mg/L
Nitrate	10.0	1.4	mg/L
Nitrite	1.0	<0.5	mg/L
Sulfate	250	17	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-03

Client Sample ID: Source 3 Well #2

Date Received : 01/23/97 Collection Date : 01/23/97

Test	MCL	Results	Units
Antimony	0.006	<0.0050	mg/L
Arsenic	0.05	<0.01	mg/L
Barium	2.0	<0.10	mg/L
Beryllium	0.004	<0.0020	mg/L
Cadmium	0.005	<0.0020	mg/L
Chromium	0.1	<0.010	mg/L
Copper	1.0*	<0.02	mg/L
Iron	0.3	<0.05	mg/L
Lead	0.05*	<0.002	mg/L
Manganese	0.05	<0.01	mg/L
Mercury	0.002	<0.0005	mg/L
Nickel	0.1	<0.040	mg/L
Selenium	0.05	<0.005	mg/L
Silver	0.1	<0.010	mg/L

Test	MCL	Results	Units
Sodium		7	mg/L
Thallium	0.002	<0.0010	mg/L
Zinc	5.0	<0.05	mg/L
Hardness		93	mg/L as CaCO ₃
Conductivity	700	190	Michromhos/cm 25 deg
Turbidity	1.0	0.1	NTU
Color	15.0	<5.0	Color Units
Chloride	250	<20.0	mg/L
Cyanide	0.2	<0.1	mg/L
Fluoride	2.0	<0.50	mg/L
Nitrate	10.0	1.2	mg/L
Nitrite	1.0	<0.5	mg/L
Sulfate	250	18	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-04
Client Sample ID: Source 4 Well #3

Date Received : 01/23/97 Collection Date : 01/23/97

Test	MCL	Results	Units
Antimony	0.006	<0.0050	mg/L
Arsenic	0.05	<0.01	mg/L
Barium	2.0	<0.10	mg/L
Beryllium	0.004	<0.0020	mg/L
Cadmium	0.005	<0.0020	mg/L
Chromium	0.1	<0.010	mg/L
Copper	1.0*	<0.02	mg/L
Iron	0.3	<0.05	mg/L
Lead	0.05*	<0.002	mg/L
Manganese	0.05	0.024	mg/L
Mercury	0.002	<0.0005	mg/L
Nickel	0.1	<0.040	mg/L
Selenium	0.05	<0.005	mg/L
Silver	0.1	<0.010	mg/L

Test	MCL	Results	Units
Sodium		8	mg/L
Thallium	0.002	<0.0010	mg/L
Zinc	5.0	<0.05	mg/L
Hardness		78	mg/L as CaCO ₃
Conductivity	700	170	Michromhos/cm 25 deg
Turbidity	1.0	0.3	NTU
Color	15.0	5.0	Color Units
Chloride	250	<20.0	mg/L
Cyanide	0.2	<0.1	mg/L
Fluoride	2.0	<0.50	mg/L
Nitrate	10.0	1.7	mg/L
Nitrite	1.0	<0.5	mg/L
Sulfate	250	12	mg/L

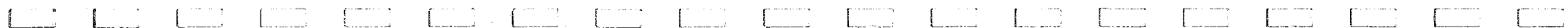
MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9310234-02
Client Sample ID: Well #2

Date Received : 10/06/93 Collection Date : 10/06/93

Test	MCL		Results	Units
Antimony	0.006	<	0.0020	mg/L
Arsenic	0.05	<	0.010	mg/L
Barium	2.0	<	0.20	mg/L
Beryllium	0.004	<	0.0010	mg/L
Cadmium	0.005	<	0.0020	mg/L
Chromium	0.1	<	0.010	mg/L
Copper	1.0*	<	0.1	mg/L
Iron	0.3		0.10	mg/L
Lead	0.05*		0.006	mg/L
Manganese	0.05	<	0.010	mg/L
Mercury	0.002	<	0.0010	mg/L
Nickel	0.1	<	0.005	mg/L
Selenium	0.05	<	0.005	mg/L
Silver	0.1	<	0.001	mg/L
Sodium		<	10	mg/L
Thallium	0.002	<	0.0010	mg/L
Zinc	5.0		0.1	mg/L
Hardness			93	mg/L, as CaCO3
Conductivity	700		220	Micromhos/cm, 25°C
Turbidity	1.0	<	0.5	NTU
Color	15.0	<	5.0	Color Units
Chloride	250	<	10	mg/L
Cyanide	0.2	<	0.01	mg/L
Fluoride	2.0	<	0.2	mg/L
Nitrate	10.0		1.8	mg/L
Nitrite	1.0	<	0.1	mg/L
Sulfate	250		18	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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4310234-2

50-

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSIS

→ DO NOT WRITE IN SHADED AREAS • PLEASE FILL BOXES NUMBERED 1 THRU 14 • SEE BACK FOR INSTRUCTIONS

LABORATORY NUMBER: 08112494

DATE RECEIVED: 10/6/93

1. DATE COLLECTED: 10/6/93

2. SYSTEM NAME: THE HEIGHTS WATER DISTRICT

3. SYSTEM ID #: 32300 L 4. CIRCLE GROUP (A) B

5. COUNTY: KING

6. SOURCE TYPE:
 SURFACE WELL
 SPRING PURCHASE

7. SAMPLE TAKEN:
 BEFORE TREATMENT AFTER TREATMENT

8. SOURCE NO.: So. 3 9. SOURCE NAME: "WELL # 2"

10. COLLECTED BY: RICK TUEL
 TELEPHONE: (206) 567-4696

11. IF TAKEN AFTER TREATMENT, CHECK TREATMENT:
 FLUORIDATION
 CHLORINATION
 FILTRATION
 WATER SOFTENER, TYPE:
 OTHER:

12. IF TAKEN FROM DISTRIBUTION, INDICATE ADDRESS:

13. SEND REPORT AND INVOICE TO:
 ADDRESS: THE HEIGHTS WATER DIST.
 P.O. BOX 820,
 VASHON, WA, 98070

TELEPHONE: (206) 567-4855

14. REMARKS:

LABORATORY REPORT								
TESTS	MCL ¹	Less Than <	RESULTS	UNITS	Compliance YES NO		Chemis Initials	
Antimony Sb	0.006	<	0.020	mg/l	✓		10/	
Arsenic ^P As	0.05	<	0.010	mg/l	✓			
Barium ^P Ba	2.0	<	0.20	mg/l	✓			
Beryllium Be	0.004	<	0.010	mg/l	✓			
Cadmium ^P Cd	0.005	<	0.020	mg/l	✓			
Chromium ^P Cr	0.1	<	0.010	mg/l	✓			
Copper Cu	1.0 ²	<	0.1	mg/l	✓			
Iron Fe	0.3	<	0.10	mg/l	✓			
Lead ^P Pb	0.05 ²		0.006	mg/l	✓			
Manganese Mn	0.05	<	0.010	mg/l	✓			
Mercury ^P Hg	0.002	<	0.010	mg/l	✓			
Nickel Ni	0.1	<	0.005	mg/l	✓			
Selenium ^P Se	0.05	<	0.005	mg/l	✓			
Silver Ag	0.1	<	0.001	mg/l	✓			
Sodium ^P Na	20.3	<	1.0	mg/l	✓			
Thallium Tl	0.002	<	0.010	mg/l	✓			
Zinc Zn	5.0		0.1	mg/l	✓			
Hardness			93	mg/l as CaCO ₃				
Conductivity	700		220	umhos/cm 25° C	✓			
Turbidity ^P	1.0	<	0.5	NTU	✓			
Color	15.0	<	5.0	Color Units	✓			
Chloride Cl	250	<	1.0	mg/l	✓			
Cyanide CN	0.2	<	0.01	mg/l	✓			
Fluoride ^P F	2.0	<	0.2	mg/l	✓			
Nitrate ^P as N	10.0		1.8	mg/l	✓			
Nitrite as N	1.0	<	0.1	mg/l	✓			
Sulfate SO ₄	250		1.8	mg/l	✓			
TDS	500			mg/l				

LABORATORY COMMENTS:

DATE OF REPORT: 10-27-93

FOOTNOTES: 1- MCL: Maximum Contamination Level; 2- This is the State MCL, Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Cop
 3- Recommended MCL
 P- Primary Standard; TDS- Total Dissolved Solids Run only when Conductivity is Greater than 700

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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9310234-01

Client Sample ID: Well #1

Date Received : 10/06/93 Collection Date : 10/06/93

Test	MCL		Results	Units
Antimony	0.006	<	0.0020	mg/L
Arsenic	0.05	<	0.010	mg/L
Barium	2.0	<	0.20	mg/L
Beryllium	0.004	<	0.0010	mg/L
Cadmium	0.005	<	0.0020	mg/L
Chromium	0.1	<	0.010	mg/L
Copper	1.0*	<	0.1	mg/L
Iron	0.3		1.60	mg/L
Lead	0.05*	<	0.002	mg/L
Manganese	0.05		0.027	mg/L
Mercury	0.002	<	0.0010	mg/L
Nickel	0.1	<	0.005	mg/L
Selenium	0.05	<	0.005	mg/L
Silver	0.1	<	0.001	mg/L
Sodium		<	10	mg/L
Thallium	0.002	<	0.0010	mg/L
Zinc	5.0		0.1	mg/L
Hardness			77	mg/L, as CaCO3
Conductivity	700		190	Micromhos/cm, 25°C
Turbidity	1.0		2.4	NTU
Color	15.0	<	5.0	Color Units
Chloride	250	<	10	mg/L
Cyanide	0.2	<	0.01	mg/L
Fluoride	2.0	<	0.2	mg/L
Nitrate	10.0		1.4	mg/L
Nitrite	1.0	<	0.1	mg/L
Sulfate	250		15	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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1310234-1

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSIS

→ DO NOT WRITE IN SHADED AREAS • PLEASE FILL BOXES NUMBERED 1 THRU 14 • SEE BACK FOR INSTRUCTIONS

LABORATORY NUMBER: 08112493

DATE RECEIVED: 10/6/93

1. DATE COLLECTED: 10/6/93

2. SYSTEM NAME: THE HEIGHTS WATER DISTRICT

3. SYSTEM ID #: 32300 L 4. CIRCLE GROUP: (A) B

5. COUNTY: KING

6. SOURCE TYPE:
 SURFACE WELL
 SPRING PURCHASE

7. SAMPLE TAKEN:
 BEFORE TREATMENT AFTER TREATMENT

8. SOURCE NO.: So. 2 9. SOURCE NAME: "WELL # 1"

10. COLLECTED BY: RICK TUEL
 TELEPHONE: (206) 567-4696

11. IF TAKEN AFTER TREATMENT, CHECK TREATMENT:
 FLUORIDATION
 CHLORINATION
 FILTRATION
 WATER SOFTENER, TYPE:
 OTHER:

12. IF TAKEN FROM DISTRIBUTION, INDICATE ADDRESS:

13. SEND REPORT AND INVOICE TO:
 ADDRESS:
THE HEIGHTS WATER DISTRICT
P.O. Box 820,
VASCO, WA., 98070
 TELEPHONE: (206) 567-4855

14. REMARKS:

LABORATORY REPORT								
TESTS	MCL ¹	Less Than <	RESULTS	UNITS	Compliance		Chemist Initials	
					YES	NO		
Antimony Sb	0.006	<	<u>0.0020</u>	mg/l	✓		PST	
Arsenic ^P As	0.05	<	<u>0.010</u>	mg/l	✓			
Barium ^P Ba	2.0	<	<u>0.20</u>	mg/l	✓			
Beryllium Be	0.004	<	<u>0.010</u>	mg/l	✓			
Cadmium ^P Cd	0.005	<	<u>0.020</u>	mg/l	✓			
Chromium ^P Cr	0.1	<	<u>0.010</u>	mg/l	✓			
Copper Cu	1.0 ²	<	<u>0.1</u>	mg/l	✓			
Iron Fe	0.3		<u>1.60</u>	mg/l		✓		
Lead ^P Pb	0.05 ²	<	<u>0.002</u>	mg/l	✓			
Manganese Mn	0.05		<u>0.037</u>	mg/l	✓			
Mercury ^P Hg	0.002	<	<u>0.010</u>	mg/l	✓			
Nickel Ni	0.1	<	<u>0.005</u>	mg/l	✓			
Selenium ^P Se	0.05	<	<u>0.005</u>	mg/l	✓			
Silver Ag	0.1	<	<u>0.001</u>	mg/l	✓			
Sodium ^P Na	20. ³	<	<u>10</u>	mg/l	✓			
Thallium Tl	0.002 ²	<	<u>0.010</u>	mg/l	✓			
Zinc Zn	5.0		<u>0.1</u>	mg/l	✓			
Hardness			<u>77</u>	mg/l as CaCO ₃				
Conductivity	700		<u>190</u>	umhos/cm 25° C	✓			
Turbidity ^P	1.0		<u>2.4</u>	NTU		✓		
Color	15.0	<	<u>5.0</u>	Color Units	✓			
Chloride Cl	250	<	<u>10</u>	mg/l	✓			
Cyanide CN	0.2	<	<u>0.01</u>	mg/l	✓			
Fluoride ^P F	2.0	<	<u>0.3</u>	mg/l	✓			
Nitrate ^P as N	10.0		<u>1.4</u>	mg/l	✓			
Nitrite as N	1.0	<	<u>0.1</u>	mg/l	✓			
Sulfate SO ₄	250		<u>1.3</u>	mg/l	✓			
TDS	500			mg/l				

LABORATORY COMMENTS:

DATE OF REPORT: 10/27/93

FOOTNOTES: 1- MCL: Maximum Contamination Level; 2- This is the State MCL, Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper
 3- Recommended MCL
 P- Primary Standard; TDS- Total Dissolved Solids Run only when Conductivity is Greater than 700

R. A. J. J. J.
FOIL - GARAGE

Laucks ⁸⁴ years

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9310234-03
Client Sample ID: Springs

Date Received : 10/06/93 Collection Date : 10/06/93

Test	MCL	Results	Units
Antimony	0.006	< 0.0020	mg/L
Arsenic	0.05	< 0.010	mg/L
Barium	2.0	< 0.20	mg/L
Beryllium	0.004	< 0.0010	mg/L
Cadmium	0.005	< 0.0020	mg/L
Chromium	0.1	< 0.010	mg/L
Copper	1.0*	< 0.1	mg/L
Iron	0.3	< 0.10	mg/L
Lead	0.05*	< 0.002	mg/L
Manganese	0.05	< 0.010	mg/L
Mercury	0.002	< 0.0010	mg/L
Nickel	0.1	< 0.005	mg/L
Selenium	0.05	< 0.005	mg/L
Silver	0.1	< 0.001	mg/L
Sodium		< 10	mg/L
Thallium	0.002	< 0.0010	mg/L
Zinc	5.0	< 0.1	mg/L
Hardness		95	mg/L, as CaCO3
Conductivity	700	230	Micromhos/cm, 25°C
Turbidity	1.0	< 0.5	NTU
Color	15.0	< 5.0	Color Units
Chloride	250	< 10	mg/L
Cyanide	0.2	< 0.01	mg/L
Fluoride	2.0	< 0.2	mg/L
Nitrate	10.0	1.7	mg/L
Nitrite	1.0	< 0.1	mg/L
Sulfate	250	17	mg/L

MCL = Maximum Contamination Level established for drinking water under current EPA and State of Washington regulations. No MCL has been established for hardness or sodium, although 20 mg/L is a recommended MCL for sodium.

* = This is the Washington State MCL. Federal action levels are 0.015 mg/L for lead and 1.3 mg/L for copper.



