9.1 WATER DEPARTMENT GENERAL INFORMATION

The Water Departments current mailing address and phone number is as follows:

City of Kent Water Department Mailing Address:	220 4th Avenue South Kent, Washington 98032-5895 Phone: (253) 856-5600 Fax: (253) 856-6600
City of Kent Water Department's Site Address:	City of Kent Water Department 5821 South 240th Kent, Washington 98032-5895
State Department of Health Identification Number:	381501
State Department of Health Contact Person:	Ms. Paige Igoe, P.E. State Department of Health 20435 72nd Ave South Suite 200, K17-12 Kent, WA 98032-2358 (253) 395-6750

State Department of Health after business hours hotline: 1 (877) 481-4901
(Weekends, Evenings, Holidays)

9.2 WATER SYSTEM ORGANIZATION, MANAGEMENT, AND PERSONNEL

The City of Kent is a municipality organized with an elected mayor/council type of government. Overall City management, including Public Works, is provided by a City Operations Manager who acts under the direction of the Mayor/City Council. The Public Works Director manages the entire Public Works Department, including an Engineering Division which provides support to all of the Public Works Divisions. A Public Works Operations Manager oversees the operation of the Public Works Maintenance Division, which includes the Water Department. The Water system is operated and maintained under the direct supervision of a Water Superintendent, who holds the Water Distribution Manager 4 certification required by the Washington State Department of Health (DOH).

The Water Superintendent and Public Works Operations Manager handle the routine management decisions for the Water Department. The Public Works Director is involved with all decisions of a significant nature, including the planning for future needs. All major policy decisions and capital requests are reviewed and approved by the Mayor/City Council/Operations Manager. The following paragraphs identify functions in the City of Kent Water Department and an asterisk (*) denotes specifically qualified and licensed/certified personnel necessary for water system operation in accordance with the requirements of the State Department of Health. Figure 9-1 presents an organizational chart of the internal organization of the Water Department.

Normal Day to Day Operations

Management, supervision, and direction is provided by the Water Superintendent*. The Field Supervisors implement and follow through on the planned schedules for operation and maintenance of the water system, and also implement emergency repairs under the direction of the Water Superintendent. Routine repair needs are often requested or reported by customers or citizens of Kent, by meter reader personnel, or by other City staff; and are prioritized and merged with the work schedules by the Field Supervisors* for their specific areas of responsibility. The Water Superintendent is required to hold a State of Washington Water Distribution Manager 4 certification.

9.2.2 Preventative Maintenance

Weekly work schedules and personnel assignments are prepared by the Field Supervisors and reviewed with the Water Superintendent. Ongoing preventative maintenance programs are continuously improved upon by the field personnel, along with new programs, under the direction of the Field Supervisors and the Water Superintendent. An Infrastructure Management System (Hansen software) is used to track system component inventory, record maintenance history, and produce preventative maintenance work schedules for the water system infrastructure.