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4310234-3

WATER SAMPLE INFORMATION FOR INORGANIC CHEMICAL ANALYSIS

→ DO NOT WRITE IN SHADED AREAS • PLEASE FILL BOXES NUMBERED 1 THRU 14 • SEE BACK FOR INSTRUCTIONS

LABORATORY NUMBER:
0812495

DATE RECEIVED:
10-6-93

1. DATE COLLECTED:
10/6/93

2. SYSTEM NAME:
THE HEIGHTS WATER DIST.

3. SYSTEM ID #: **32300 L** 4. CIRCLE GROUP **(A) B**

5. COUNTY:
KING

6. SOURCE TYPE:
 SURFACE WELL
 SPRING PURCHASE

7. SAMPLE TAKEN:
 BEFORE TREATMENT AFTER TREATMENT

8. SOURCE NO.: **SO. 1** 9. SOURCE NAME: **"SPRINGS"**

10. COLLECTED BY: **RICK TUEL**

TELEPHONE: **(206) 567-4696**

11. IF TAKEN AFTER TREATMENT, CHECK TREATMENT:
 FLUORIDATION
 CHLORINATION
 FILTRATION
 WATER SOFTENER, TYPE: _____
 OTHER: _____

12. IF TAKEN FROM DISTRIBUTION, INDICATE ADDRESS:
13205 VASHON ISLAND HWY., VASHON, WA, 98070

13. SEND REPORT AND INVOICE TO: ADDRESS:
**THE HEIGHTS WATER DIST.
P.O. BOX 820,
VASHON, WA, 98070**

TELEPHONE: **(206) 567-4855**

14. REMARKS:

LABORATORY REPORT							
TESTS	MCL ¹	Less Than <	RESULTS	UNITS	Compliance		Chemist Initials
					YES	NO	
Antimony Sb	0.006	L	0.0020	mg/l	✓		R.T.
Arsenic ^P As	0.05	L	0.010	mg/l	✓		
Barium ^P Ba	2.0	L	0.20	mg/l	✓		
Beryllium Be	0.004	L	0.010	mg/l	✓		
Cadmium ^P Cd	0.005	L	0.020	mg/l	✓		
Chromium ^P Cr	0.1	L	0.010	mg/l	✓		
Copper Cu	1.0 ²	L	0.1	mg/l	✓		
Iron Fe	0.3	L	0.10	mg/l	✓		
Lead ^P Pb	0.05 ²	L	0.002	mg/l	✓		
Manganese Mn	0.05	L	0.010	mg/l	✓		
Mercury ^P Hg	0.002	L	0.010	mg/l	✓		
Nickel Ni	0.1	L	0.005	mg/l	✓		
Selenium ^P Se	0.05	L	0.005	mg/l	✓		
Silver Ag	0.1	L	0.001	mg/l	✓		
Sodium ^P Na	20 ³	L	1.0	mg/l	✓		
Thallium Tl	0.002	L	0.010	mg/l	✓		
Zinc Zn	5.0	L	0.1	mg/l	✓		
Hardness			95	mg/l as CaCO ₃			
Conductivity	700		230	umhos/cm 25° C	✓		
Turbidity ^P	1.0	L	0.5	NTU	✓		
Color	15.0	L	5.0	Color Units	✓		
Chloride Cl	250	L	1.0	mg/l	✓		
Cyanide CN	0.2	L	0.01	mg/l	✓		
Fluoride ^P F ⁻	2.0	L	0.2	mg/l	✓		
Nitrate ^P as N	10.0		1.7	mg/l	✓		
Nitrite as N	1.0	L	0.1	mg/l	✓		
Sulfate SO ₄	250		1.7	mg/l	✓		
TDS	500			mg/l			

LABORATORY COMMENTS:

DATE OF REPORT:
10-27-93

FOOTNOTES: 1- MCL: Maximum Contamination Level; 2- This is the State MCL, Federal Action Levels are 0.015 mg/L for Lead and 1.3 mg/L for Copper; 3- Recommended MCL; P- Primary Standard; TDS- Total Dissolved Solids Run only when Conductivity is Greater than 700

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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-05A

Client Sample ID: Hose Bib 13205 Vashon Sprg

Date Received : 01/23/97

Collection Date : 01/23/97

Test Code : TIC_V

Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc
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Form LTL-TIC-V



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Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2

Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	: King	LABORATORY NO.	: 08142933
SYSTEM ID NO.	: 32300Ls	DATA FILE	:
DATE COLLECTED	: 01/23/97	ANALYST	: JA
DATE ANALYZED	: 01/29/97	DATE OF REPORT	: 02/04/97
SOURCE NUMBER	: 502	SUPERVISOR'S INITIALS	: MC
SOURCE TYPE	: Well	LTL #	: 9701587-06A

Regulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is
less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142933

DATA FILE :

Regulated Compounds (continued)

EPA Code	NAME OF COMPOUND	* MCL (ug/L)	** Amount (ug/L)
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142933

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFLUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-06A

Client Sample ID: Hose Bib At Well Head #1

Date Received : 01/23/97

Collection Date : 01/23/97

Test Code : TIC_V

Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc
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Form LTL-TIC-V



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Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	: King	LABORATORY NO.	: 08142934
SYSTEM ID NO.	: 32300Ls	DATA FILE	:
DATE COLLECTED	: 01/23/97	ANALYST	: JA
DATE ANALYZED	: 01/29/97	DATE OF REPORT	: 02/04/97
SOURCE NUMBER	: 503	SUPERVISOR'S INITIALS	: MC
SOURCE TYPE	: Well	LTL #	: 9701587-07A

Regulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is
less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142934

DATA FILE :

Regulated Compounds (continued)

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142934

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-07A
Client Sample ID: Hose Bib At Well #2

Date Received : 01/23/97 Collection Date : 01/23/97
Test Code : TIC_V Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc
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Form LTL-TIC-V



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Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	: King	LABORATORY NO.	: 08142935
SYSTEM ID NO.	: 32200Ls	DATA FILE	:
DATE COLLECTED	: 01/23/97	ANALYST	: JA
DATE ANALYZED	: 01/29/97	DATE OF REPORT	: 02/04/97
SOURCE NUMBER	: 504	SUPERVISOR'S INITIALS	: MC
SOURCE TYPE	: Well	LTL #	: 9701587-08A

Regulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is
less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142935

DATA FILE :

Regulated Compounds (continued)

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08142935

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFLUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9701587-08A
Client Sample ID: Hose Bib At Well #3

Date Received : 01/23/97 Collection Date : 01/23/97
Test Code : TIC_V Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc

Form LTL-TIC-V



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Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	:	LABORATORY NO.	:
SYSTEM ID NO.	:	DATA FILE	:
DATE COLLECTED	:	ANALYST	: JA
DATE ANALYZED	:	DATE OF REPORT	: 02/04/97
SOURCE NUMBER	:	SUPERVISOR'S INITIALS	: MC
SOURCE TYPE	:	LTL #	: 9701587-09A

Regulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is
less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. :
DATA FILE :

Regulated Compounds (continued)

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. :

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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Garage



STATE OF WASHINGTON

DEPARTMENT OF HEALTH

DIVISION OF DRINKING WATER

Airustrial Center, Bldg. 3 • P.O. Box 47822 • Olympia, Washington 98504-7822

February 2, 1995

Enclosed are the results of the synthetic organic chemicals (SOC) sample collected from your water system, as part of the Department of Health's Area Wide Sampling Project. No detections above the EPA trigger levels were found. The sample we took for this project will count as the first quarter's sample IF you do not receive a waiver or are required to do partial sampling in combination with a waiver. **PLEASE KEEP THE ENCLOSED ANALYTICAL REPORT IN YOUR RECORDS.**

Please note that participation in the Area Wide Sampling Project does not mean that you have been granted a monitoring waiver. In order to be eligible for any of the available waivers, DOH **must** have on file a completed Groundwater Contamination Susceptibility Assessment Survey Form for each groundwater source or a Surface Water Checklist for each surface water source. If you have filed these forms, then you will be notified of your susceptibility rating and waiver options in the next few weeks. If you have not filed these forms you still can. However, systems submitting forms after March 15 will be required to do the first quarter of monitoring no matter what the waiver determination is. If you need copies of these forms, please contact your regional DOH office.

Group A Transient Non Community (TNC) water systems, as well as emergency or inactive sources, are exempt from the SOC testing requirements. If your water system is classified as a Group A Community (COMM) or Non-Transient Non-Community (NTNC) water system, then you must complete 4 consecutive quarters of monitoring for SOC's (Analytical Methods 515.1, 525.1, 531, 547 & 549), beginning in March 1995, **UNLESS** you are granted a waiver to reduce the monitoring requirements. If you are unsure as to the classification of your system check your Water Facilities Inventory (WFI) form or call your DOH regional office.

Thank you for participating in this project. The Area Wide Sampling Project has provided DOH with a database containing water quality information regarding pesticides. This database will assist in Phase II/V Area Waiver determinations.

Sincerely,

Patricia Wickham
Project Manager

**DOH Area-Wide Groundwater Monitoring Project
Synthetic Organic Compound (SOC) Water Quality Report**

Analyzed by Sound Analytical Services, Inc.

HEIGHTS WATER DISTRICT, THE

Sample Date 8/12/94

P. O. BOX 820

Report Date 2/2/95

VASHON

PWSID 32300LS04

WA

98528

DOH Sample ID DOH-0124

<u>METHOD</u>	<u>CONSTITUENT</u>	<u>RESULT (1)</u>	<u>UNITS</u>	<u>QUAL (2)</u>	<u>MCL (3)</u>	<u>EPA Trigger Level (4)</u>
EPA 515.1	2,4,5-T	ND	ug/L	UJ		0.8
	2,4,5-TP	ND	ug/L	UJ	50	0.2
	2,4-D	ND	ug/L	UJ	70	0.1
	2,4-DB	ND	ug/L	UJ		0.8
	Dalapon	ND	ug/L	UJ	200	1
	Dicamba	ND	ug/L	UJ		0.81
	Dinoseb	ND	ug/L	UJ	7	0.2
	Pentachlorophenol	ND	ug/L	UJ	1	0.04
EPA 525.1	Picloram	ND	ug/L	UJ	500	0.1
	Alachlor	ND	ug/L	UJ	2	0.2
	Aldrin	ND	ug/L	UJ		0.083
	Atrazine	ND	ug/L	UJ	3	0.1
	Benzo(a)pyrene	ND	ug/L	UJ	0.2	0.02
	Butachlor	ND	ug/L	UJ		0.5
	CHLORDANE	ND	ug/L	UJ	2	0.2
	DI(ETHYLHEXYL)-ADIPATE	ND	ug/L	UJ	400	0.6
	DI(ETHYLHEXYL)-PHTHAL	ND	ug/L	B	6	0.6
	Dieldrin	ND	ug/L	UJ		0.5
	Endrin	ND	ug/L	UJ	2	0.01
	Heptachlor	ND	ug/L	UJ	0.4	0.04
	Heptachlor epoxide	ND	ug/L	UJ	0.2	0.02
	Hexachlorobenzene	ND	ug/L	UJ	1	0.1
	HEXACHLOROCYCLO-PEN	ND	ug/L	UJ	50	0.1
	Lindane	ND	ug/L	UJ	0.2	0.02
	Methoxychlor	ND	ug/L	UJ	40	0.1
	METOLACHLOR	ND	ug/L	UJ		0.5
	Metribuzin	ND	ug/L	UJ		0.5
	Propachlor	ND	ug/L	UJ		0.5
Simazine	ND	ug/L	UJ	4	0.07	
EPA 531.1	Toxaphene	ND	ug/L	UJ	3	1
	3-Hydroxycarbofuran	ND	ug/L	UJ		
	Aldicarb	ND	ug/L	UJ	3	0.5
	Aldicarb Sulfone	ND	ug/L	UJ	3	0.8
	Aldicarb Sulfoxide	ND	ug/L	UJ	3	0.5
	Carbaryl	ND	ug/L	UJ		2
	Carbofuran	ND	ug/L	UJ	40	0.9
	Methomyl	ND	ug/L	UJ		5
	Oxamyl	ND	ug/L	UJ	200	2

(1) ND: Compound not detected.

(2) U, UJ: Compound not detected J: Detected below reporting limit, resampling may be required. B: Compound detected in blank.

(3) MCL: Maximum Concentration Limit, maximum concentration permissible in water as established by EPA, NPDWR.

(4) EPA Trigger Level: EPA specified concentration over which increased monitoring frequencies are required.

George W. Jett

1105

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

Certificate of Analysis

Work Order# : 93-12-734
DATE RECEIVED : 12/20/93
DATE OF REPORT: 01/07/94

ATTN : R. Fitzpatrick

Work ID : Drinking Water Analysis
Taken By : Client
Transported by: Hand Delivered
Type : Water

SAMPLE IDENTIFICATION:

	<u>Sample Description</u>	<u>Collection Date</u>
01	S02	12/20/93 12:35
02	S03	12/20/93 01:10
03	S04	12/20/93 12:55
04	Composite S02/S03/S04	12/20/93

GENERAL COMMENTS ON VOLATILE ORGANICS TICs:

Tentatively Identified Compounds, or TICs, are reported on a separate page if you requested this additional analytical work or if a regulatory agency requires that TICs be reported. (For instance, the State of Washington requires TIC reporting for all official 524.2 analyses.) In the heading information on the TIC report, the number of tentatively identified compounds found is noted. If no TICs were found, the report will say so and there will be no further information on the report. If TICs were found, they will be listed and an estimated concentration will be shown for each.

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.



Laucks ⁸⁵ years

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	: King	LABORATORY NO.	: 08114980
SYSTEM NAME	: HeightsWatDi	DATA FILE	:
SYSTEM ID NO.	: 32300L	ANALYST	: DDT
DATE COLLECTED	: 12/20/93	DATE OF REPORT	: 01/07/94
DATE ANALYZED	: 12/22/93	SUPERVISOR'S INITIALS	: MLC
SOURCE NUMBER	: S02, S03, S04	LTL #	: 9312734-04A
SOURCE TYPE	: Well		

Regulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant Level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08114980

DATA FILE :

Regulated Compounds (continued)

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08114980

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFLUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

REPORT ON SAMPLE: 9312734-04A

Client Sample ID: Composite SO2/SO3/SO4

Date Received : 12/20/93

Collection Date : 12/20/93

Test Code : TIC_V

Test Method : 524.2

TENTATIVELY IDENTIFIED VOLATILE COMPOUNDS

Number of TICs found: 0 Conc Units: ug/L

CAS Number	Compound Name	RT	Est. Conc
------------	---------------	----	-----------



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VOC

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Chemistry, Microbiology, and Technical Services

VOLATILE ORGANIC CHEMICAL REPORT

Results of Analysis by EPA Method 524.2
Measurement of Purgeable Organic Compounds in Water by Capillary Column
Gas Chromatography/Mass Spectrometry

Send Report To: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

COUNTY	: King	LABORATORY NO.	: 08112286
SYSTEM NAME	: HeightsWatDi	DATA FILE	:
SYSTEM ID NO.	: 3230L	ANALYST	: DDT
DATE COLLECTED	: 09/30/93	DATE OF REPORT	: 10/19/93
DATE ANALYZED	: 10/06/93	SUPERVISOR'S INITIALS	: MLC
SOURCE NUMBER	: S01	LTL #	: 9310028-01A
SOURCE TYPE	: Spring		

Regulated Compounds

EPA Code	NAME OF COMPOUND	* MCL (ug/L)	** Amount (ug/L)
2976	VINYL CHLORIDE	2	ND
2977	1,1-DICHLOROETHYLENE	7	ND
2981	1,1,1-TRICHLOROETHANE	200	ND
2982	CARBON TETRACHLORIDE	.5	ND
2990	BENZENE	5	ND
2980	1,2-DICHLOROETHANE	5	ND
2984	TRICHLOROETHYLENE	5	ND
2969	P-DICHLOROBENZENE	75	ND
2979	T-1,2-DICHLOROETHYLENE	100	ND
2380	CIS-1,2-DICHLOROETHYLENE	70	ND
2983	1,2-DICHLOROPROPANE	5	ND
2991	TOLUENE	1000	ND
2987	TETRACHLOROETHYLENE	5	ND
2989	CHLOROBENZENE	100	ND
2992	ETHYL BENZENE	700	ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 1 of 3)



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Laucks ⁸⁵ years

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Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08112286
DATA FILE :

Regulated Compounds (continued)

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>* MCL (ug/L)</u>	<u>** Amount (ug/L)</u>
2995	M/P-XYLENE (total xylene MCL=10000)		ND
2997	O-XYLENE (total xylene MCL=10000)		ND
2996	STYRENE	100	ND
2968	O-DICHLOROBENZENE	600	ND
2964	METHYLENE CHLORIDE	5	ND
2985	1,1,2-TRICHLOROETHANE	5	ND
2378	1,2,4-TRICHLOROBENZENE	70	ND

Trihalomethanes (THM)

2941	CHLOROFORM		ND
2943	BROMODICHLOROMETHANE		ND
2944	CHLORODIBROMOMETHANE		ND
2942	BROMOFORM		ND

* Maximum Contaminant level

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

(page 2 of 3)



This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.

Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

Results of Analysis by EPA Method 524.2 (continued)

LABORATORY NO. : 08112286

DATA FILE :

Unregulated Compounds

<u>EPA Code</u>	<u>NAME OF COMPOUND</u>	<u>** Amount (ug/L)</u>
2210	CHLOROMETHANE	ND
2214	BROMOMETHANE	ND
2216	CHLOROETHANE	ND
2978	1,1-DICHLOROETHANE	ND
2416	2,2-DICHLOROPROPANE	ND
2410	1,1-DICHLOROPROPENE	ND
2408	DIBROMOMETHANE	ND
2412	1,3-DICHLOROPROPANE	ND
2986	1,1,1,2-TETRACHLOROETHANE	ND
2993	BROMOBENZENE	ND
2414	1,2,3-TRICHLOROPROPANE	ND
2988	1,1,2,2-TETRACHLOROETHANE	ND
2965	O-CHLOROTOLUENE	ND
2966	P-CHLOROTOLUENE	ND
2967	M-DICHLOROBENZENE	ND
2212	DICHLORODIFLUOROMETHANE	ND
2218	TRICHLOROFUOROMETHANE	ND
2430	BROMOCHLOROMETHANE	ND
2994	ISOPROPYLBENZENE	ND
2998	N-PROPYLBENZENE	ND
2424	1,3,5-TRIMETHYLBENZENE	ND
2426	TERT-BUTYLBENZENE	ND
2428	SEC-BUTYLBENZENE	ND
2030	P-ISOPROPYLTOLUENE	ND
2422	N-BUTYLBENZENE	ND
2418	1,2,4-TRIMETHYLBENZENE	ND
2248	NAPHTHALENE	ND
2246	HEXACHLOROBUTADIENE	ND
2420	1,2,3-TRICHLOROBENZENE	ND
2228	CIS-1,3-DICHLOROPROPENE	ND
2224	TRANS-1,3-DICHLOROPROPENE	ND

** NOTE: ND indicates that the true concentration is less than the method detection limit of 0.5 ug/L.

All detected non-THM compounds have been confirmed by reanalysis.

(page 3 of 3)



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VOC
1989

State of Washington
Department of Social and Health Services
Division of Health
Public Health Laboratories
1610 N.E. 150th St., Seattle, WA 98155
(206)361-2898

Lab Number : 5401562 Customer : HEIGHTS WATER DISTRICT
Date collected : 10-24-89 Address : RT. 1, BOX 378
Date Received : 10-24-89 City : VASHON
Date Tested : 10/26/89 23:06 State, Zip : WA, 98070
Data File : >1326P::D4 County : KING

Miscellaneous Sample Information : 5401562

System ID Number : 32300L System Name : HEIGHTS WATER DIST.

Non-Composited Samples

OSHS Source Number : S02
Source Name : WELL # 1

Composited Samples

Number of Sources Used in Composite : N/A
OSHS Source #'s Composited : N/A

Analysis of Individual Sources Necessary: N/A

Analyst : PAMELA MS
Instrument : 1

Date of Report : 11-28-89
Analyst's Initials : PAN
Supervisor's Initials : P

Charge \$200

Results of Analysis by EPA Method 524

REGULATED COMPOUNDS

EPA Code #	Compound Name	MCL(ug/l)	* Amount (ug/l)	Compliance
2976	VINYL CHLORIDE	2	0.0	YES
2977	1,1-DICHLOROETHYLENE	7	0.0	YES
2981	1,1,1-TRICHLOROETHANE	200	0.0	YES
2982	CARBON TETRACHLORIDE	5	0.0	YES
2990	BENZENE	5	0.0	YES
2980	1,2-DICHLOROETHANE	5	0.0	YES
2984	TRICHLOROETHYLENE	5	0.0	YES
2969	P-DICHLOROBENZENE	75	0.0	YES

*Note: An Amount of 0.0 ug/l indicates that the true concentration is less than the detection limit of the method (0.5 ug/l for all compounds).

Lab Number : 5401562
Data File : >1J26P::D4

Results of Analysis by EPA Method 524
(continued)

Unregulated Compounds

Monitoring Required

EPA Code #	Compound Name	*Amount (ug/l)
2210	CHLOROMETHANE	0.0
2214	BROMOMETHANE	0.0
2216	CHLOROETHANE	0.0
2964	METHYLENE CHLORIDE	0.0
2979	T-1,2,-DICHLOROETHYLENE	0.0
2978	1,1-DICHLOROETHANE	0.0
2416	2,2-DICHLOROPROPANE	0.0
2380	CIS-1,2-DICHLOROETHYLENE	0.0
2941	CHLOROFORM (THM)	0.0
2410	1,1-DICHLOROPROPENE	0.0
2983	1,2-DICHLOROPROPANE	0.0
2408	DIBROMOMETHANE	0.0
2943	BROMODICHLOROMETHANE (THM)	0.0
2991	TOLUENE	0.0
2985	1,1,2-TRICHLOROETHANE	0.0
2987	TETRACHLOROETHYLENE	0.0
2412	1,3-DICHLOROPROPANE	0.0
2944	CHLORODIBROMOMETHANE (THM)	0.0
2989	CHLOROBENZENE	0.0
2986	1,1,1,2-TETRACHLOROETHANE	0.0
2992	ETHYL BENZENE	0.0
2995	M/P-XYLENE	0.0
2997	O-XYLENE	0.0
2996	STYRENE	0.0
2942	BROMOFORM (THM)	0.0
2993	BROMOBENZENE	0.0
2414	1,2,3-TRICHLOROPROPANE	0.0
2988	1,1,2,2-TETRACHLOROETHANE	0.0
2965	O-CHLOROTOLUENE	0.0
2966	P-CHLOROTOLUENE	0.0
2967	M-DICHLOROBENZENE	0.0
2968	O-DICHLOROBENZENE	0.0

*Note: An Amount of 0.0 ug/l indicates that the true concentration is less than the detection limit of the method (0.5 ug/l for all compounds).

Lab Number : 5401562
Data File : 1J26P::D4

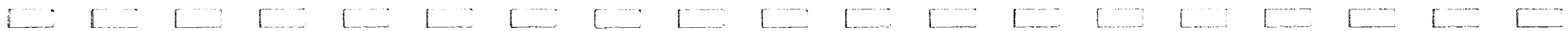
Results of Analysis by EPA Method 524
(continued)

Unregulated Compounds

Discretionary

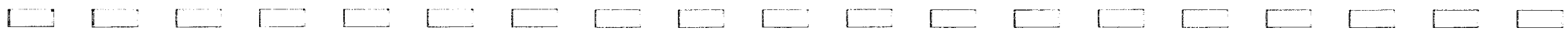
EPA Code #	Compound Name	*Amount (ug/l)
2218	TRICHLOROFLUOROMETHANE	0.0
2430	BROMOCHLOROMETHANE	0.0
2994	ISOPROPYLBENZENE	0.0
2998	N-PROPYLBENZENE	0.0
2424	1,3,5-TRIMETHYLBENZENE	0.0
2426	TERT-BUTYLBENZENE	0.0
2418	1,2,4-TRIMETHYLBENZENE	0.0
2428	SEC-BUTYLBENZENE	0.0
2030	P-ISOPROPYLTOLUENE	0.0
2422	N-BUTYLBENZENE	0.0
2378	1,2,4-TRICHLOROBENZENE	0.0
2248	NAPHTHALENE	0.0
2246	HEXACHLOROBUTADIENE	0.0
2420	1,2,3-TRICHLOROBENZENE	0.0

*Note: An Amount of 0.0 ug/l indicates that the true concentration is less than the detection limit of the method (0.5 ug/l for all compounds).



APPENDIX F





RECEIVED

MAR 17 1998

HEDGES & ROTH ENGINEERING, INC
BELLEVUE, WA

Heights Water
P.O. Box 820, Vashon, WA 98070

Coliform Monitoring Plan

Prepared by: Kevin Ward and Derrick Reed

March 12, 1998

Contents:

- I. System Map
- II. Narrative Description
- III. Plan Maintenance Program

II. Narrative

System Information

1) Water System name.

Heights Water

2) System ID number.

32300L

3) Sources- For each source- DOH source number, source name, source category, source location as indicated on the Water Facilities Inventory (WFI).

DOH Source Number	Source Name	Source Category	Source Location
So 1	Springs	Spring	NE/SE 18 23N 03E
So 2	Well #1	Well field	NE/SE 18 23N 03E
So 3	Well #2	Well field	NE/SE 18 23N 03E
So 4	Well #3	Well field	NE/SE 18 23N 03E
So 5	Wells #1,2,3	Well field	NE/SE 18 23N 03E

4). Storage/reservoirs –(including volume).

There are a total of five water storage tanks in the system. The property where the office is located has three 100,000 gallon ground-level tanks and a 20,000 gallon elevated tank. There is another 10,000 gallon tank located further south along the Vashon Highway. The total storage capacity of the system is therefore 330,000 gallons.

5). Pressure Stations.

There are four pressure stations on Heights Water's system.

1. Located at the corner of S.W. 112th and Pt. Vashon Dr.
2. Located at the corner of S.W. Van Olinda and Glen Acres Rd.
3. Located at the southeast end of the ferry dock
4. Located at the end of Dolphin Pt. Drive.

6). Treatment plant- location, source treated, process utilized and for what objective (as described in the Source Treatment Inventory).

There are two treatment plants: one at the springs pump-house and the latter at the

wells pump-house. The treatment of the water is limited to precautionary chlorination. A 12.5% solution of sodium hypochlorite is stored in each building mixed into the 55 gallon solution tank at 5 gallons of sodium hypochlorite (12.5%) to 50 gallons of water. The chlorinating system is the same for the springs and the wells.

- 7.) Total population served. (as indicated on WFI). Noncommunity systems with monthly variations in nonresident subpopulations should project the expected total population from historical data. The months and years referenced for this estimate should be included.

Date printed: 10/3/97 Date updated: 12/19/96 population 1,475

- 8.) Total number of service connections.

Total authorized service connections-750

Total current connections-591

- 9.) Number of pressure zones

There are several pressure zones within the system. The storage tanks are located on the highest land within the service area, while many of the service connections are on the beach. There are four pressure reducing valves in the distribution system. The system pressure is as high as 150 psi near the ferry pier. In areas where the system pressure exceeds 50 psi, individual pressure reducing valves are provided at the customer meter. In addition to reducing pressure, the subsequent reduced flow aids in water conservation. A hydraulic model is necessary to more precisely define system pressure zones.

- 10.) Population served by each pressure zone, (as available).

This data is based on an estimate of 2.3 individuals per household:

North pressure zone- 404 connections X 2.3 = 929.2 est. individuals per zone

South pressure zone- 146 connections X 2.3 = 335.8 est. individuals per zone

S.E. pressure zone- 40 connections X 2.3 = 92 est. individuals per zone

- 11.) Service connections in each pressure zone.

The service connections in each pressure zone are as follows:

North pressure zone- 404 connections

South pressure zone- 146 connections

S.E. pressure zone- 40 connections

B. Sampling Information

- 1.) Minimum number of routine monthly samples required by the DOH Drinking Water Regulations, per the table attached to the outline.

With a population of 1, 475 Heights Water falls into a category of having two samples/month required by the federal Total coliform rule.

- 2.) Total number of routine sampling sites needed to represent all distribution areas and areas of concern (e.g. pressure zones, areas served by each source, and areas served by each distribution reservoir). May be larger than the minimum number used in (1) above:

Heights Water has six routine sampling sites that represent all distribution areas and areas of concern.

- 3.) Location of all routine sampling sites needed to cover all pressure zones, areas served by each source, and areas served by each distribution source, and areas served by each distribution system reservoir. The general location of routine sample sites must be indicated on the schematic, map, or as built, and the specific location (address) must be listed in the narrative.

Coliform Monitoring is carried out at representative points throughout the distribution system. Sites variously used are:

- a) At or adjacent to the pumping distribution station (central).
Address: 13205 Vashon Highway S.W.

- b) At Fire Station 5, Vashon Highway (north end).

- c) At the Pressure Regulating Station (west end).
Address: Corner of S.W. 112th St. and Pt. Vashon Drive

- d) At the Pressure Regulating Station (east end).
Address: S.W. Van Olinda

- e) At the blow-off (south end).
Address: Vashon Highway and 158th St.

- f) At the blow-off pipe (northeast area).
Address: Corner of Cunliffe Rd. and S.W. 122nd Pl.

- 4.) The number of (daily, weekly, biweekly) samples. Systems required to take multiple samples on regular time intervals throughout the month, i.e. samples should not all be taken on the same day, but on a daily, weekly, or biweekly schedule. The number of daily, weekly, or biweekly samples taken must be described.

4.) continued:

Sampling Schedule: In accordance with DOH Table 2 “Minimum Monthly Routine Coliform Sampling Requirements for Group A Systems” – for a system with approx. 1,475 persons being supplied. Currently, two samples are submitted twice each calendar month (assuming no coliform presence the previous month).

5.) Monthly rotation cycles- If sample sites are rotated on a monthly basis, i.e. there is a greater number of routine sampling sites identified than monthly required sites, an explanation of the month to month rotation cycle must be included. It is desirable to rotate through each important sample site about 4 times per year.

Rotation Schedule

Month	Sample site(s)	Month	Sample site(s)
January	A, B	July	C, D
February	E,F	August	A,B
March	C,D	September	E,F
April	A, B	October	C, D
May	E,F	November	A, B
June	C, D	December	E, F

6.) Repeat sampling site availability- The system must assure that repeat sample sites are available, and accessible for each routine sampling site, i.e. at least one upstream & one downstream site within five service connections of each routine sampling site. An additional repeat sample site must be identified for systems collecting one or less routine sample per month.

Sample Site A- repeat site @ W. Fitzpatrick 10616 S.W. 133rd St. & Vashon Hwy.
@ Walter Ebell 13118 Vashon Highway S.W.

Sample Site B- repeat site @ Lawrence Hansen 11920 105th Ave. S.W.
@ PTI Communications 11960 Vashon Hwy S.W.

Sample Site C- repeat site @ Lane Nothman 11146 109th Ave. S.W.
@ James Johnson 3042 Old Port Lane

Sample Site D- repeat site @ Dorothy Morgan 8735 S.W. Van Olinda Rd.
@ Evan Pruett 8202 S.W. Hawthorne Lane

Sample Site E- repeat site @ Odell Lovre 16218 Vashon Hwy S.W.
@ Ted Kutscher 16212 Vashon Hwy S.W.

Sample Site F- repeat site @ Tom Dinsmore 11830 Cunliffe Rd. S.W.
@ Lynn Wilhoit 10010 S.W. 122nd Pl.

- 7.) Systems collecting less than five routine samples per month will be required to collect a total of five samples in the month following coliform bacteria detection in any routine sample. These systems must indicate on the system map and include in the narrative, the location of the additional routine sites.

Sample Site A- repeat site @ W. Fitzpatrick S.W. 133rd and Vashon Hwy. S.W.

Sample Site B- repeat site @ PTI Communications 11960 Vashon Hwy. S.W.

Sample Site C- repeat site @ James Johnson 3042 Old Port Lane

Sample Site D- repeat site @ Evan Pruett 8202 S.W. Hawthorne Lane

Sample Site E- repeat site @ Odell Lovre 16218 Vashon Hwy. S.W.

Sample Site F- repeat site @ Tom Dinsmore 11830 Cunliffe Rd. S.W.

- 8.) Systems using surface water, or ground water under the direct influence of surface water (such as springs and shallow wells), and not practicing filtration, must identify the location of the first service, and assure that it is available and accessible for coliform sample collection if the turbidity of the source water exceeds 1 NTU.

None of the water supply systems involve surface water or ground water under the influence of surface water.

C. Plan Preparation Information

- 1.) Name of plan preparer, title, daytime phone number

Kevin Ward, WDM-1
Derrick Reed, WDM-1
Ph. # (206)567-4696

- 2.) Date plan prepared and/or modified

3/11/98

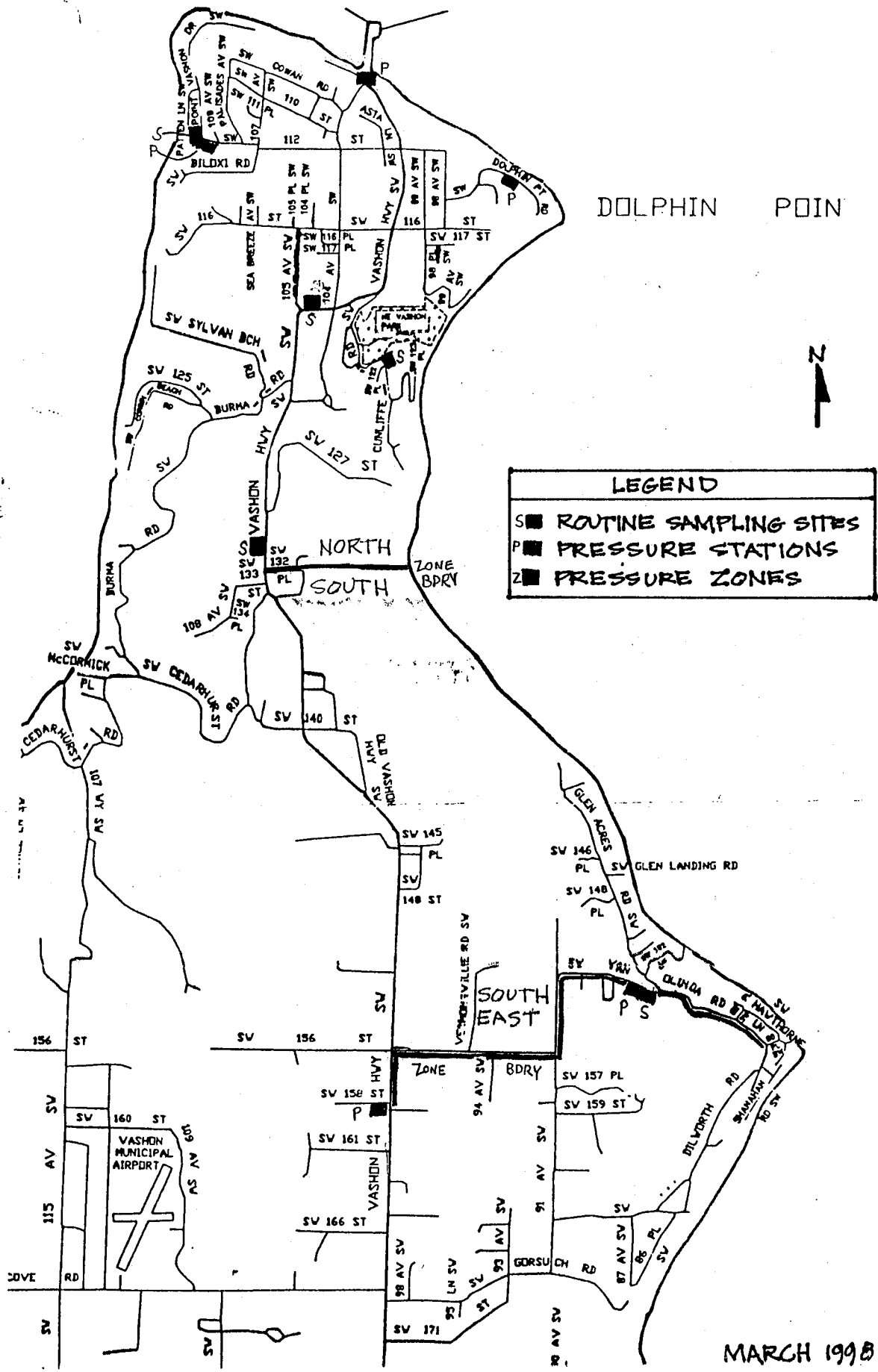
- 3.) As applicable, name and office of the reviewer and date last reviewed