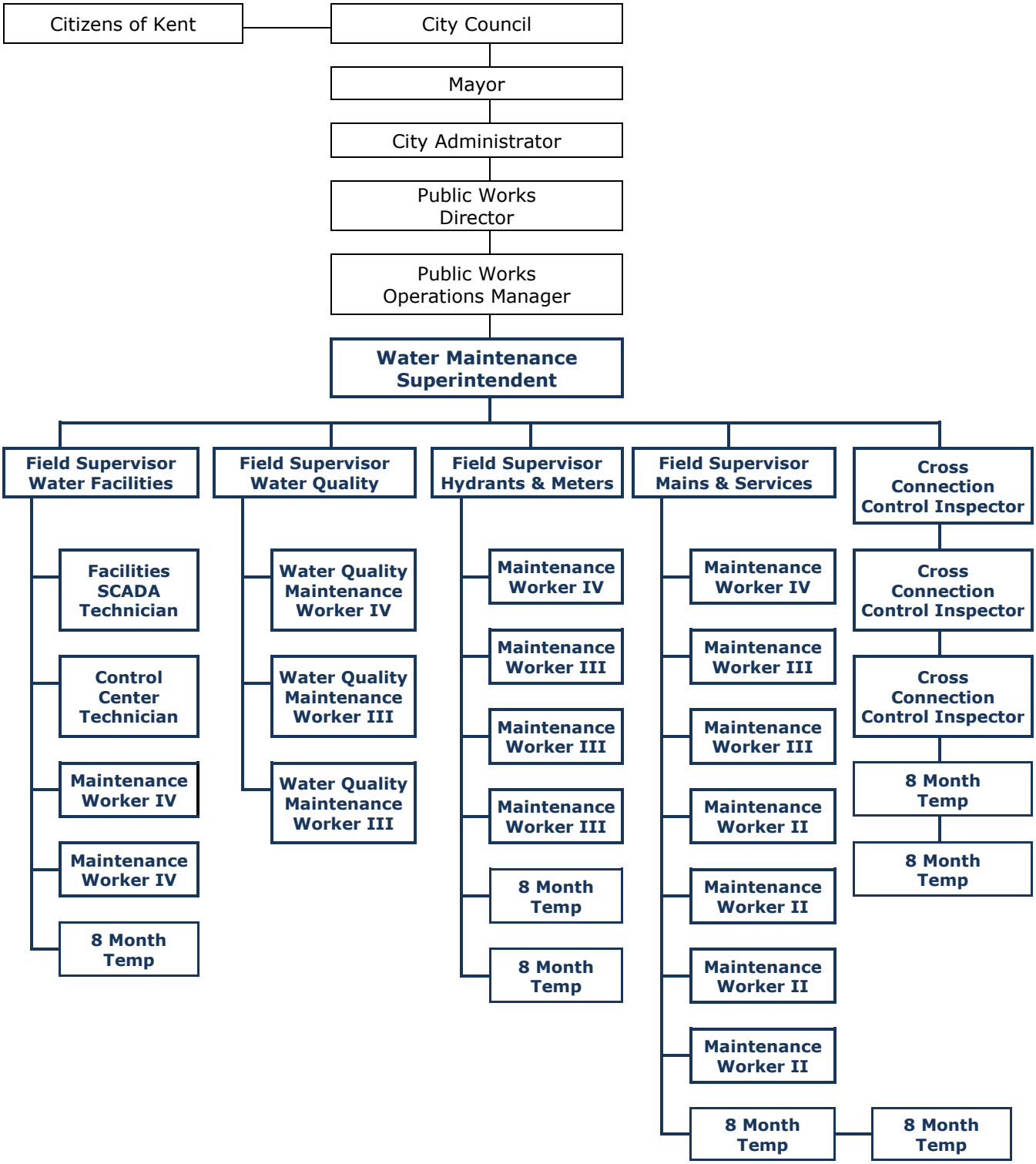
9.2.3 Field Engineering

Three technical groups support the engineering needs of the water system. The general areas of responsibility are identified below and are shown with the group which normally handles the work in that area.

9.2.3.1 Consultant Engineers*

Consulting Engineers are typically retained to perform specialized studies related to the water system, such as this Water System Plan. They are also often retained for specialized design, planning and construction needs; such as water quality studies and system planning, water storage reservoirs, treatment systems, pump stations, hydraulic analyses, and structural improvements. Consulting Engineers are considered Engineer of Record on many of the City's projects and as such are required to be registered as Professional Engineers in the State of Washington in the specific engineering application that is required for a given project.

FIGURE 9-1
CITY OF KENT WATER DEPARTMENT ORGANIZATION CHART



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9.2.3.2 Public Works Operations Engineers*

The City of Kent's Public Works Operations Engineers are typically registered Professional Engineers. These individuals are typically responsible for specialized projects and smaller design and construction needs that do not require assistance from outside consultants. These include completion of water treatment and distribution project management, water system construction standards, construction Plan review, GIS conversion/ implementation, water system planning and capital project coordination.

9.2.3.3 Public Works Engineering*

Employees of the Public Works Engineering group normally design and manage distribution water system projects, manage developer improvements to the water system, water tank painting and structural improvements, water main replacements, and construction standards. A variety of certifications are applicable to this category of Public Works staff, primarily registered Professional Engineers.

9.2.4 Water Quality Monitoring

Daily system monitoring of water quality and the required water system monitoring is performed by the Water Quality Division Staff of the Water Department, under the direction of the Water Superintendent, a WDM 4 – in compliance with DOH requirements. Water treatment plant operation is performed by WTPO-2 certified personnel*, as required by DOH, under the direction of the Water Superintendent. In-house staff performs most routine water analysis functions daily, and a State certified contract lab is used for compliance monitoring requirements.

9.2.5 Emergency Response

The following paragraphs provide a brief overview of the key staff responsible for emergency response as it related to the water system. The City of Kent maintains a comprehensive City-wide emergency response plan that is used in the event of an emergency. The emergency contact list is located in the Water Facilities Control Center at 5821 S. 240th Street Kent, WA 98032 Additional information of the basic elements of that Plan is provided later in this chapter. The water system emergency response program itself is classified as a confidential document due to the critical nature of maintaining water system security as a matter of practicality, and in accordance with the Homeland Security Act.

9.2.5.1 After Hours Emergency Personnel

The Water Superintendent is on call at all times, available by pager or telephone 24 hours a day. Kent's Police Department maintains callout lists of

all water department personnel, and procedures for contacting them during emergencies or for customer complaints. Two water department personnel are normally on 24 hour stand-by duty, with pagers and a city vehicle available for use after hours, on weekends during the higher demand months and on holidays.

9.2.5.2 Normal Working Hours Emergency Personnel

Most emergencies during normal working hours are routed through the Control Center for prioritization and dispatch to field crews. The Control Center monitors the Master SCADA terminal and monitors the water system operation, under the direction of the Water Superintendent. Major City Emergencies are managed by the City Emergency Operations Committee (EOC), and the Kent Fire Department, coordinated with the Water Department and other utilities through the Control Center and the Public Works DOC.