Reed Fitzpatrick
President of the Board of Trustees
Heights Water

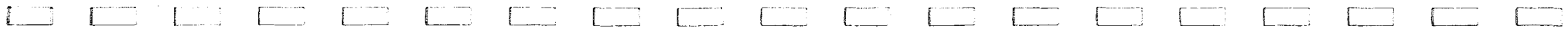
date last reviewed 03/92

HEIGHTS WATER PRESSURE ZONES & ROUTINE SAMPLING SITES*

* SAMPLING SITES ARE FOR COLIFORM TESTING



MARCH 1998



APPENDIX G





SAMPLE SITE IDENTIFICATION AND CERTIFICATION

RESULTS OF MONITORING

THE RESULTS OF LEAD AND COPPER TAP WATER SAMPLES MUST BE ATTACHED TO THIS DOCUMENT

of samples required 20 # of samples submitted 20 90th Percentile Pb .011
90th Percentile Cu .48

THE RESULTS OF WATER QUALITY PARAMETER SAMPLES MUST BE ATTACHED TO THIS DOCUMENT

of samples required 0 # of tap samples submitted 0
of entry point samples required 0 # of entry point samples submitted 0

CHANGE OF SAMPLING SITES

Original site address: not applicable

New site address:

Distance between sites (approximately):

Targeting Criteria: NEW: OLD:

Reason for change (attach additional pages if necessary):

SIGNATURE	<i>K S Amer</i>	Heights Water District	Vashon, Wa
	K. S. Amer	Trustee	22 Dec 1993
NAME	TITLE	DATE	

SAMPLE SITE IDENTIFICATION AND CERTIFICATION

System's Name: Heights Water District **Type:** CWS NTCWS
 (private non-profit system)

Address: P. O. Box 820 **Size:** >100,000
Vashon, Wa 98070 10,001 to 100,000
 3,301 to 10,000
 501 to 3,300
 101 to 500
 ≤100

Telephone number: (206) 567-4696

System ID #: 32300 L

Contact Person: Mark E. Tuel

CERTIFICATION OF SAMPLING SITES

LEAD SOLDER SITES

# of single-family structures with copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 1)	<u>12</u>
# of multi-family structures with copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 1)	<u>0</u>
# of buildings containing copper pipes with lead solder installed after 1982 or lead pipes and/or lead service lines (Tier 2)	<u>0</u>
# of sites that contain copper pipes with lead solder installed before 1983 (to be used only if other conditions have been exhausted) (Tier 3)	<u>8</u>
TOTAL	<u>20</u>

The following sources have been explored to determine the number of structures which have interior lead pipe or copper pipe with lead solder.

- Plumbing and/or building codes
- Plumbing and/or building permits
- Contacts within the building department, municipal clerk's office, or state regulatory agencies for historical documentation of the service area development
- Water Quality Data

Other Resources Which PWS May Utilize

- Interviews with building inspectors
- Survey of service area plumbers about when and where lead solder was used from 1982 to present
- Survey residents in sections of the service area where lead pipe and/or copper pipe with lead solder is suspected to exist
- Interviews with local contractors and developers

Explanation of Tier 2 and Tier 3 sites (attach additional pages if necessary)

See attached sheet

Explanation of Tier 3 Sampling Sites

Eight Tier 3 Sampling Sites had to be used because our water system has absolutely no lead pipe, lead service lines, pigtails, or goosenecks. Also, no soldered joints on copper service lines or meter installations. This was carefully confirmed after a laborous and lengthy research program, including numerous site investigations and personal interviews. Further, even the number of structures that would fit into the Tier 1 category with lead-soldered copper pipe installed between the end of 1982 and the local lead solder ban date were very limited due to the small size of our system area.

SAMPLE SITE IDENTIFICATION AND CERTIFICATION

CERTIFICATION OF SAMPLING SITES

LEAD SERVICE LINE SITES

of samples required to be drawn from lead service line sites
 # of samples actually drawn from lead service line sites
 Difference (explain differences other than zero)

0
0
0

The following sources have been explored to determine the number of lead service lines in the distribution system.

- Distribution system maps and record drawings
- Information collected for the presence of lead and copper as required under §141.42 of the Code of Federal Regulations
- Capital improvement plans and/or master plans for distribution system development
- Current and historical standard operating procedures and/or operation and maintenance (O&M) manuals for the type of materials used for service connections
- Utility records including meter installation records, customer complaint investigations and all historical documentation which indicate and/or confirm the location of lead service connections
- Existing water quality data for indications of 'troubled areas'

Other Sources Which PWS Utilized

- Interviews with senior personnel
- Conduct service line sampling where lead service lines are suspected to exist but their presence is not confirmed
- Review of permit files
- Community survey
- Review of USGS maps and records
- Interviews with pipe suppliers, contractors, and/or developers

Explanation of fewer than 50% LSL sites identified (attach additional pages if necessary):
 System has no lead service lines, pigtails or goosenecks.

CERTIFICATION OF COLLECTION METHODS

I certify that:

Each first draw tap sample for lead and copper is one liter in volume and has stood motionless in the plumbing system of each sampling site for at least six hours.

Each first draw sample collected from a single-family residence has been collected from the cold water kitchen tap or bathroom sink tap.

Each first draw sample collected from a non-residential building has been collected at an interior tap from which water is typically drawn for consumption.

Each first-draw sample collected during an annual or triennial monitoring period has been collected in the months of June, July, August or September.

Each resident who volunteered to collect tap water samples from his or her home has been properly instructed by [insert water system's name] Heights Water District in the proper methods for collecting lead and copper samples. I do not challenge the accuracy of those sampling results. Enclosed is a copy of the material distributed to residents explaining the proper collection methods, and a list of the residents who performed sampling. (attached)

LIST OF RESIDENTS WHO PERFORMED SAMPLING
FIRST SAMPLING PERIOD

Alfred M. Ludwigsen

L. Higley

J. Schlumpf

Jo Anne R. Bacon

K. S. Amer

Judith Bresch

Rosalie Bean

Kathy Kernan

Lyle Harlson

Robert Katica

Muriel Spalding

L. Higley

Gerald W. Tucker

B. Vance

Shelley B. Whitlock

Alf Lied

Keith H. Gleason

Mike Kimmel

Louise Ogilvy

E. Flory

Laucks ⁸⁵ years Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

ATTN : Mark E. Tuel

Work ID : Lead/Copper Test #21
Taken By : Client
Transported by: Hand Delivered
Type : Water

Certificate of Analysis

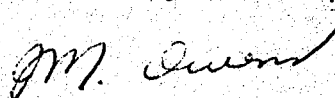
Work Order# : 93-12-484
DATE RECEIVED : 12/13/93
DATE OF REPORT: 12/22/93

SAMPLE IDENTIFICATION:

	<u>Sample</u> <u>Description</u>	<u>Collection</u> <u>Date</u>
01	11020 SW Dolphin Pt. Rd.	12/13/93 10:00

Unless otherwise instructed all samples will be discarded on 02/10/94.

Respectfully submitted,
Laucks Testing Laboratories, Inc.


J. M. Owens



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Laucks ⁸⁵ years

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corp.

Certificate of Analysis

Work Order # 93-12-484

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>
Copper (Method 200.8)	mg/L	0.033
Lead (Method 200.8)	mg/L	0.006



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Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

Certificate of Analysis

Work Order# : 93-12-066
DATE RECEIVED : 12/02/93
DATE OF REPORT: 12/14/93

ATTN : Mark E. Tuel

Work ID : Lead/Copper Testing
Taken By : Client
Transported by: Hand Delivered
Type : Water

SAMPLE IDENTIFICATION:

	Sample Description	Collection Date
01	14 10649 SW Cedarhurst	12/01/93 08:00
02	16 8118 SW Van Olinda Rd.	12/02/93 08:15
03	17 11423 99th Ave. S.W.	12/02/93 08:45
04	18 15638 94th Ave. S.W.	12/02/93 08:25
05	19 10705 SW 110th St.	12/02/93 09:00
06	20 11117 Asta Lane	12/02/93 08:50

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Unless otherwise instructed all samples will be discarded on 01/30/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.


J. M. Owens



This report is submitted for the exclusive use of the person, partnership, or corporation to whom it is addressed. Subsequent use of the name of this company or any member of its staff in connection with the advertising or sale of any product or process will be granted only on contract. This company accepts no responsibility except for the due performance of inspection and/or analysis in good faith and according to the rules of the trade and of science.



ucks® 85 years

ing Laboratories, Inc.

South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corp.

Certificate of Analysis

Work Order # 93-12-066

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.12	0.11	0.095	0.020
Lead (Method 200.8)	mg/L	0.003	0.005	0.002 U	0.005

Analyte	Units	<u>05</u>	<u>06</u>
Copper (Method 200.8)	mg/L	0.034	0.011
Lead (Method 200.8)	mg/L	0.019 *	0.013

* NEWLY INSTALLED KITCHEN FAUCET



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Laucks

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

ATTN : Mark E. Tuel

Work ID : Lead/Copper Test
Taken By : Client
Transported by: Hand Delivered
Type : Water

Certificate of Analysis

Work Order# : 93-11-875
DATE RECEIVED : 11/29/93
DATE OF REPORT: 12/10/93

SAMPLE IDENTIFICATION:

	<u>Sample</u> <u>Description</u>	<u>Collection</u> <u>Date</u>
01	#11 10044 SW 122nd Pl.	11/29/93 10:30
02	#12 10349 SW 110th St.	11/29/93 10:45
03	#13 9228 SW 156th St.	11/29/93 08:00
04	#15 11955 99th Ave. SW	11/29/93 11:00

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Unless otherwise instructed all samples will be discarded on 01/27/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.


J. M. Owens



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Laucks ⁸⁵ years

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corp.

Certificate of Analysis

Work Order # 93-11-875

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.12	0.091	0.58	0.48
Lead (Method 200.8)	mg/L	0.002	0.002 U	0.005	0.002



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Laucks ⁸⁵ YEARS

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

Certificate of Analysis

Work Order# : 93-11-750
DATE RECEIVED : 11/19/93
DATE OF REPORT: 12/01/93

ATTN : Mark E. Tuel

Work ID : Pb/Cu Test
Taken By : Client
Transported by: Hand Delivered
Type : Water

SAMPLE IDENTIFICATION:

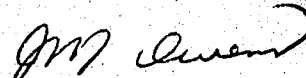
	Sample Description	Collection Date
01	#2 11118 Asta Lane	11/18/93 08:15
02	#6 11037 Patten Lane	11/19/93 08:10
03	#7 11543 Seabreeze Ave.	11/19/93 08:15
04	#8 11124 Palisades Ave. SW	11/18/93 10:00
05	#9 8004 Hawthorne Lane	11/18/93 08:00
06	#10 7917 Hawthorne Lane	11/18/93 08:00

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.

Unless otherwise instructed all samples will be discarded on 01/20/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.


J. M. Owens



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Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corp.

Certificate of Analysis

Work Order # 93-11-750

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.25	0.32	0.48	0.50
Lead (Method 200.8)	mg/L	0.002 U	0.002	0.002 U	0.002 U

Analyte	Units	<u>05</u>	<u>06</u>
Copper (Method 200.8)	mg/L	0.13	0.048
Lead (Method 200.8)	mg/L	0.005	0.002 U



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Laucks ⁸⁵ YEARS

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corp.
P.O. Box 820
Vashon, WA 98070-0820

Certificate of Analysis

Work Order# : 93-11-644
DATE RECEIVED : 11/16/93
DATE OF REPORT: 11/29/93

ATTN : Mark E. Tuel

Work ID : Copper/Lead Analysis
Taken By : Client
Transported by: Hand Delivered
Type : Water

SAMPLE IDENTIFICATION:

	<u>Sample</u> <u>Description</u>	<u>Collection</u> <u>Date</u>
01	#1 14407 Vashon Isl. Hwy	11/16/93 06:00
02	8002 80th Pl. SW	11/16/93
03	#4 11217 107th Ave SW	11/16/93
04	#5 10634 SW Cowan Rd	11/16/93

Unless otherwise instructed all samples will be discarded on 01/14/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J.M. Owens
J. M. Owens



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Laucks ⁸⁵ YEARS

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corp.

Certificate of Analysis

Work Order # 93-11-644

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.10	0.086	0.24	0.26
Lead (Method 200.8)	mg/L	0.011	0.009	0.009	0.005



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WATER BACTERIOLOGICAL ANALYSIS
 SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY
 If instructions are not followed, sample will be rejected.

WATER BACTERIOLOGICAL ANALYSIS
 SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY
 If instructions are not followed, sample will be rejected.

DATE COLLECTED MONTH DAY YEAR 12 / 18 / 93			TIME COLLECTED 8:10 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM		COUNTY NAME KING
TYPE OF SYSTEM <input checked="" type="checkbox"/> PUBLIC <input type="checkbox"/> INDIVIDUAL (serves only 1 residence)		IF PUBLIC SYSTEM, COMPLETE: I.D. No. 32300L			CIRCLE GROUP (A) B

DATE COLLECTED MONTH DAY YEAR 12 / 18 / 93			TIME COLLECTED 8:20 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM		COUNTY NAME KING
TYPE OF SYSTEM <input checked="" type="checkbox"/> PUBLIC <input type="checkbox"/> INDIVIDUAL (serves only 1 residence)		IF PUBLIC SYSTEM, COMPLETE: I.D. No. 32300L			CIRCLE GROUP (A) B

NAME OF SYSTEM
 HEIGHTS WATER DISTRICT

NAME OF SYSTEM
 HEIGHTS WATER DISTRICT

SPECIFIC LOCATION WHERE SAMPLE COLLECTED PRV VAULT @ CORNER OF SW 112 nd ST. & PT. VASHON DR. (HOSE BIB)	TELEPHONE NO. DAY () 567-4855 EVENING () 463-3900
--	---

SPECIFIC LOCATION WHERE SAMPLE COLLECTED HOSE BIB @ 11025 PATTEN LANE SW	TELEPHONE NO. DAY () 567-4855 EVENING () 463-3900
--	---

SAMPLE COLLECTED BY: (Name) MARK E. TUEL	SYSTEM OWNER/MGR.: (Name) R. FITZPATRICK
---	---

SAMPLE COLLECTED BY: (Name) MARK E. TUEL	SYSTEM OWNER/MGR.: (Name) R. FITZPATRICK
---	---

SOURCE TYPE GROUND WATER UNDER SURFACE INFLUENCE
 SURFACE WELL or WELL FIELD SPRING PURCHASED or INTERTIE COMBINATION or OTHER

SOURCE TYPE GROUND WATER UNDER SURFACE INFLUENCE
 SURFACE WELL or WELL FIELD SPRING PURCHASED or INTERTIE COMBINATION or OTHER

SEND REPORT TO: (Print Full Name, Address and Zip Code)
 H W D
 PO BOX 820
 VASHON WASHINGTON 98070

SEND REPORT TO: (Print Full Name, Address and Zip Code)
 H W D
 PO BOX 820
 VASHON WASHINGTON 98070

TYPE OF SAMPLE (check only one in this column)

<input type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input type="checkbox"/> Chlorinated (Residual: ___ Total ___ Free)
	<input type="checkbox"/> Filtered
	<input type="checkbox"/> Untreated or Other
<input checked="" type="checkbox"/> REPEAT SAMPLE Previous coliform presence	Lab # 08114089 Date 12/13/93
<input type="checkbox"/> RAW SOURCE WATER	Source # S
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS	<input type="checkbox"/> Total Coliform
<input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> Fecal Coliform

TYPE OF SAMPLE (check only one in this column)

<input type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input type="checkbox"/> Chlorinated (Residual: ___ Total ___ Free)
	<input type="checkbox"/> Filtered
	<input type="checkbox"/> Untreated or Other
<input checked="" type="checkbox"/> REPEAT SAMPLE Previous coliform presence	Lab # 08114089 Date 12/13/93
<input type="checkbox"/> RAW SOURCE WATER	Source # S
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS	<input type="checkbox"/> Total Coliform
<input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> Fecal Coliform

REMARKS: CHECK #1

REMARKS: CHECK #2

(LAB USE ONLY) DRINKING WATER RESULTS

<input type="checkbox"/> UNSATISFACTORY, Coliforms present	<input checked="" type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED	<input type="checkbox"/> E. Coli present <input type="checkbox"/> E. Coli absent <input type="checkbox"/> Fecal present <input type="checkbox"/> Fecal absent

(LAB USE ONLY) DRINKING WATER RESULTS

<input type="checkbox"/> UNSATISFACTORY, Coliforms present	<input checked="" type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED	<input type="checkbox"/> E. Coli present <input type="checkbox"/> E. Coli absent <input type="checkbox"/> Fecal present <input type="checkbox"/> Fecal absent

OTHER LABORATORY RESULTS

TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml

OTHER LABORATORY RESULTS

TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml

ANOTHER SAMPLE REQUIRED

SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

ANOTHER SAMPLE REQUIRED

SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

LAB NO. (7 DIGITS) 08114343	DATE, TIME RECEIVED 12/18/93 10:45	RECEIVED BY JEA
DATE REPORTED 12/20	LABORATORY: 701-2	

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

LAB NO. (7 DIGITS) 08114344	DATE, TIME RECEIVED 12/18/93 10:45	RECEIVED BY JEA
DATE REPORTED 12/20	LABORATORY: 701-3	

WATER BACTERIOLOGICAL ANALYSIS

SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY
If instructions are not followed, sample will be rejected.