9.2.6 Cross Connection Control Personnel

The City's Cross Connection Control (CCC) program is managed by a designated Cross Connection Control inspector * (CCS-1) under the supervision of the Water Superintendent (see section 6 of this chapter for a description of the CCC program). All Water Department personnel classified as Maintenance Worker 3 and above are required to be CCS-1 certified to assist with water system protection and implementation of the program.

9.2.7 Implementation of the Improvement Program

Improvements are jointly planned, budgeted, and prioritized by personnel of the Engineering and Operations divisions of the Public Works Department. Once developed, the annual budget is submitted to the Public Works Department for review and approval and to the Mayor and City Council for adoption. Overall implementation is the responsibility of the Public Works Director or designee, who assigns specific elements thereof to the City Engineer or Operations Manager.

9.2.8 Budget Formulation

Field crews and Field Supervisors prepare and submit operating budget and capital budget requests to the Water Superintendent, who prioritizes requests and adds capital improvements, reviews them with the Public Works Operations Manager, and submits them to the Public Works Director for review and approval. Final approval is given by the City Operations Manager / Mayor / City Council. The Water Department rate structure and debt service is managed by the Public Works Director and staff as well as the City Finance Department.

9.2.9 Response to Complaints

Complaints are recorded by office staff and routed to the Water Superintendent or Field Supervisors / Control Center for follow up or crew dispatch in a timely manner. Follow up results are reviewed by the Water Superintendent and recorded by office staff. An Infrastructure Management System Customer Service module has been implemented to provide better complaint tracking and more effective response.

9.2.10 Public / Press Contact

All press related releases, related to the Water System, are generally routed to the Water Superintendent, reviewed with the Public Works Operations Manager and the Public Works Director.

9.2.11 Billing

Water customers billing and meter reading is managed by the Utility Billing division of the Finance Department.

9.3 PERSONNEL CERTIFICATIONS

The State Department of Health requires State certifications for individuals responsible for certain aspects of water system management and operation. The City of Kent associates State certifications with specific job classifications as follows:

- Water System Management – Water Distribution Manager 4
- Water Treatment Plant Supervision – WTPO2
- Water Treatment Plant Operation-WTPO - 1
- Cross Connection Control Program – CCS-1

The City has on staff the personnel to meet or exceed those requirements and requires State DOH certification of all tenured water operations and maintenance personnel. This is achieved by sponsoring personnel attendance at appropriate safety and technical seminars to encourage advancements as well as compliance with the professional growth required. Table 9-1 provides a listing of current certifications held by City staff members, and those required by DOH for this water system as indicated by a *.

TABLE 9-1: EMPLOYEE CERTIFICATION
CITY OF KENT WATER DEPARTMENT

Certification	Number of Certified Personnel
BAT - Backflow Assembly Tester	2
*CCS 1- Cross Connection Specialist 1	23
WTMIT – Water Distribution Manager In Training	8
WDM1 - Water Distribution Manager 1	13
WDM2 - Water Distribution Manager 2	13
WDM3 - Water Distribution Manager 3	7
*WDM4 - Water Distribution Manager 4	1
WDS - Water Distribution Specialist	9
WDSIT - Water Distribution Specialist In Training	3
WDS1 - Water Distribution Specialist 1	2
WDS2 - Water Distribution Specialist 2	3
WTPOIT - Water Treatment Plant Operator In Training	11
*WTPO1 - Water Treatment Plant Operator 1	7
*WTPO2 - Water Treatment Plant Operator 2	3
WTPO3 - Water Treatment Plant Operator 3	3
WTPO4 - Water Treatment Plant Operator 4	1

9.4 SAFETY PROCEDURES

Employees of the Kent Water Department adhere to all relevant OSHA/WISHA safety requirements, and follow procedures that meet or exceed those requirements. i.e., lock out/tag out for pump station repairs and maintenance. Regular training of employees during safety meetings and tailgate meetings ensures that all employees are reminded of current safety policies and procedures.

Areas of potential work place hazards which have been identified by the Water Department personnel are:

- Confined Space hazards – primarily atmospheric or oxygen deficiency
- Electrical, mechanical, and energy hazards
- Hazardous chemicals and materials
- Asbestos pipe hazards
- Fall hazards
- Excavation hazards
- Equipment operation hazards

The City has compiled programs to ensure the safety of its employees and citizens in each of the areas above. The employees are thoroughly trained in each of the safety programs as they apply to their job duties, and there are daily safety tailgate meetings with crews by Field Supervisors to review specific safety procedures for the scheduled tasks and

assignments. The department crews meet together monthly for mandatory safety training organized and coordinated by the safety committee, made up of representatives from each department. The committee also regularly inspects facilities and maintenance practices, as well as investigating incidents and accidents, to aggressively reduce workplace accidents and injuries of employees. First Aid training is required for all employees, and First Aid equipment (10 unit packs) are maintained in all vehicles and at major facilities. 911 is called whenever needed for medical aid. Following is a synopsis of each hazard, where it is commonly found and the procedures the employees use to protect themselves and others as well as the work environment.