WATER BACTERIOLOGICAL ANALYSIS

SAMPLE COLLECTION: READ INSTRUCTIONS ON BACK OF GOLDENROD COPY
If instructions are not followed, sample will be rejected.

DATE COLLECTED MONTH DAY YEAR 12/13/93			TIME COLLECTED :30 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM		COUNTY NAME KING
TYPE OF SYSTEM IF PUBLIC SYSTEM, COMPLETE: <input checked="" type="checkbox"/> PUBLIC <input type="checkbox"/> INDIVIDUAL (serves only 1 residence)					
I.D. No. 323004			CIRCLE GROUP (A) B		
NAME OF SYSTEM HEIGHTS WATER DIST.					
SPECIFIC LOCATION WHERE SAMPLE COLLECTED Hobe BIB PUMP STATION			TELEPHONE NO. DAY () 567-4855 EVENING () 463-3900		
SAMPLE COLLECTED BY: (Name) R. FITZPATRICK			SYSTEM OWNER/MGR.: (Name) R. FITZPATRICK		
SOURCE TYPE <input checked="" type="checkbox"/> GROUND WATER UNDER SURFACE INFLUENCE <input type="checkbox"/> SURFACE <input checked="" type="checkbox"/> WELL or WELL FIELD <input type="checkbox"/> SPRING <input type="checkbox"/> PURCHASED or INTERTIE <input type="checkbox"/> COMBINATION or OTHER					
SEND REPORT TO: (Print Full Name, Address and Zip Code) HWD POBX 820 ASTON WASHINGTON 98070					

DATE COLLECTED MONTH DAY YEAR 12/13/93			TIME COLLECTED :45 <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM		COUNTY NAME KING
TYPE OF SYSTEM IF PUBLIC SYSTEM, COMPLETE: <input checked="" type="checkbox"/> PUBLIC <input type="checkbox"/> INDIVIDUAL (serves only 1 residence)					
I.D. No. 323004			CIRCLE GROUP (A) B		
NAME OF SYSTEM HEIGHTS WATER DIST.					
SPECIFIC LOCATION WHERE SAMPLE COLLECTED TEST STATION PT VASA. DR			TELEPHONE NO. DAY () 567-4855 EVENING () 463-3900		
SAMPLE COLLECTED BY: (Name) R. FITZPATRICK			SYSTEM OWNER/MGR.: (Name) R. FITZPATRICK		
SOURCE TYPE <input type="checkbox"/> GROUND WATER UNDER SURFACE INFLUENCE <input checked="" type="checkbox"/> SURFACE <input checked="" type="checkbox"/> WELL or WELL FIELD <input type="checkbox"/> SPRING <input type="checkbox"/> PURCHASED or INTERTIE <input type="checkbox"/> COMBINATION or OTHER					
SEND REPORT TO: (Print Full Name, Address and Zip Code) HWD POBX 820 ASTON WASHINGTON 98070					

TYPE OF SAMPLE (check only one in this column)		Chlorinated (Residual: <u>55</u> Total <u>50</u> Free)	
<input checked="" type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input type="checkbox"/> Filtered		
<input type="checkbox"/> REPEAT SAMPLE Previous coliform presence	<input type="checkbox"/> Untreated or Other		
<input type="checkbox"/> RAW SOURCE WATER	Source # <u>S</u>	<input type="checkbox"/> Total Coliform	
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS		<input type="checkbox"/> Fecal Coliform	
<input type="checkbox"/> OTHER (Specify)			

TYPE OF SAMPLE (check only one in this column)		Chlorinated (Residual: <u>55</u> Total <u>50</u> Free)	
<input type="checkbox"/> ROUTINE DRINKING WATER check treatment	<input type="checkbox"/> Filtered		
<input type="checkbox"/> REPEAT SAMPLE Previous coliform presence	<input type="checkbox"/> Untreated or Other		
<input type="checkbox"/> RAW SOURCE WATER	Source # <u>S</u>	<input type="checkbox"/> Total Coliform	
<input type="checkbox"/> NEW CONSTRUCTION or REPAIRS		<input type="checkbox"/> Fecal Coliform	
<input type="checkbox"/> OTHER (Specify)			

REMARKS:

REMARKS:
CWT messages to 567-4855/463-3900 12/13

(LAB USE ONLY) DRINKING WATER RESULTS	
<input type="checkbox"/> UNSATISFACTORY, Coliforms present	<input checked="" type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED <input type="checkbox"/> E. Coli present <input type="checkbox"/> Fecal present	<input type="checkbox"/> E. Coli absent <input type="checkbox"/> Fecal absent
OTHER LABORATORY RESULTS	
TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml
ANOTHER SAMPLE REQUIRED	
SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

(LAB USE ONLY) DRINKING WATER RESULTS	
<input checked="" type="checkbox"/> UNSATISFACTORY, Coliforms present	<input type="checkbox"/> SATISFACTORY, Coliforms absent
REPEAT SAMPLES REQUIRED <input type="checkbox"/> E. Coli present <input type="checkbox"/> Fecal present	<input checked="" type="checkbox"/> E. Coli absent <input type="checkbox"/> Fecal absent
OTHER LABORATORY RESULTS	
TOTAL COLIFORM _____ /100 ml	E. COLI _____ /100ml
FECAL COLIFORM _____ /100 ml	PLATE COUNT _____ /ml
ANOTHER SAMPLE REQUIRED	
SAMPLE NOT TESTED BECAUSE:	TEST UNSUITABLE BECAUSE:
<input type="checkbox"/> Sample too old	<input type="checkbox"/> Confluent growth
<input type="checkbox"/> Wrong container	<input type="checkbox"/> TNTC
<input type="checkbox"/> Incomplete form	<input type="checkbox"/> Turbid culture
<input type="checkbox"/>	<input type="checkbox"/> Excess debris

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

SEE REVERSE SIDE OF GREEN COPY FOR EXPLANATION OF RESULTS

LAB NO. (7 DIGITS) 08114088	DATE, TIME RECEIVED 12-13-93 11:50	RECEIVED BY PJO
--------------------------------	---------------------------------------	--------------------

LAB NO. (7 DIGITS) 08114089	DATE, TIME RECEIVED 12-13-93 11:50	RECEIVED BY PJO
--------------------------------	---------------------------------------	--------------------

DATE REPORTED 12/14	LABORATORY: 475-
------------------------	---------------------

DATE REPORTED 12/14	LABORATORY: 475-
------------------------	---------------------

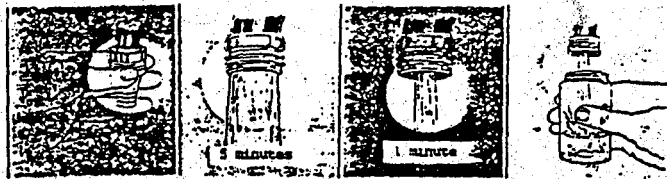
REMARKS
DOH 306-002 (REV. 4/82)

REMARKS

WASHINGTON STATE DEPARTMENT OF HEALTH
NORTHWEST DRINKING WATER SECTION

Preferred Coliform Sample Collection Method

1. Use an inside faucet. Use faucets that have separate hot and cold handles. Bathroom fixtures are a good choice. Avoid swivel taps, such as those found at kitchen sinks.
2. Remove any attachments from the faucet, including aerators, screens, hoses, and water filters.
3. Turn on the cold water only and let it run with a steady stream for at least 5 minutes. This water may be saved in a bucket to be used later. Before collecting the sample turn the water down so that the stream is the width of a pencil, then let the water run 1 minute. A chlorine residual test can be run at this time.
4. When you are ready to take the sample hold the bottle near the bottom and unscrew the cap. Hold onto the cap with your fingers away from the edge, and avoid splashing it as the sample is collected.
5. Hold the bottle under the constant stream of water, being careful not to touch the tap.



6. Fill the bottle to the neck or indicated fill line so that the lab has enough water to run the test, but do not allow it to overflow. You may notice some liquid or powder in the bottle. This is supposed to be there, do not rinse it out.
7. Replace the lid as soon as the bottle is filled and removed from flow.
8. Turn off the water and replace any attachments.
9. Fill out the lab slip, making sure to include your six-digit Washington State ID number, the date, time, and where the sample was collected, who collected it, and whether it is a routine, repeat, or other type of sample. Remember, on repeat samples you also have to list the lab number of the sample with coliforms present and the date it was collected. If there was anything unusual about a sample note it on the form. If the slip is filled out wrong, you may not get credit for the sample.

If you must use an outside tap, additional precautions should be taken.

Other Tips:

- + Do not use a bottle if the cap is not screwed on tightly when you are ready to use it.
- + Do not open the faucet as far as it will go. A very high flow, or sudden changes in water pressure can cause sediment to dislodge and make the sample unusable.



WORKSHEET #1

1 of 2

June - Dec., '93

MATERIALS SURVEY INVESTIGATION RESULTS

PWS ID NUMBER

32300 L

POPULATION SERVED BY PWS

501 - 3,300

PWS			Type of Structure	Location	Contact Person		LSL	Home Plumbing Material	Verified	Volunteered	Selected		Received Training Material
PL	Cu	#			Name	Phone					Routine	Optional	
.001	.10	①	SFR<83	11407 Vashon Island Hwy.	Al Ludwigsen	567-5150	no	COPPER galv. plastic	yes	yes	✓		yes
.002	.25	②	SFR<83	1118 Asta Lane	Larry Higley	567-4368	no	COPPER	yes	yes	✓		yes
.009	.26	③	SFR<83	8002 80 th Pl. SW	Jake Schlumpf	567-4459	no	COPPER galv. plastic	yes	yes	✓		yes
.007	.24	④	SFR<83	11217 107 th Ave., SW	Tony Bacon	567-4233	no	COPPER	yes	yes	✓		yes
.005	.26	⑤	SFR<83	10634 SW Cowan Rd.	Ken Amer	567-5189	no	COPPER	yes	yes	✓		yes
.002	.32	⑥	SFR>82	11037 Patten Lane	Walter Bresch	567-5297	no	COPPER	yes	yes	✓		yes
.002	.42	⑦	SFR>82	11543 Seabreeze Ave. SW	John Bean	567-4372	no	COPPER	yes	yes	✓		yes
.002	.50	⑧	SFR>82	11241 Palisades Ave. SW	Milton Dudley	567-4851	no	COPPER	yes	yes	✓		yes
.005	.13	⑨	SFR>82	8004 Hawthorne Lane	Lyle Harlson	567-4967	no	COPPER	yes	yes	✓		yes
.002	.048	⑩	SFR>82	7917 Hawthorne Lane	Robert Katica	567-4742	no	COPPER	yes	yes	✓		yes
.002	.12	⑪	SFR>82	10044 SW 122 nd Place	Robert Kellum	567-4701	no	COPPER	yes	yes	✓		yes
.002	.091	⑫	SFR<83	10349 SW 110 th St.	Muriel Spalding	567-4879	no	COPPER	yes	yes	✓		yes

Lead & Copper **Monitoring Report** **Appendix B**

System Name: The Heights Water District I.D. # 32300 L

RESULTS OF MONITORING

Sample Number (1)	Date Collected (2)	Location of Sample Site (3)	Source (4)	TIER (5)	Lead (6) (mg/L)	Copper (7) (mg/L)
①	4/13/94	14407 Vashon Highway		3	.003	.14
②	"	11217 107 th Ave. s.w.		3	.004	.10
③	"	10634 s.w. Cowan Rd.		3	.004	.25
④	"	11037 Patten Lane		1	.002	.31
⑤	"	11543 Seabreeze Ave.		1	.002	.56
⑥	"	11124 Palisades Ave.		1	.002	.19
⑦	"	10044 s.w. 122 nd Pl.		1	.003	.26
⑧	"	10349 s.w. 110 th St.		3	.002	.11
⑨	"	9228 s.w. 156 th St.		1	.003	.49
⑩	"	10649 s.w. Cedarhurst		1	.005	.20
⑪	4/21/94	11955 99 th Ave. s.w.		1	.002	.52
⑫	"	11423 99 th Ave. s.w.		1	.002	.051
⑬	"	15638 94 th Ave. s.w.		3	.009	.066
⑭	"	8118 s.w. Van Olinda Rd.		1	.004	.13
⑮	"	7923 Hawthorne Lane		1	.002	.11
⑯	"	8002 80 th Place, s.w.		3	.003	.12
⑰	"	7917 Hawthorne Lane		1	.002	.020
⑱	"	10705 s.w. 110 th St.		3	.002	.010
⑲	"	11117 Asta Lane		3	.010	.011
⑳	"	11118 Asta Lane		3	.011	.35

- Notes:
- (1) The number assigned to the sample by the laboratory
 - (2) Date sample was collected from the tap
 - (3) Address or code for the home. Some water systems have assigned codes to the homes to protect the privacy of residents. When addresses are provided, DOH will make every effort to assure that they are not released as public information. If a water system decides to use codes, it must be able to provide the locations upon request.
 - (4) 1 = Tier 1; 2 = Tier 2; 3 = Tier 3; E = Exception Site; LSL if connected to a lead service line
 - (5) For systems with multiple sources, indicate which source(s) serves each sample location, if clearly defined. Example: if a pressure zone is served directly from a certain well or if portions of the distribution are isolated from the rest of the system. If sources blend such that they are difficult to distinguish, this column may be left blank.
 - (6) Lead analysis result
 - (7) Copper analysis result

Laucks ^{Since} 1908

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

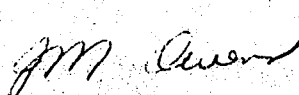
CLIENT : Heights Water Corporation

Certificate of Analysis

Work Order# : 94-04-847

Unless otherwise instructed all samples will be discarded on 06/19/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.


J. M. Owens



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Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corporation
P.O. Box 820
Vashon, WA. 98070-0820

Certificate of Analysis

Work Order# : 94-04-847

DATE RECEIVED : 04/21/94

DATE OF REPORT: 05/06/94

ATTN : Mark E. Tuel

Work ID : Copper / Lead Analysis
Taken By : Client
Transported by: Hand Delivered
Type : Water

SAMPLE IDENTIFICATION:

	<u>Sample Description</u>	<u>Collection Date</u>
01	#11 11955 99th Ave. SW	04/21/94 07:30
02	#12 11423 99th Ave. SW	04/21/94 05:45
03	#13 15638 94th Ave. SW	04/21/94 06:05
04	#14 8118 SW Van Olinda Rd.	04/21/94 06:00
05	#15 7923 Hawthorne Lane	04/21/94 07:30
06	#16 8002 80th Place, SW	04/21/94 07:31
07	#17 7917 Hawthorne Lane	04/21/94 06:15
08	#18 10705 SW 110th St.	04/21/94 06:50
09	#19 11117 Asta Lane	04/21/94 05:30
10	#20 11118 Asta Lane	04/21/94 06:15

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.



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Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corporation

Certificate of Analysis

Work Order # 94-04-847

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.52	0.051	0.066	0.13
Lead (Method 200.8)	mg/L	0.002	0.002 U	0.009	0.004

Analyte	Units	<u>05</u>	<u>06</u>	<u>07</u>	<u>08</u>
Copper (Method 200.8)	mg/L	0.11	0.12	0.020	0.010 U
Lead (Method 200.8)	mg/L	0.002 U	0.003	0.002 U	0.002 U

Analyte	Units	<u>09</u>	<u>10</u>
Copper (Method 200.8)	mg/L	0.011	0.35
Lead (Method 200.8)	mg/L	0.010	0.011



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Laucks ^{Since} 1908

Testing Laboratories, Inc.

940 South Harney St., Seattle, WA 98108 (206) 767-5060 FAX (206) 767-5063

Chemistry, Microbiology, and Technical Services

CLIENT: Heights Water Corporation
P.O. Box 820
Vashon, WA. 98070-0820

ATTN : Mark E. Tuel

Work ID : Lead/Copper Test
Taken By : Client
Transported by: Hand Delivered
Type : Water

Certificate of Analysis

Work Order# : 94-04-539

DATE RECEIVED : 04/13/94

DATE OF REPORT: 04/26/94

SAMPLE IDENTIFICATION:

	<u>Sample</u> <u>Description</u>	<u>Collection</u> <u>Date</u>
01	#1 14407 Vashon Highway	04/13/94 05:00
02	#2 11217 107th Ave. SW	04/13/94 05:30
03	#3 10634 SW Cowan Rd.	04/13/94 06:00
04	#4 11037 Patten Lane	04/13/94 07:30
05	#5 11543 Seabreeze Ave.	04/13/94 08:50
06	#6 11124 Palisades Ave.	04/13/94 07:15
07	#7 10044 SW 122nd Place	04/13/94 06:15
08	#8 10349 SW 110th St.	04/13/94 05:00
09	#9 9228 SW 156th St.	04/13/94 06:08
10	#10 10649 SW Cedarhurst	04/13/94 05:00

FLAGGING:

The flag "U" indicates the analyte of interest was not detected, to the limit of detection indicated.