9.5 ROUTINE SYSTEM OPERATION

The following presents a schedule of inspection and maintenance for major water system components within the Kent Water System. Detailed information regarding specific facilities and equipment is not presented herein and are contained in Operation and Maintenance manuals.

9.5.1 Wells and Springs

Well and spring source facilities are exercised regularly to maintain reliability when not in use. Disinfection and bacteriological analysis are performed after long periods of inactivity or following rehabilitation work on the source facilities. When online, local PLC or remote (SCADA) controls start and stop the pumps as needed, based on reservoir levels or system pressure.

9.5.2 Pump Stations

Pumps alternate on and off regularly, usually every 24 hours, to provide exercise and to maintain maximum reliability. Local controls (or remote SCADA control) start and stop the pumps as needed based on system pressures or reservoir levels.

9.5.3 Reservoirs

Reservoirs are monitored regularly for chlorine residuals, daily or weekly, to assure frequent water turnover and avoid stagnation. Pump start and stop setpoints are set to assure frequent water level cycling. Reservoirs which are drained for maintenance or repairs are cleaned, disinfected, and sampled for bacteriological or VOC contaminants before being returned to service, following AWWA Standards.

9.5.4 Meter Reading

Source, pump station, and reservoir meters are read each weekday on a regular schedule when online. The Water Department plans to implement remote totalizer reading with its new SCADA system in the near future, which will allow for system wide totals to be obtained at a preset time, even on weekends and holidays. This

will allow for better record keeping of production and demand, as well as enhance daily demand planning during peak periods.

9.6 SYSTEM PERFORMANCE

The overall performance of the water system is monitored by two critical parameters:

- Water Quality Reliability - Operations and maintenance programs and priorities are aligned to achieve optimum water quality that meets or exceeds DOH requirements throughout the water system. Water quality performance is measured by the history of MCL violations, as well as the number, frequency and type of complaints from customers regarding water quality. Performance is also measured by the daily source/system water quality parameters being above or below the average recorded. The Kent water system has an excellent record of water quality in its system over the last six years.
- Water production and storage – Operations and maintenance programs and priorities are aligned to achieve a reliable water supply measured both in quantity stored to meet demands and system pressures. Kent's system has a good history of maintaining reservoir levels at or above 80 percent at all times and water system pressures meeting the system design, even during peak summer demands and fire flow conditions/testing.

  Performance is measured by monitoring and recording reservoir levels and system pressures, as well as tracking customer complaints for low pressure. Customers are advised of the system pressure available and what is causing the volume restrictions.

Facility or system component performance is generally reflected in one of the two areas identified above. Individual equipment or appurtenance performance is monitored for reliable performance throughout its life cycle. Those which do not meet the criteria are scheduled/budgeted for replacement. The Hansen IMS system will assist in tracking performance and maintenance history in the future, as well as maintenance and repair costs.

9.7 PREVENTATIVE MAINTENANCE

The City of Kent maintains a strong preventative maintenance program to maximize the useful life of all water system facilities and avoid emergency conditions wherever possible by performing system maintenance in a regularly scheduled and timely manner. A key component of the City's preventative maintenance and asset management is the HANSEN IMS (Infrastructure Management System). The City invested in this program to track maintenance work on its infrastructure and create a database that includes maintenance information on water system facilities such as: valves, hydrants, water mains, water meters and services, pump stations, sources/wells, treatment facilities, and storage tanks/reservoirs.

Another key change to water system operation and maintenance in recent years is the advancement Geographic Information System (GIS). The City's in-house GIS staff and

Water Department personnel have worked to create a comprehensive water system map in GIS linked to the Hansen technical maintenance data for a specific location or facility. When the Hansen system generates a work order, it also has the capability (as soon as it is linked to GIS) of printing a map of where the asset identified on the work order is located. This also allows for City-wide integration of data assists with a variety of inter-department functions such as scheduling capital improvements projects, budgeting and coordinating water, sewer, street and stormwater infrastructure repairs and projects through the common GIS database.

Another key benefit of the Hansen software in conjunction with the City-wide GIS system is that it provides a mechanism for developing an inventory of all water system assets. Using the inventory of assets and historical maintenance and repair data, a "self-thinking" database can be established to prompt staff when preventative maintenance work needs to be performed. Full implementation of the program will allow the City to:

- Inventory/track all assets by ID number and physical address
- Track labor, material, and associated costs
- Schedule work by individual asset or group assets
- Generate work orders for scheduled and unscheduled preventative maintenance
- Forecast repairs and replacement part needs
- Project budgetary information

9.7.1 Fire Hydrants

There are approximately 2600 hydrants within the water system that are maintained by the Water Department. Information such as location, size, type, feeder information, manufacturer, and number of turns for the foot valve are examples of the information that is collected for the database.

Presently, City Water Personnel have the responsibility for an ongoing program of inspecting and flushing hydrants. The Department hires one or more summer employees who have a goal to inspect and operate approximately one-half of the fire hydrants annually and notifies the Water Distribution Supervisor of any items requiring maintenance. With the addition of the Hansen system, the Water Department does not anticipate changing the current inspection procedures however, it will provide the database for labor, material, and historical data.

9.7.2 Meters 3-inches and Larger

Large meters, sizes 3 inch and 4 inch, currently undergo bi-annual testing, and all meters sized 6 inch to 10 inch are tested annually. Some large meters require additional personnel to enter the confined space, and to provide support during the testing. The work order generated by the Hansen system will prompt crews in advance if the meter is located within a confined space, as well as the history of

repairs and accuracy profile of each meter. The City has been upgrading many of the large meters and vaults for the past 10 years and the accuracy, reliability, and safety has been significantly improved.

9.7.3 Water Mains/Dead End Mains

There are approximately 450 dead-end mains within the distribution system. Dead end mains are flushed on a yearly basis or on a more frequent basis as required. Each dead end main has been assigned a unique identifier within the Hansen system for better tracking of historical data. Each time the main is flushed, it is recorded in the database. After a few years (or sooner for mains which require more frequent flushing) the database will generate work orders for main flushing. Other distribution mains are flushed or cleaned on an as needed basis.

9.7.4 Pump Stations

All water sources and pump stations are visited on a daily basis while in operation. Well and pump data is recorded and monitored to identify any irregularities in system operation. Pumps and pump station equipment receive regular service on an hours-in-operation or lapsed time basis.

9.7.5 Storage Reservoirs

Daily visits to the storage reservoirs are made to check security and overall site conditions. The reservoirs are taken out of service approximately every three to five years for cleaning and are painted every ten to fifteen years or on an as needed basis.

9.7.6 Pressure Reducing Valves

City owned distribution system pressure reducing valves are inspected monthly, receive complete maintenance on an annual basis, and are rebuilt every four years. Maintenance for privately owned pressure reducing valves is the responsibility of the customer.

9.7.7 Telemetry

The telemetry system employs primarily electronic components which require little maintenance other than calibration checks and battery replacement. The telemetry system is inspected annually. This includes inspecting all telemetry recording instruments and mechanical flow meters.

In addition, more frequent checks are made to monitor facilities having temporary problems. Emergency response equipment and spare parts inventory are also checked periodically.

9.7.8 Watershed Inspection

To assist in maintaining the integrity of the City's water supply sources, the City has a watershed inspection and wellhead protection (WHPA) program. Under this (WHPA) program the watershed areas are inspected on a regular basis for any activity that may affect the water quality at the City's facilities. Should a potential issue appear, the City would proceed with the necessary testing & studies to verify or discount its' concerns. Should a concern be validated the City would take whatever steps necessary to protect the integrity of its sources which could include both physical improvements at its sources and legal action against the polluter. The City has obtained baseline sampling results from multiple sites within its most susceptible watershed and WHPA's one year time of travel, for high and low aquifer level periods, as Phase one of its Wellhead Protection program.

The City also has advised King County of areas under County jurisdiction which fall within the watershed area and requested consideration and cooperation of protection of the watershed in County land use planning and actual developments.

Further protection of the sources of supply is achieved by regular, contracted daily security patrol services during evening and night time hours at these sources.

9.7.9 Preventative Maintenance Schedule

A summary of the City of Kent's water system preventative maintenance schedule is described in Table 9-2.

TABLE 9-2: PREVENTATIVE MAINTENANCE SCHEDULE
CITY OF KENT

Task	Interval					Comments
	Daily	Weekly	Monthly	Semi-Annual	Annual	
SOURCES OF SUPPLY						
Inspect online buildings and sites, pumps and chemical feed equipment, record flow and hour meter readings and electronic well levels, make adjustments, add chemicals, and sample and record water quality information.	x					
Exercise generators		x				
Inspect all facilities, manually sound and record pumping and monitoring well levels. Clean buildings and piping.		x				
Inspect and exercise/test all equipment, perform scheduled PM, lubricate and adjust equipment as necessary per manufacturers recommendations, record pump and motor voltage, amperage, and efficiency values.			x			
Inspect and test motor/pump bearings – ultrasound.					x	
Inspect and test electrical panels and motor connections - infrared.					x	
Inspect watersheds and surrounding areas - WHPA.			x			
Monitoring well levels recorded			x			More thorough summer/winter.
Grounds maintenance, mowing, and weeding.		x				Spring/summer.
Tree pruning and clearing fence lines.				x		Spring/Fall
Repaint buildings and piping.					x	1-5 years
Inspect/clean/test pump control valves.					x	
Rebuild pump control and flow control valves – replace all rubber parts.					x	Contractor (4 years)
Calibrate flow meters , level and pressure transmitters, rebuild as necessary.					x	
INTERTIES						
Inspect online sites daily, record flow and pressure readings, water quality information.	x					
Inspect and clean all intertie sites, vaults, hatches, and piping.			x			
Inspect, flush, and test/exercise all equipment.			x		x	
Inspect and test electrical panels and motor connections – infrared.					x	
Inspect, clean, and test control and PRV valves.					x	
Inspect, calibrate, and test flow meters – rebuild as necessary.						Every 2 years.
Rebuild control valves - replace all rubber parts.						Contractor (4 years)
Grounds maintenance.		x				As Needed.