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Laucks ^{Since} 1908

Testing Laboratories, Inc.

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Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corporation

Certificate of Analysis

Work Order # 94-04-539

TESTS PERFORMED AND RESULTS:

Analyte	Units	<u>01</u>	<u>02</u>	<u>03</u>	<u>04</u>
Copper (Method 200.8)	mg/L	0.14	0.10	0.25	0.31
Lead (Method 200.8)	mg/L	0.003	0.004	0.004	0.002 U

Analyte	Units	<u>05</u>	<u>06</u>	<u>07</u>	<u>08</u>
Copper (Method 200.8)	mg/L	0.56	0.19	0.26	0.11
Lead (Method 200.8)	mg/L	0.002	0.002 U	0.003	0.002 U

Analyte	Units	<u>09</u>	<u>10</u>
Copper (Method 200.8)	mg/L	0.49	0.20
Lead (Method 200.8)	mg/L	0.003	0.005



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Chemistry, Microbiology, and Technical Services

CLIENT : Heights Water Corporation

Certificate of Analysis

Work Order# : 94-04-539

Unless otherwise instructed all samples will be discarded on 06/11/94

Respectfully submitted,
Laucks Testing Laboratories, Inc.

J.M. Owens
J. M. Owens



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APPENDIX H





No. (Revision Three)

	Year 1	Year 2	Year 3	Year 4
1 REVENUES				
2 Water Rates	\$189,420	\$226,320	\$266,220	\$281,520
2a Certificates	\$882,000	\$315,000	\$315,000	\$315,000
3 Fees and Service	\$340	\$340	\$340	\$340
4 Other Revenue	\$1,200	\$1,200	\$1,200	\$1,200
5 TOTAL REVENUES	\$1,072,960	\$542,860	\$582,760	\$598,060
6 EXPENSES				
7 Operation & Maintenance (O&M)				
8 Salaries & Benefits (Operator)	\$48,500	\$50,925	\$53,471	\$56,145
8a O&M Training, Qualification, Licenses	\$2,775	\$2,914	\$3,059	\$3,212
8b Satellite System Management Admin.	\$12,000	\$0	\$0	\$0
8c Disaster Planning (Prevention/Recovery)	\$10,000	\$0	\$0	\$0
8d Emergency Response Planning & Coord.	\$7,000	\$7,350	\$7,718	\$8,103
8e Watershed/Wellhead Protection Plan	\$5,000	\$5,000	\$0	\$0
8f High Risk Site Protection Valving	\$32,000	\$0	\$0	\$0
9 Power & Other Utilities	\$14,500	\$15,225	\$15,986	\$16,786
10 Chemical & Treatment	\$1,200	\$1,260	\$1,323	\$1,389
11 Monitoring	\$2,600	\$2,730	\$2,867	\$3,010
12 Materials, Supplies & Parts	\$18,000	\$18,900	\$19,845	\$20,837
13 Transportation Expenses	\$18,000	\$3,150	\$3,308	\$3,473
14 Miscellaneous Expenses	\$1,500	\$1,575	\$1,654	\$1,736
15 Total O&M	\$173,075	\$109,029	\$109,230	\$114,692
16 General & Administrative Expenses				
17 Salaries & Benefits	\$26,500	\$27,825	\$29,216	\$30,677
17a G&A Training	\$1,800	\$1,890	\$1,985	\$2,084
18 Office Supplies & Postage	\$4,000	\$4,200	\$4,410	\$4,631
18a Office Equipment and Planning	\$5,000	\$5,250	\$5,513	\$5,788
19 Insurance - Liab, Veh, Wk. Comp.	\$6,000	\$6,300	\$6,615	\$6,946
20 Legal & Accounting	\$5,500	\$5,775	\$6,064	\$6,367
21 Engineering & Professional Services	\$5,000	\$5,250	\$5,513	\$5,788
22 Fees (Professional Associations, dues)	\$1,050	\$1,103	\$1,158	\$1,216
23 Miscellaneous Expenses	\$1,700	\$1,785	\$1,874	\$1,968
24 Total General & Admin. Expenses	\$56,550	\$59,378	\$62,346	\$65,464
25 Depreciation Expense	\$0	\$0	\$0	\$0
26 TOTAL EXPENSES	\$229,625	\$168,406	\$171,577	\$180,155
27 Taxes (Property, B & O)	\$5,500	\$5,775	\$6,064	\$6,367
28 Annual Debt Payments - Loans/Bonds (P&I)	\$6,024	\$6,024	\$6,024	\$6,024
29 Total Outstanding Debt - Loans/Bonds (P&I)	\$30,000	\$23,976	\$17,952	\$11,928
30 Capital Improvement Program Expenditures				
31 New CIP Facilities	\$907,750	\$260,750	\$135,750	\$324,750
32 Renewal & Replacement Facilities	\$30,000	\$30,000	\$30,000	\$30,000
33 Safe Drinking Water Act Facilities				
34 Non-Facility Costs				
35 Capital Sources				
36 Loan/Bonds Funds	\$0	\$0	\$0	\$0
37 Grants	\$0	\$0	\$0	\$0
38 Joint contribution	(\$200,000)	(\$50,000)	\$0	\$0
39 Special Charges	(\$168,000)	(\$60,000)	(\$60,000)	(\$60,000)
40 Withdrawal From Existing Reserves	\$0	\$0	\$0	\$0
41 Net CIP	\$569,750	\$180,750	\$105,750	\$294,750
42 Operating Cash Reserve				
43 Minimum Balance	\$28,703	\$21,051	\$21,447	\$22,519
44 Annual Balance	\$6,663	\$4,388	\$396	\$1,072
45 Target Balance	\$16,663	\$21,051	\$21,447	\$22,519
46 Emergency Reserve				
47 Minimum Balance	\$30,000	\$31,500	\$33,075	\$34,729
48 Annual Balance	\$30,000	\$1,500	\$1,575	\$1,654
49 Target Balance	\$30,000	\$31,500	\$33,075	\$34,729
50 Replacement Reserve (Voluntary)				
51 Minimum Balance	\$20,000	\$21,000	\$22,050	\$23,153
52 Annual Balance	\$20,000	\$1,000	\$1,050	\$1,103
53 Target Balance	\$20,000	\$21,000	\$22,050	\$23,153
54 TOTAL REV. REQUIRED	\$867,562	\$367,843	\$292,436	\$491,125
55 BUDGET SURPLUS (DEFICIT)	\$205,398	\$175,017	\$290,324	\$106,935
56 1.5% Annual Median Household Income	\$543	\$543	\$543	\$543
57 Projected Annual Residential Bill	\$259	\$290	\$321	\$320
58 Under (Over) Priced	\$284	\$253	\$222	\$223

No. (Revision Three)

1	REVENUES	Year 5	Year 6
2	Water Rates	\$296,820	\$312,120
2a	Certificates	\$315,000	\$315,000
3	Fees and Service	\$340	\$340
4	Other Revenue	\$1,200	\$1,200
5	TOTAL REVENUES	\$613,360	\$628,660
6	EXPENSES		
7	Operation & Maintenance (O&M)		
8	Salaries & Benefits (Operator)	\$58,952	\$61,900
8a	O&M Training, Qualification, Licenses	\$3,373	\$3,542
8b	Satellite System Management Admin.	\$0	\$0
8c	Disaster Planning (Prevention/Recovery)	\$0	\$0
8d	Emergency Response Planning & Coord.	\$8,509	\$8,934
8e	Watershed/Wellhead Protection Plan	\$0	\$0
8f	High Risk Site Protection Valving	\$0	\$0
9	Power & Other Utilities	\$17,625	\$18,506
10	Chemical & Treatment	\$1,459	\$1,532
11	Monitoring	\$3,160	\$3,318
12	Materials, Supplies & Parts	\$21,879	\$22,973
13	Transportation Expenses	\$3,647	\$3,829
14	Miscellaneous Expenses	\$1,823	\$1,914
15	Total O&M	\$120,426	\$126,448
16	General & Administrative Expenses		
17	Salaries & Benefits	\$32,211	\$33,821
17a	G&A Training	\$2,188	\$2,297
18	Office Supplies & Postage	\$4,862	\$5,105
18a	Office Equipment and Planning	\$6,078	\$6,381
19	Insurance - Liab, Veh, Wk. Comp.	\$7,293	\$7,658
20	Legal & Accounting	\$6,685	\$7,020
21	Engineering & Professional Services	\$6,078	\$6,381
22	Fees (Professional Associations, dues)	\$1,276	\$1,340
23	Miscellaneous Expenses	\$2,066	\$2,170
24	Total General & Admin. Expenses	\$68,737	\$72,174
25	Depreciation Expense	\$0	\$0
26	TOTAL EXPENSES	\$189,163	\$198,621
27	Taxes (Property, E & O)	\$6,685	\$7,020
28	Annual Debt Payments - Loans/Bonds (P&I)	\$6,024	\$2,904
29	Total Outstanding Debt - Loans/Bonds (P&I)	\$5,904	\$2,904
30	Capital Improvement Program Expenditures		
31	New CIP Facilities	\$165,000	\$130,000
32	Renewal & Replacement Facilities	\$30,000	\$30,000
33	Safe Drinking Water Act Facilities		
34	Non-Facility Costs		
35	Capital Sources		
36	Loan/Bonds Funds	\$0	\$0
37	Grants	\$0	\$0
38	Joint contribution	\$0	\$0
39	Special Charges	(\$60,000)	(\$60,000)
40	Withdrawal From Existing Reserves	\$0	\$0
41	Net CIP	\$135,000	\$100,000
42	Operating Cash Reserve		
43	Minimum Balance	\$23,645	\$24,828
44	Annual Balance	\$1,126	\$1,182
45	Target Balance	\$23,645	\$24,828
46	Emergency Reserve		
47	Minimum Balance	\$36,465	\$38,288
48	Annual Balance	\$1,736	\$1,823
49	Target Balance	\$36,465	\$38,288
50	Replacement Reserve (Voluntary)		
51	Minimum Balance	\$24,310	\$25,526
52	Annual Balance	\$1,158	\$1,216
53	Target Balance	\$24,310	\$25,526
54	TOTAL REV. REQUIRED	\$340,892	\$312,766
55	BUDGET SURPLUS (DEFICIT)	\$272,468	\$315,894
56	1.5% Annual Median Household Income	\$543	\$543
57	Projected Annual Residential Bill	\$319	\$318
58	Under (Over) Priced	\$224	\$225

Cell: C11

Comment: Heights Water:

Line 8: Revision Two increased O&M Salaries and Benefits by \$1,500 per year. (\$47K to \$48.5K) Benefits for retirement, medical and dental.

Cell: C12

Comment: Heights Water:

Line 8a: Added in Revision Two. O&M Training, Qualification, and Licenses includes \$75 for license renewals for operators, \$750 for WETRC, \$150 for Evergreen Rural Water Assoc. fees and \$1800 for computer training

Cell: C15

Comment: Heights Water:

Line 8d: \$2,000 per year for program development and management. \$5,000 per year for equipment, supplies, and coordination with government agencies

Cell: B17

Comment: Heights Water:

Line 8f: Added in Revision Three for a one time cost of installing valve protection in 8 locations at \$4,000 each.

Cell: C22

Comment: Heights Water:

Line 13: Year 1 Transportation Expenses include \$15,000 for a replacement service truck (used).

Cell: C26

Comment: Heights Water:

Line 17: Revision Two increased O&M Salaries and Benefits by \$1,500 per year. (\$25K to \$26.5K) Benefits for retirement, medical and dental.

Cell: C27

Comment: Heights Water:

Line 17a: G&A training is \$1,800 per year for computer and office training.

Cell: C31

Comment: Heights Water:

Line 20: Legal and Accounting expense includes \$2,500 retainer for lawyer. Average expense in this category the last six years was \$3,000.

Cell: C33

Comment: Heights Water:

Line 22: Average expense the last six years was \$800. Added \$250 per year for Revision Two.

Cell: B43

Comment: Heights Water:

Line 32: \$20,000 per year allocated for exploration, geology, and source development. Plus \$10,000 per year for source diversification (water rights acquisition and easements).

**Projection of Water Rate Revenue
(Revision Three)**

No.	Description	FORECASTED					
		Year 1	Year 2	Year3	Year4	Year5	Year6
1	Single Residential	700	750	800	850	900	950
2	Meter Charge @ \$/Meter/2 Months	\$41	\$46	\$51	\$51	\$51	\$51
3	CIP Charge \$/ERU/2 months	\$0	\$0	\$0	\$0	\$0	\$0
4	Subtotal Meter Revenue	\$172,200	\$207,000	\$244,800	\$260,100	\$275,400	\$290,700
5	Subtotal CIP Charges	\$0	\$0	\$0	\$0	\$0	\$0
6	Dual Residential and Commercial	20	20	20	20	20	20
7	Meter Charge @ \$/Meter/2 Months	\$82	\$92	\$102	\$102	\$102	\$102
8	CIP Charge \$/ERU/2 months	\$0	\$0	\$0	\$0	\$0	\$0
9	Subtotal Meter Revenue	\$9,840	\$11,040	\$12,240	\$12,240	\$12,240	\$12,240
10	Subtotal CIP Charges	\$0	\$0	\$0	\$0	\$0	\$0
11	Multi-unit	10	10	10	10	10	10
12	Meter Charge @ \$/Meter/2 Months	\$123	\$138	\$153	\$153	\$153	\$153
13	CIP Charge \$/ERU/2 months	\$0	\$0	\$0	\$0	\$0	\$0
14	Subtotal Meter Revenue	\$7,380	\$8,280	\$9,180	\$9,180	\$9,180	\$9,180
15	Subtotal CIP Charges	\$0	\$0	\$0	\$0	\$0	\$0
16	Total Meter Revenue	\$189,420	\$226,320	\$266,220	\$281,520	\$296,820	\$312,120
17	Total CIP Charges	\$0	\$0	\$0	\$0	\$0	\$0
18	Total Revenue (All)	\$189,420	\$226,320	\$266,220	\$281,520	\$296,820	\$312,120
19	Total Number of Service Connections	730	780	830	880	930	980
20	Rate Revenue Per Connection	\$259	\$290	\$321	\$320	\$319	\$318
21	Projected Water Sales (GPD)	616,000	656,000	696,000	736,000	776,000	816,000
22	Commodity Charge @ \$/1000 (N/A)	\$0	\$0	\$0	\$0	\$0	\$0

No.	Average GPD/Connection	Year 1	Year 2	Year3	Year4	Year5	Year6
1	Single Residential	800	800	800	800	800	800
2	Dual Residential and Commercial	1,600	1,600	1,600	1,600	1,600	1,600
3	Multi-unit	2,400	2,400	2,400	2,400	2,400	2,400

No.	Description	Year 1	Year 2	Year3	Year4	Year5	Year6
1	New Members	140	50	50	50	50	50
2	Certificate Cost	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300	\$6,300
3	Subtotal Certificate Revenue	\$882,000	\$315,000	\$315,000	\$315,000	\$315,000	\$315,000
4	Installation/Connection Charge	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200	\$1,200
5	Subtotal Connection Charges	\$168,000	\$60,000	\$60,000	\$60,000	\$60,000	\$60,000
6	Total Projected Revenue	\$1,050,000	\$375,000	\$375,000	\$375,000	\$375,000	\$375,000

Cell: C34

Comment: Heights Water:

Rounded certificate cost to \$6,300 (from \$6,340) for revision three.

Cell: C36

Comment: Heights Water:

Rounded installation/connection charge to \$1,200 (from \$1,205) for revision three.