TABLE 9-2: PREVENTATIVE MAINTENANCE SCHEDULE CONTINUED

Task	Interval					Comments
PUMP STATIONS	Daily	Weekly	Monthly	Semi-Annual	Annual	
Inspect online buildings and sites, pumps, and equipment. Record flow/hour meter and pressure readings, check Cl_2 and pH readings.	x					
Exercise generator(s) and diesel pump(s).		x				
Inspect all facilities, clean buildings and piping.		x				
Inspect and exercise/test all equipment, perform scheduled PM, lubricate and adjust equipment as necessary to meet manufacturers recommendations, record pump and motor voltage, amperage, and efficiency values.			x			
Inspect and test motor/pump bearings - ultrasound					x	
Inspect and test electrical panels and motor connections - infrared					x	
Inspect/clean/test pump control valves.					x	
Rebuild pump control valves – replace all rubber parts.						Contractor (4 years)
Calibrate flow meters and pressure transmitters – rebuild as necessary.					x	
Repaint buildings and piping.						1-5 years.
Grounds maintenance mowing and weeding.		x				Spring and summer
Tree pruning and clearing fence lines.				x		Spring/Fall
PRESSURE REDUCING VALVE STATIONS AND VAULTS						
Inspect and clean valve stations and vaults. Record pressures and check operation.			x			
Inspect, clean, adjust, and test pressure reducing valves.					x	
Rebuild Control Valves – replace all rubber parts.						Contractor (4 years)
SCADA SYSTEM						
Remote units (RTU) – inspect and test batteries, calibration, and radio transmission.				x		
Base station and master SCADA - test auxiliary power supplies.			x			
Clean and test/verify function of all discrete, analog, and control points from remote sites.					x	

TABLE 9-2: PREVENTATIVE MAINTENANCE SCHEDULE CONTINUED

Task	Interval					Comments
DISTRIBUTION SYSTEM	Daily	Weekly	Monthly	Semi-Annual	Annual	
Collect representative samples Cl_2, NaF, and pH.	x					
Reservoir/remote sites Cl_2, NaF, pH, and bacteriological.	x	x	x			DOH requirement. 70 per month Bacti.
Flush all dead end mains.					x	More frequently when needed.
Air/vacuum release valves – inspect, clean, and test.						As needed
Transmission mains (inspect and clear easements).					x	As needed
Distribution mains – leak detect program						When leakage is above standard
Fire hydrants/hydrant valves – inspect, test, operate, and record pressures.					x	As needed or every 2 years
Distribution valves – exercise and clean out valve box.						As needed
Test 3-inch and larger meters.					x	Annual (6" and up) Bi-Annual (3 and 4")
Replace 2-inch and smaller meters.						15 to 20 years or as needed.
Read commercial meters.			x			
Read residential meters						Bi-monthly
Distribution main cleaning -ongoing						10 to 20 years or as needed
Cross connection/backflow devices tested by Certified BAT.					x	Documentation provided to City

9.8 EQUIPMENT INVENTORY

The City maintains a full array of heavy equipment, vehicles and supplies to maintain regular system operations, construct small system extensions and replacements and respond to emergency conditions. Identification of routine supplies and emergency response equipment and materials has been coordinated with the City's emergency response and hazard mitigation plans, a complete vulnerability assessment and the needs of various departments within the City. An ongoing materials list and inventory is maintained by the water department for in-house needs and to assist with emergency response if requested by other purveyors in the area.

9.8.1 Chemical Inventory

Operation and maintenance of a public water system requires use of various chemicals for water treatment and disinfection of facilities. The following table identifies the typical types of chemicals stored and their purpose. Chemical specifications are identified in the City's Warehouse/Purchasing agents files, the MSDS records, and are posted on-site wherever chemical agents and compounds are use for water treatment.

TABLE 9-3: CHEMICAL INVENTORY
CITY OF KENT WATER SYSTEM

Chemical	Purpose/Use
Chlorine (Liquid/Gas)	Disinfection of Water Supply
Sodium fluoride	Fluoridation of Water Supply
Sodium hypochlorite (12.5%)	Disinfection of Water Supply
Sodium hydroxide (25%)	PH Adjustment (Corrosion Control)
Potassium permanganate (Dry)	Fe & Mn Removal
Potassium permanganate (4% solution)	Fe & Mn Removal

9.9 WATER QUALITY MONITORING PROGRAM

9.9.1 Existing Water Quality

Each of the City of Kent's water supply sources is currently classified as groundwater. The City is conducting an extensive Wellhead Protection Monitoring Program to serve as an early detection of possible aquifer contamination. The Program involves monitoring from selected wells within the 1 year, 5 year, and 10 year zones of influence for the sources most susceptible to contamination; Clark Springs, Kent Springs, and Armstrong Springs. The City is also developing Phase 2 of its Wellhead Protection Program expected to be approved and in place in 2009 for all other groundwater sources.

The current quality of Kent's water supply is excellent with only minor secondary contaminant concerns. Secondary contaminants are classified by the Environmental Protection Agency (EPA) as aesthetic concerns and not a threat to human health. These contaminants are primarily iron and manganese. They are treated by aeration and dilution for the Seven Oaks (Soos Creek) and Garrison well sites, and oxidation followed by filtration for the 208th and 212th well sites. The City chlorinates its water supply for public health protection from bacteriological pathogens. The City also fluoridates the water supply for dental health benefits for consumers. The City's water supply is also moderately hard, with a relatively low pH, consequently, it is slightly corrosive to plumbing fixtures. The City is currently in the final design phase of facilities at Guiberson Reservoir to adjust the pH of the water when blending with Tacoma water to make it less corrosive. As noted earlier, the 212th Treatment Plant adjusts the pH of its product water to a pH of 8.2 whenever it is operating.

The City maintains compliance with the regulations set forth by the Environmental Protection Agency's (EPA) Safe Drinking Water Act (SDWA); Title 40 Code of Federal Regulations (CFR) Part 141 National Primary Drinking Water Regulations; and Washington State Department of Health (DOH) Drinking Water Regulations for Group A, Public Water Systems, Chapter 246-290, Washington Administrative Code (WAC).

The City maintains an ongoing Coliform monitoring plan which is reviewed and updated as need, but no less than annually. A Stage I Disinfectant/Disinfectant By Product (D/DBP) plan is in place, and historical monitoring results have afforded the City a reduced monitoring provision by DOH. Samples are collected annually during the warmest month. A Stage II D/DBP monitoring plan is in development. The City qualified for 40/30 certification on the IDSE portion of the Stage II rule from the EPA based on Stage I D/DBP water quality results, meaning each sample collected for Trihalomethanes (THM) was below 40 µg/L, and Haloacetic Acids (HAA) were below 30 µg/L. The final Stage II D/DBP plan is due in 2012. The City is in compliance with the Lead and Copper Rule (LCR), and has an ongoing corrosion control program. With the implementation of the Ground Water Rule (GWR) in 2009, the City chose triggered source water monitoring to meet the requirements of the GWR, and a copy of the City's GWR Monitoring Plan is on file with DOH.

TABLE 9-4: WATER TREATMENT
CITY OF KENT

Source	Type of Treatment	Comments
Clark Springs	Chlorination, fluoridation, and pH adjustment	None
Kent Springs	Chlorination, fluoridation, and pH adjustment	None
East Hill Well	Chlorination, fluoridation, and pH adjustment	None
Seven Oaks (Soos Creek Well)	Chlorination, fluoridation	Blended with Clark Springs or Kent Springs
Armstrong Springs Wells #1 & #2	Chlorination, fluoridation	Blended with Clark Springs or Kent Springs
Garrison Well	Chlorination, fluoridation	Blended with treated water at 6 MG #2 Tank
O'Brien Well	Chlorination, Fluoridation	None
208th Well and 212th Wells #1, #2, & #3	Chlorination, fluoridation Filtration and pH adjustment	208th and 212th Wells treated together at the 212th Street Treatment Plant

The following is a partial list of Analytical Laboratories used by the City for routine and specific analysis of drinking water samples. These laboratories are EPA and DOH certified for compliance with Department of Health Regulations. The City's current water quality monitoring program is included in Appendix H.

TABLE 9-5: WATER QUALITY ANALYTICAL LABORATORIES
STATE OF WASHINGTON APPROVED

Laboratory	Phone Number	Address	Analysis performed
Water Management Labs Inc.	(253) 531-3121	1515 80th Street E. Tacoma, WA 98404	Bacteriological, IOC, VOC, SOC, THM, general chemistry and other water quality analysis
Laucks Testing Laboratories, Inc.	(206) 767-5060	940 S. Harney Seattle, WA	Bacteriological, IOC, VOC, SOC, THM, general chemistry and other water quality analysis
Edge Analytical Laboratories	(800) 755-9295	1620 S Walnut Street Burlington, WA 98233	Bacteriological, IOC, VOC, SOC, THM, general chemistry and other water quality analysis. UCMR II
Weyerhauser Analytical	(253) 924-6872	32901 Weyerhauser Way S Federal Way, WA 98477	Organic and general chemistry (also Clark Springs 129 priority pollutants analysis)
Washington DOH Public Health Laboratories	(206) 361-2898	1610 NE 150th Street Seattle, WA 98155	Maximum total Trihalomethane potential (MTTP's); radionuclides; general organic chemistry

9.9.2 Public Notification

In accordance with the requirements of the U.S. EPA the City of Kent prepares an annual water quality report sometimes referred or Consumer Confidence Report. A copy of this report is included in Appendix H.