Capital Improvement Plan
(Revision Three)

Improvement Item	Priority	Project Cost	Year Planned	Revenue Funds	Loan Funds	Grant Funds	Joint Funds	User Charges	Total
Replace South End storage tank (250,000 gallons)	1	\$400,000	Year1	\$400,000					\$400,000
Replace North End elevated tank (250,000 gallons)	1	\$400,000	Year1	\$200,000			\$200,000		\$400,000
Well #4 connection	1	\$15,000	Year1	\$15,000					\$15,000
Meter reading automation (Phase 1)	1	\$21,750	Year1	\$21,750					\$21,750
Main Pump Station Renewal (Piping and valves)	2	\$40,000	Year1	\$40,000					\$40,000
System hydraulic analysis	2	\$6,000	Year1	\$6,000					\$6,000
Portable emergency generator	3	\$25,000	Year1	\$25,000					\$25,000
			Year1 Total	\$707,750	\$0	\$0	\$200,000	\$0	\$907,750
SW 156th Street (Island Manor)	1	\$156,000	Year2	\$106,000			\$50,000		\$156,000
Pressurize North End regulators on 103rd	1	\$20,000	Year2	\$20,000					\$20,000
Meter reading automation (Phase 2)	1	\$21,750	Year2	\$21,750					\$21,750
Cowan Road	2	\$63,000	Year2					\$63,000	\$63,000
			Year2 Total	\$147,750	\$0	\$0	\$50,000	\$63,000	\$260,750
Alternative spring transmission line (Phase 1)	1	\$60,000	Year3	\$60,000					\$60,000
Meter reading automation (Phase 3)	1	\$21,750	Year3	\$21,750					\$21,750
SW 122nd Street west of Cunliffe Road	2	\$12,000	Year3	\$12,000					\$12,000
107th Ave from 112th to Cowan Road	2	\$42,000	Year3					\$42,000	\$42,000
			Year3 Total	\$93,750	\$0	\$0	\$0	\$42,000	\$135,750
Alternative spring transmission line (Phase 2)	1	\$60,000	Year4	\$60,000					\$60,000
Meter reading automation (Phase 4)	1	\$21,750	Year4	\$21,750					\$21,750
SW 110th Street west of 103rd SW	2	\$78,000	Year4	\$78,000					\$78,000
Vashon Highway piping upgrade (Phase 1)	2	\$165,000	Year4	\$165,000					\$165,000
			Year4 Total	\$324,750	\$0	\$0	\$0	\$0	\$324,750
Vashon Highway piping upgrade (Phase 2)	2	\$165,000	Year5	\$165,000					\$165,000
			Year5 Total	\$165,000	\$0	\$0	\$0	\$0	\$165,000
Vashon Highway piping upgrade (Phase 3)	2	\$130,000	Year6	\$130,000					\$130,000
			Year6 Total	\$130,000	\$0	\$0	\$0	\$0	\$130,000
			Grand Total	\$1,569,000	\$0	\$0	\$250,000	\$105,000	\$1,924,000

**Financial Viability Test Summary
(Revision Three)**

Do you have a budget in place, and are rates sufficient Test 1 to cover expenditures?				
No.	Descriptions	Year 1	Year 6	Basis for Calculation
1	REVENUES			
2	Water Rates	\$1,071,420	\$627,120	From Worksheet 1, Lines 2
3	Total Other Revenue	\$1,540	\$1,540	From Worksheet 1, Lines 3+4
4	TOTAL REVENUES (Add 2-4)	\$1,072,960	\$628,660	Should Equal Line 5 Worksheet 1
5	EXPENSES			
6	Total O&M & A&G & Depreciation	\$229,625	\$198,621	From Worksheet 1, Line 26
7	Taxes (property, B & O)	\$5,500	\$7,020	From Worksheet 1, Line 27
8	Annual Debt Payments - Loans/Bonds (P & I)	\$6,024	\$2,904	From Worksheet 1, Line 28
9	Net CIP From Rates	\$569,750	\$100,000	From Worksheet 1, Line 40
10	Operating Cash Reserve (Increase)	\$6,663	\$1,182	From Worksheet 1, Line 43
11	Emergency Reserve (Increase)	\$30,000	\$1,823	From Worksheet 1, Line 47
12	Replacement Reserve (Increase) (Voluntary)	\$20,000	\$1,216	From Worksheet 1, Line 51
13	TOTAL REVENUE REQUIRED (Add Lines 6-12)	\$867,562	\$312,766	Should Equal Line 53 Worksheet 1
14	Required Water Rates (Lines 13 - 3)	(\$205,398)	(\$315,894)	Total Expenses Less Other Revenue
15	Is Line 4 = to or > than Line 13?	Yes	Yes	Yes/No, If No Go Back and Raise Rates or Reduce Expenses

Test 2 Is the Operating Cash Reserve => 1/8 (Annual O&M & G&A)				
16	Current Operating Reserve (beginning of year)	\$10,000	\$23,645	
17	Plus: Budgeted Increase (Line 10)	\$6,663	\$1,182	From Worksheet 1, Line 43
18	Total Operating Cash Reserve (Lines 16&17) (end of year)	\$16,663	\$24,828	From Worksheet 1, Line 44
19	Required Operating Cash Reserve	\$28,703	\$24,828	From Worksheet 1, Line 42
20	Is Line 18 => Line 19?	Yes	Yes	Yes/No, If No Revise Budget

Test 3 Is the Emergency Reserve => Cost of Most Vulnerable Facility (MVF)				
21	Current Emergency Reserve (beginning of year)	\$0	\$36,465	
22	Plus: Budgeted Increase (Line 11)	\$30,000	\$1,823	From Worksheet 1, Line 47
23	Total Emergency Reserve (Lines 21&22) (end of year)	\$30,000	\$38,288	From Worksheet 1, Line 48
24	Required Emergency Reserve (Cost of MVF)	\$30,000	\$38,288	From Worksheet 1, Line 46
25	Is Line 23 => Line 24?	Yes	Yes	For Budget Year 6, Yes/No, If No, Revise Budget

Test 4 Is Cost per ERU => 1.5% Median Household Income				
26	Median Household Income (Appendix E)	\$36,200	\$36,200	
27	Median Household Income X .015 (Line 26 X .015)	\$543	\$543	
28	Cost per ERU (Line 14/31)	\$259	\$318	
29	Is Line 27 => Line 28?	Yes	Yes	Yes/No, If No, DOH suggests system explore restructuring options or revise improvements schedule
30	Median Household Income (Appendix E)	\$36,200	\$36,200	
31	Total Number of Equilavent Residential Units			From Your Customer Records

Heights Water
Income and Expense Statement History

	Period ending	7/31/97	7/31/96	7/31/95	7/31/94	7/31/93	Average
Income							
Water service and sales revenue		\$162,364	\$146,934	\$131,407	\$120,529	\$111,503	\$134,547
Transfer and certification fees		\$350	\$250	\$415	\$450	\$225	\$338
Interest and miscellaneous income		\$1,632	\$719	\$980	\$1,380	\$1,498	\$1,242
Total Income		\$164,346	\$147,903	\$132,802	\$122,359	\$113,226	\$136,127
Expenses							
Accounting		\$5,247	\$2,865	\$2,130	\$0	\$0	\$2,048
Accounting and legal		\$0	\$0	\$0	\$2,067	\$1,950	\$803
Administrative		\$2,923	\$1,054	\$1,007	\$2,156	\$1,140	\$1,656
Benefits - M&O staff		\$946	\$0	\$0	\$0	\$0	\$189
Benefits - Office staff		\$505	\$3,014	\$9,356	\$0	\$0	\$2,575
Chlorination		\$0	\$1,275	\$1,557	\$1,322	\$1,501	\$1,131
Inspections and testing		\$5,294	\$772	\$1,830	\$4,423	\$708	\$2,605
Insurance - Combined categories		\$4,949	\$1,950	\$9,254	\$7,037	\$7,511	\$6,140
Insurance, Medical - M&O staff		\$2,885	\$5,147	\$0	\$0	\$0	\$1,606
Legal		\$0	\$2,768	\$2,090	\$0	\$0	\$972
Maintenance		\$10,145	\$6,692	\$4,143	\$6,204	\$6,982	\$6,833
Office		\$4,105	\$1,285	\$4,555	\$3,815	\$3,015	\$3,355
Payroll costs - Combined categories		\$0	\$8,881	\$4,871	\$0	\$0	\$2,750
Payroll costs - M&O staff		\$3,779	\$0	\$0	\$0	\$0	\$756
Payroll costs - Office staff		\$1,977	\$0	\$0	\$0	\$0	\$395
Power		\$12,400	\$12,313	\$13,493	\$13,012	\$11,141	\$12,472
Repairs		\$9,132	\$4,274	\$6,576	\$11,135	\$22,765	\$10,776
Salaries - Combined categories		\$0	\$53,627	\$46,434	\$38,232	\$37,170	\$35,093
Salaries - M&O staff		\$40,032	\$0	\$0	\$0	\$0	\$8,006
Salaries - Office staff		\$20,892	\$0	\$0	\$0	\$0	\$4,178
Taxes - Business		\$5,463	\$5,940	\$5,095	\$0	\$0	\$3,299
Taxes and fees - Combined		\$0	\$0	\$0	\$8,733	\$9,117	\$3,570
Telephone		\$1,578	\$2,555	\$1,374	\$1,575	\$1,668	\$1,750
Vehicle (Truck)		\$3,898	\$2,619	\$3,086	\$1,999	\$3,016	\$2,924
Waiver fees		\$0	\$0	\$3,639	\$0	\$0	\$728
Total Expenses		\$136,150	\$117,031	\$120,490	\$101,710	\$107,684	\$116,613
Net Operating Income (Loss)		\$28,196	\$30,873	\$12,312	\$20,649	\$5,542	\$19,514
Other (Income) and Expenses							
Billing Software		\$1,600	\$0	\$0	\$0	\$0	\$320
Comprehensive Plan		\$11,249	\$0	\$0	\$0	\$0	\$2,250
Depreciation		\$0	\$15,618	\$15,847	\$13,320	\$13,117	\$11,580
New Service		\$1,649	\$0	\$0	\$0	\$0	\$330
Parking Area		\$5,659	\$0	\$0	\$0	\$0	\$1,132
Patten Palisades Leak		\$2,099	\$0	\$0	\$0	\$0	\$420
Slide Repair		\$4,313	\$0	\$0	\$0	\$0	\$863
Spring Site		\$732	\$0	\$0	\$0	\$0	\$146
Storage Shed		\$1,600	\$0	\$0	\$0	\$0	\$320
System Consultant		\$1,297	\$0	\$0	\$0	\$0	\$259
Well #4		\$27,124	\$0	\$0	\$0	\$0	\$5,425
Total Other (Income) and Expense		\$57,322	\$15,618	\$15,847	\$13,320	\$13,117	\$23,045
Net Income (Loss) Before Tax		(\$29,126)	\$15,255	(\$3,535)	\$7,329	(\$7,575)	(\$3,530)
Net Income (Loss)		(\$29,126)	\$15,255	(\$3,535)	\$7,329	(\$7,575)	(\$3,530)

APPENDIX I





Hedges & Roth Engineering, Inc.

ENGINEERS
PLANNERS
SURVEYORS
AM/FM/GIS

May 18, 1998

King County Utilities Technical Review Committee
King County Department of Natural Resources
700 Fifth Avenue, Suite 2200
Seattle, WA 98104

Attn: Bruce Bennett, Chair

RE: Heights Water 1997 Draft Comprehensive Water System Plan

Dear Mr. Bennett,

Thank you for your response (October 7, 1997) to the Draft Comprehensive Water System Plan. Our response to your issues and questions follows in the order presented in your letter.

Page 2-1

The sentence containing the K.C.C. citation has been removed for both the incorrect citation and its tendency to confuse the issue. Heights does not expect density greater than that allowed by the current zoning.

Page 2-2

The Island is clearly entirely Rural and the typographical error has been corrected.

Page 2-7

We agree that the growth numbers summarized in Table 2-3 should be as inclusive as possible. Many of the new connections are transfers from other systems and do not represent new construction on the Island. Heights intends to serve new customers as quickly as possible, based on water availability and customer demand. It is unclear how the DOE arrived at a number of 75 connections for the Morningside area. Heights is currently contacting residents in this area concerning extension of Heights service into the area and has received commitment from only 12 property owners, less than the minimum of 25 which would make the project economically feasible. Population forecasting includes 30 new connections for the Morningside area, in order to be reasonably inclusive. The change in Table 2-3 necessitates many other changes throughout the Plan, including water supply and storage requirement forecasting, etc.

Page 2-3, 4-3 and Appendix A

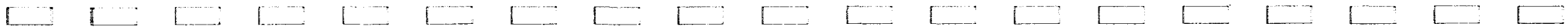
Average Day Demand (ADD) data is shown in the revised Table 2-4. Peak Day Demand can be best estimated from 1997 October/November average usage of 313 gpd per connection, with a peaking factor of 2.5, for an estimated PDD of 782 gpd.

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14450 NE 29th Place, Suite 101, Bellevue, Washington 98007
(425) 869-9448 (800) 835-0292 Fax (425) 869-1190

Bellevue, WA
Wenatchee, WA
Puyallup, WA



Bruce Bennett
Utilities Technical Review Committee
May 18, 1998
Page 2

Table 2-4 has been updated to show 1997 water consumption, revealing per capita usage well below 100 gpd for most months. The statement on Page 4-3 concerning the annual average water usage of 400 gpd per connection was mistakenly drawn from the previous Table 2-4, which, in that version, showed July-August production, clearly the period of greatest water usage, which is actually the point of departure for estimating a PDD figure. This previous number did not represent the average annual consumption or estimated ADD.

Page 2-10

Heights Water has received approval from DOH for a reduction in the 800 gpd supply requirement to 600 gpd. The Plan has been revised to show a 600-gpd requirement. Analysis of the limited historical water use figures supported this reduction in the supply requirement.

Pursuit of additional water sources is partially based on the need to diversify sources for reliability. Currently, all water is derived from a small area of the larger Vashon aquifer. Providing new well or spring sources, primarily near the south end of the system, will provide for increased reliability and a possible reduction in pumping costs from a new source. A new tank is proposed near the south end of the system and a future source nearby would be ideal.

Page 2-12 and 4-3

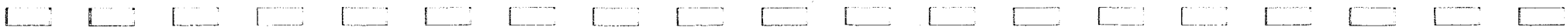
Heights keeps detailed records on all aspects of production, distribution and sale of water. From these figures unaccounted-for water is determined. Heights has budgeted for a leak detection program in year one of its CIP. Current water loss is approximately 22%. Heights plans to replace virtually all of its primary distribution mains over the next six years, with the long-term goal of reducing water loss to 10% or less.

Specific actions to be taken during a water shortage include a variety of public contact methods. The system office is located on the main Vashon Highway and a signboard is used to notify passers-by, many of whom are Heights customers. The local newspaper, The Beachcomber, regularly publishes articles concerning the state of the weather, water issues and conservation-related stories. Heights and the other water purveyors would, per their current policy, contact the paper to request notices and calls for conservation to be published. Direct mailings and telephone contact with system customers would be the next level of response.

In the event of a catastrophic failure of some sort, limited to the Heights system and not affecting District 19, for example a tank collapse or other disaster, the intertie with District 19 would be opened, if necessary, and water pumped to the Heights system.

Page 7-8

While the capital program is ambitious, Heights will receive a loan from the Drinking Water State Revolving Fund (DWSRF) for much of the work. Heights has also recently started providing new water shares, as a result of the reduction in the supply requirement from 800 gpd to 600 gpd, as well as the approval of both the spring water right increase and the approval of the new well. These shares are available at \$7500, greatly increasing working capital. As a condition of receiving the DWSRF funds, Heights will have to undertake the hydraulic analysis, so the priority of the analysis has been increased to Priority 1.



Bruce Bennett
Utilities Technical Review Committee
May 18, 1998
Page 3

Development of Well 4 is complete and has increased the available source for the system by 42 gpm. Completion of the well provides a distinct increase in reliability, as all other sources are located far down the hill and away from the storage tanks.

The limited improvements undertaken since the last plan is the result of the lack of funds available to the system. No new water connections have been allowed since 1991. Heights is currently evaluating its entire financial structure, including funding mechanisms for the CIP. Note that many of the items to be completed, for example Nos. 3,4,8 and 11, are entirely funded by the customers served by the improvement. Heights has applied for low-interest loans through the Drinking Water State Revolving Fund (DWSRF), which was set up by the State in response to the Safe Drinking Water Act and Bob James of DOH has stated that they will receive this loan, partly contingent on completing a hydraulic analysis.

The Vashon-Maury Island Ground Water Management Plan (VMIGWMP) is now referenced in the Plan. The VMIGWMP is consistent with the goals of the Heights Plan; protection and conservation of the limited ground water supply on Vashon Island. Since Heights does not plan to promote increased density in its planning area, the Plan is also consistent with other Plans which cover the area. It is possible that Heights could have increased administrative duties if the VMIGWMP is adopted, since additional information and fees may have to be collected and disseminated.

These responses have been incorporated into the Plan, in the form of either direct changes or additions to clarify issues. Thank you for your input.

Very truly yours,

HEDGES & ROTH ENGINEERING, INC.
Bellevue Office



Scott Goss
Designer

cc: Heights Water, Reed Fitzpatrick
DOH, Stacy Patterson



Hedges & Roth Engineering, Inc.

ENGINEERS
PLANNERS
SURVEYORS
AM/FM/GIS

May 18, 1998

Washington State Dept. of Health
1511 Third Avenue, Suite 719
Seattle, WA 98101-1632

Attn: Stacy Patterson

RE: Heights Water Comprehensive Plan
Submittal No. 97-0919

Dear Ms. Patterson,

Thank you for your comments (January 5, 1997) on the Heights Water Draft Comprehensive Water System Plan. Our response to your comments and questions follows in the order presented in your letter.

Introduction

1. Heights is currently pursuing a formal intertie agreement with Water District 19. Heights has sent a draft intertie agreement to District 19, which is currently reviewing and drafting a response to this agreement.

Planning Considerations

2. The 1997 connections were actually 590, with an additional 22 ERUs for commercial or larger services, for a total of 612 ERUs. This math error has been corrected throughout the Plan and the necessary tables revised.
3. Heights is currently planning for extension of service to the Morningside area. A minimum of 25 connections are necessary to make the project economically feasible. Only 12 residents have committed to the project so far. For planning purposes, 30 future connections are used in the growth forecasts. Service to this area is included in the projections in Table 2-3; see the notes under the table.
4. Tables 2-6 and 2-7, as well as many other tables have been revised as a result of DOH approval of the Well 4. This increased capacity has been included in all of the capacity and storage calculations, and is explained in the notes for each table.
5. The moratorium on new services has been lifted and the Plan revised to show this condition.

Existing Water System

6. DOE has verbally issued a water right for Well 4. The DOE office has stated that, due to a huge backlog, it may be several years before they actually mail out the piece of paper.
7. The Plan has been revised to clarify that the water rights issued to Wells 1, 2 and 3 are supplemental to the water rights for the springs. This is further clarified in the DOE Report of Examination in Appendix A.

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14450 NE 29th Place, Suite 101, Bellevue, Washington 98007
(425) 869-9448 (800) 835-0292 Fax (425) 869-1190

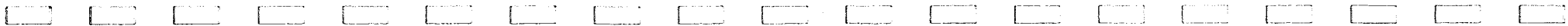
Bellevue, WA
Wenatchee, WA
Puyallup, WA



8. In fact, all three listed pumping scenarios exceed 184 gpm and were shown only as possibilities. These scenarios have been removed from Figure 9, since the system does not actually operate in this manner.
9. DOE has issued an increase in the spring water rights to a total of 0.41 cfs, or 184 gpm. A copy of this water right is included in Appendix A.
10. Chapter Three, Existing Water System, has been revised to more fully explain the main distribution station pumping capacities, arrangements and logic. The configuration of the distribution station is relatively complex, since it has developed over many years. With the existing manifold configuration, any pump can be used to pump to either the north or the south, therefore the pump capacities listed in Chapter Three apply to both the north and south, although the pumping rates may vary slightly in relation to the head against which they are pumping.
11. Chapter Three has been revised to indicate the overflow elevations of the two elevated tanks and the HGL for the South System. The South System target operating pressure is 70-75 psi at the distribution station, making the HGL approximately 537 feet.
12. Chapter Three has been revised to describe the connections at the south tank and the isolation of the south system from the southeast system. One fill pipe leads into the south elevated tank. A separate pipe leads out of the tank to the Southeast system. This outlet pipe is connected to the fill pipe and includes a check valve so that the pressure from the pump filling the tank holds the check valve closed. Should the pump fail, the pressure on the downstream side of the check valve would drop, opening the valve and allowing water to flow out of the tank through both the main Southeast outlet and also back to the fill pipe, which is connected to the distribution piping for the South system. A detail of this arrangement can be seen on sheet two of the system map, included in the Coliform Monitoring Plan. A float valve keeps the tank filled and near-constant demand keeps the check valve closed.
13. The ERUs are distributed as follows: North = 419; South = 158; and Southeast = 35, for a total of 612.
14. A hydraulic analysis will be conducted as a Priority 1 item after the Water System Plan is approved and before the system can receive any funding from the DWSRF. Money is included in the budget for this analysis.
15. The issue of provision of fire flow will be examined in the hydraulic analysis and the costs and benefits also discussed with the membership in the next annual budget analysis.

Operations

16. The peak day demand and average water use information has been greatly revised to reflect more data.
17. A conservation goal of an additional 4% reduction in the next six years is listed in Table 4-1. This is a goal consistent with the 6% over nine years outlined in the Vashon Coordinated Water System Plan. Heights does track both quantities produced and quantities sold. The current quantity of unaccounted-for water is approximately 22%. Estimating water savings over the last seven years requires applying a subjective upper limit on the possible usage of water in the absence of effective conservation. Table 4-1 illustrates a theoretical upper limit on the water saved over these periods, but this is based on consumption up to the production requirement and does not realistically measure conserved water. Heights customers have a long history of



- successful water conservation and Heights will continue to provide customers with literature and guidance in conservation to maintain good practices while also attempting to find distribution system and customer leaks and convince more people to conserve.
18. The cross-connection control program is currently in development and a questionnaire has been sent out to Heights customers in an attempt to identify potential sources of contamination. Once identified, the customer will be required to install a specified DOH-approved device. Initial and annual testing of CCC devices will be conducted by A-1 Fire Equipment (12249 - 8th Street South, Seattle, WA 98168). Failure of the customer to comply with CCC requirements will result in cessation of water service until compliance is demonstrated. Each customer will have to sign a document outlining the policies and acknowledges their responsibility.
 19. The system has a portable generator to run the chlorination equipment at the spring pumps. This generator would be used in conjunction with the auxiliary pump to supply the system with chlorinated water.
 20. Heights has prepared a new Coliform Monitoring Plan, which is included in Appendix F. This new Coliform Monitoring Plan still uses blowoffs and PRV stations as four of the six collection sites. In order to comply with your recommendations, Heights will be phasing in new self-contained sampling stations over the next year.

Financial Program

21. Heights has completed the financial viability test and it is now included as Appendix H.

System requirements and Improvements

22. Heights is working with Kato and Warren Engineers on a Watershed Control Program. Completion time for this program is currently unknown, but Heights expects it to be after approval of the Water System Plan.
23. Heights is not actively offering satellite management services to small systems within their service area. Their current policy is to evaluate any incoming request for such services on a case-by-case basis. Any satellite management costs would be borne by the small system receiving such services.

Relationship with Other Plans

24. A copy of the response to the UTRC letter is included as an attachment to this letter. No response was received from either DOE or Water District No. 19.

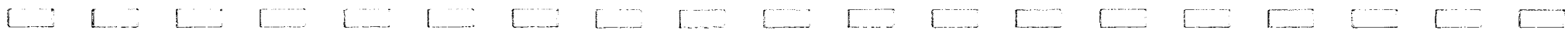
Very truly yours,

HEDGES & ROTH ENGINEERING, INC.
Bellevue Office



Scott Goss
Designer

cc: Heights Water
UTRC, Bruce Bennett





**King County
Water and Land Resources Division**

Department of Natural Resources
700 Fifth Avenue, Suite 2200
Seattle, WA 98104
(206) 296-6519
(206) 296-0192 FAX

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OCT 10 1997

REGGES & ROTH ENGINEERING, INC.
BELLEVUE, WA

October 7, 1997

Reed Fitzpatrick, President
Heights Water
P.O. Box 820
Vashon, WA 98070

Dear Mr. Fitzpatrick:

Thank you for sending me the 1997 comprehensive water system plan for Heights Water. I have completed my preliminary review and have found, in general, that the plan is thorough and well prepared. I have several comments that should be addressed prior to review of this plan by the King County Utilities Technical Review Committee.

Page 2-1

The discussion concerning the RA-2.5 zoning designation contains a cite for K.C.C. 21A.12.080(B)(20). This cite is incorrect. What is the purpose of the discussion concerning RA-2.5 zoning – are you expecting more or less development than the zoned capacity would indicate?

Page 2-2

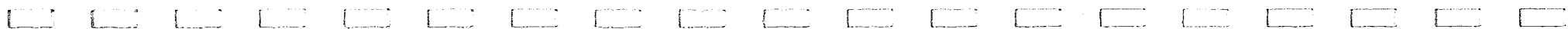
There is a typographical error in the first sentence of the last paragraph. Heights Water, and all of Vashon, are zoned Rural.

Page 2-7

Table 2-3 indicates that the total number of connections anticipated by 2017 is 700. If the existing connections, including North Vashon, are added to the 60 customers waiting to be connected to Heights Water and the 75 connections in the Morningside system, there are a total of 725 connections. Does the planning information in Table 2-3 indicate that Heights water is not intending to serve the Morningside system until after 2017? If so, why? Shouldn't the 2017 number of connections be as inclusive as possible?

Pages 2-9, 4-3, and Appendix A

Table 2-4 gives historical demand projections during July and August for the past five years. Although this peak month information is useful, it does not address either average day demand or peak day demand, both critical numbers in water supply planning. The Washington State Department of Ecology (DOE) report in Appendix A states that Heights Water has a per capita usage of less than 100 gpd, yet the plan states that historical water usage figures are not



Reed Fitzpatrick
October 7, 1997
Page Two

recorded. On page 4-3 it is stated that the 1996 average water use was 400 gpd/connection. This number is extremely high. If all customers are metered and customer bills show consumption history, as stated in the DOE report, why doesn't the plan show average day and peak day demand? If data are not available, what are the best estimates of average day and peak day demand? Is the 400 gpd/connection value valid?

Page 2-10

The demand forecast given in Table 2-5 is based on an assumption of water use equal to 800 gpd/connection. Although this Washington State Department of Health planning assumption may be useful in some cases, in general it is much too high to reflect actual water usage. It is interesting to note that if a water use of 500 gpd/connection (9% greater than the highest peak month usage during the past five years) is used to project demand, no addition water supplies are needed until after 2017. In fact, 804 connections could be made with the existing water supply assuming a water use of 500 gpd/connection. This number of connections would be sufficient to account for all of the existing connections, including North Vashon, the 60 customers waiting to be connected to Heights Water, and the 75 connections in the Morningside system. Why does Heights Water believe it is necessary to obtain more water rights?

Pages 2-12 and 4-3

The Water Shortage Response and Conservation sections need improvement. Aside from distributing educational materials and watching for obvious leaks, what has been done to promote conservation? How much water has been conserved? King County established a conservation goal for Vashon Island of 4% by 1996 (relative to 1991) and 6% by 2000 (relative to 1991). Is Heights Water meeting these goals? What specific actions will be taken if a water shortage occurs?

Page 7-8

The capital program identified is fairly ambitious. How will it be paid for? Why is the hydraulic analysis given a priority of 2? Shouldn't that analysis drive the capital program? Why is well development given a priority of 1 when the water isn't needed? On page 3-10 it is stated that only marginal system improvements have been achieved since 1992. Why? Is this problem anticipated to occur with the newly-proposed capital plan?

The plan does not mention the Vashon-Maury Island Ground Water Management Plan that has been developed for the island and is currently being reviewed by the Metropolitan King County Council. What effect would adoption of the Ground Water Management Plan have on Heights Water?

Reed Fitzpatrick
October 7, 1997
Page Three

I would be happy to discuss any of these comments with you. Contact me at (206) 296-1952 with any questions you may have. Please address my comments in the next draft of the plan and send 8 copies to my attention for distribution to the UTRC.

Sincerely,



Bruce Bennett, Chair
King County Utilities Technical Review Committee

cc: Scott Goss, Hedges and Roth Engineering
Stacy Patterson, Washington State Department of Health
Bill Eckel, Manager, Regional Water Resources Services Unit



STATE OF WASHINGTON
DEPARTMENT OF HEALTH
1511 Third Ave., Suite 719 • Seattle, Washington 98101-1632

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JAN 7 1998

WEDGES GROUP ENGINEERING, INC.
BELLEVUE, WA

January 5, 1997

MR. REED FITZPATRICK
HEIGHTS WATER
PO BOX 820
VASHON WA 98070

Subject: Heights Water
King County
Water System Plan
Submittal No. 97-0919

Dear Mr. Fitzpatrick:

Thank you for the Heights Water System Plan (WSP) received in this office on September 29, 1997. We have completed our review and ask that the following comments be addressed in a subsequent submittal of the plan. These comments must be adequately addressed before final approval.

Introduction

1. We recommend the system pursue a formal intertie agreement with King County Water District No. 19 for the emergency intertie. However, at the very least the WSP should state the conditions, limitations, quantity, and location pertaining to the use of this intertie.

Planning Considerations

2. Page 2-3 indicates that the system has 16 ERUs which when added to the existing 584 connections, does not total 606. Are there instead 22 ERUs? Please correct this page and table 2-3 if necessary.
3. Page 2-6 discusses the Morningside system which appears to have 5 connections. Is service to this system accounted for in table 2-3? Please explain how Heights will proceed with the possibility of serving this system.

Heights Water System

January 5, 1998

Page 2

4. Tables 2-6 and 2-7 do not appear to include the production capacity of Well 4 in determining the future standby storage requirements of the system. Please review these tables and clarify the source capacity of the system with Wells 1, 2, & 3 out of service. It is our understanding that the production capacity of the springs and Well 4 without Wells 1, 2, & 3 in service is 226 gpm.
5. As indicated by table 2-5 of the revised submittal of Chapter 2, the Heights system has enough capacity to lift its moratorium and provide for all requests for service through 2017. Please clearly state this in the revised plan and correct the statement on page 1-1 which indicates that the system is in moratorium.

Existing Water System

6. The plan (page 3-2) indicates that DOE has yet to issue a water right for Well 4. It is our understanding that the right has been issued. If this is correct then the plan should indicate that water rights have been obtained and copies of the water rights should be included in the appropriate appendix.
7. The plan (page 3-2) should clarify that the water rights issued to Wells 1, 2, & 3 are supplemental to the 217 acre-feet/year of primary rights previously issued to the springs.
8. Page 3-3 indicates that the source clearwell pumping capacity is 184 gpm while page 3-4 could suggest that all three pumps could potentially produce as much as 352 gpm. Figure 9 identifies several pumping scenarios which exceed 184 gpm. Please clarify.
9. The plan indicates that the spring source currently has a water right limitation of 135 gpm. How does this restriction impact your ability to pump out of the source clearwell and should 135 gpm be used in your standby storage calculation?
10. Please describe the main distribution pump station in more detail. What is the pumping capacity in gpm for each pump to both the North and the South systems? How are the pumps controlled? How is it decided which pumps should serve the North system and which pumps should serve the South system?
11. Please identify the overflow elevations of the two elevated storage tanks and indicate the HGL of the South system under normal conditions.

Heights Water System

January 5, 1998

Page 3

12. Please describe how the Southeast system is isolated from the South system. Is the 10,000 gallon elevated tank connected to the South system with an altitude valve? Is the check valve described on page 3-6 actually located on the outlet of the 10,000 gallon tank? If an altitude valve is used to keep the 10,000 gallon tank full is there a loss of pressure in the area when this tank is being filled?
13. Please indicate the number of ERUs which are located respectively in the North, South, and Southeast portions of the distribution system.
14. A hydraulic analysis should be conducted of the distribution system to support extensions of water service to new customers and a water system main replacement program as well as to evaluate the pros and cons of the proposed intertie and joint storage facility with King County Water District No. 19.
15. It is recognized that fire flow is not required in rural areas. How does the community feel about the provision of fire flow? Has this issue been discussed at an annual meeting or in a newsletter format?

Operations

16. The 1996 average water use described in the Conservation section should be described as July through August average day demand and should not be compared with our peak day demand criteria.
17. Although the Heights has achieved success with its conservation program, it is still necessary for the plan to establish a new conservation goal for the next six years. The Vashon Coordinated Water System Plan established a goal of 6% by the year 2000 using 1991 as the base year. Does the system track water that is unaccounted for? How much water has been saved over the past seven years as a result of the system's conservation efforts? Please indicate a target savings percentage and specifically list the measures that will be taken to achieve it over the next six years.
18. The cross-connection control program must include operating policies, installation practices, testing procedures, and enforcement authority. Does the utility have a list of installed cross-connection control devices? Does the utility ensure that these devices are tested annually? Does the water utility have any enforcement authority?

19. The provision of emergency power to operate the system's chlorination equipment during a power outage must be a high priority.
20. We do not recommend collecting coliform water samples from either blow-offs or PRV vaults. In addition the coliform Monitoring Plan should contain all the information identified in WAC 246-290-300(2)(b). Please review the enclosed guidance to assist in the preparation of a Coliform Monitoring Plan.

Financial Program

21. A complete financial viability test must be submitted with the final plan. Please see the enclosed Financial Viability Manual. This manual may have already been completed as a part of the State Revolving Fund application process. The five worksheets from the manual must be included in the plan with emphasis on the availability of both operating cash and emergency reserves.

System Requirements and Improvements

22. Although the plan addresses some watershed control and wellhead protection elements, a complete source protection program must be submitted with the final plan. We recommend that the Heights develop a Watershed Control Program. Please see pages 38-45 in the enclosed *Water System Planning Handbook* for guidance.
23. Has the district decided what type of satellite management services it would like to offer? Please describe the policies and conditions surrounding the operation and maintenance of small systems if any have been developed.

Relationship with Other plans

24. Please address any comments received from the county and from adjacent purveyors.

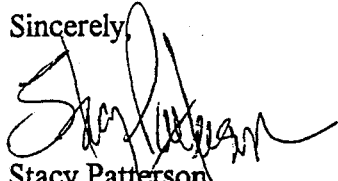
I hope you have found these comments to be clear and constructive. Please submit the updated WSP on or before April 5, 1998. In order to expedite the review of your revised submittal, please include a cover letter summarizing how each of the above comments was addressed in the updated plan and where each response is located (i.e., page numbers, Appendices, etc.). Please note that we are enclosing an invoice for \$1,754.00 for the WSP review. This fee covers our cost for the current review, and the review of one

Heights Water System
January 5, 1998
Page 5

revised WSP. If additional revisions are required, an additional fee will be assessed to cover review costs.

If you have any questions, please contact me at (206) 464-7591, or Bob James at (206) 464-7671.

Sincerely,



Stacy Patterson
Regional Planner
NW Drinking Water Operations

enclosure

cc: Bob James, DOH
Scott Goss, Hedges and Roth Engineering, Inc.
Kurt Horner, Seattle/King County Department of Health