In the event of an issue with the water supply, the City of Kent has established procedures for various levels of emergency including suspected water quality issues, known contaminants identified in the water system, boil water notifications and water supply interruption or shortage. The exact procedures and language identified for each potential water quality or quantity emergency is included in the City's Coliform Monitoring Plan, Cross Connection Control Program, Water Shortage Response Plan or Emergency Response Plan, as appropriate. In general, the City of Kent is fully prepared for the following public notification measures. Please note that these general methods of notification are intended only as a summary of complete procedures and language identified in the aforementioned plans and procedures.

- Newspaper Notices.
- Direct Mail Notice or Hand Delivery to all Consumers or Customers in a specific Area of the System.
- Posted Notice.
- Notice to radio and television stations.
- Notices to New Billing Units or New Hookups.

9.10 EMERGENCY RESPONSE

All water supply systems are subject to damage and interruption from unusual emergency events. The City of Kent Water Department has participated in City-wide emergency response planning and has a detailed program for responding to a variety of emergency conditions. The details of that emergency response program are classified confidential for the protection of the system and health and safety of system customers and privacy of water system personnel. The following provides a general overview of key activities that have been evaluated and/or are in place.

9.10.1 Water System Personnel Emergency Call-up List

The City maintains information that identifies, in order (based on DOH certification level and experience), water system personnel responsible for making decisions in specific emergency situations. Job titles and phone numbers (work and home) are included. The Kent Police Department (phone 253-856-5800) has a current list of all phone numbers on file and available 24 hours a day as well as procedures for emergency callout of the proper personnel.

9.10.2 Notification Procedures

A Boil Water Notice may be approved or distributed by the City. In all cases the Public Works Director, City Operations Manager and/or the Mayor are to be notified of any action taken as soon as possible.

9.10.3 Vulnerability Analysis

Dames and Moore completed a seismic vulnerability assessment of the City of Kent water system in 1996. The objectives of the study were to determine the potential for damage, disruption of services, and injury or loss of life (life-safety) due to an earthquake; and to develop preliminary mitigation recommendations and estimated construction costs. The City has implemented the recommendations of the vulnerability analysis in its budgeting and Capital Improvement Program (See Chapter 10). Seismic issues identified are identified in Table 9-6 and those improvements that have been accomplished are noted. Seismic upgrade prioritization was based on system performance objectives, seismic vulnerability, and upgrade cost-effectiveness. Mitigation of life-safety hazards and requiring all new construction (including buried piping and equipment installation) to meet or exceed current seismic requirements and standards were considered the highest priority for implementation. Other higher priority seismic upgrades include restraining critical non-structural equipment, strengthening 7 of the 8 water reservoirs and many of the other water facilities and pipeline connections in critical structures.

The high liquefaction susceptibility throughout most of the Green River Valley and high cost of pipeline replacement make it difficult to address pipe damage and system functionality concerns. Water system upgrades should concentrate on maintaining service in the East Hill and West Hill areas. This can be accomplished with installation of valves capable of isolating Green River Valley pressure zones, and by upgrade of key East Hill and West Hill facilities.

Water System Component Vulnerability was assessed in the following areas: major fire, earthquake, chlorine gas, mechanical failure, bomb, power, employee accident/illness, sub-zero weather, flooding, and windstorm. The study did not identify any system components as "very vulnerable". However, the analysis did put forth recommendations for corrective action on some system components. While key recommendations for security improvements have been accomplished, this is considered an ongoing expense to the City with improvements accomplished as technology allows and system components require.

Other system vulnerability upgrades have been identified in consultant reports and summarized in the CIP contained in Chapter 10. The identification and addition of all system improvements, however, will increase the reliability of the water system in the event of an emergency and extend the useful life of the system.

9.11 EMERGENCY PREPAREDNESS

TABLE 9-7 PREPARATION COMMON TO ALL EMERGENCIES
CITY OF KENT WATER DEPARTMENT

PERSONNEL	Advise personnel to arrange for safety of families in advance.
	Prepare emergency schedule and brief personnel.
	Put all personnel on emergency status.
	Strategically locate and station crews.
FACILITIES	Check vehicles, auxiliary electrical power, and pumping units. A. Sufficient fuel. B. Operation of emergency power/battery operated lights. C. Operation of vehicles.
	Check emergency communication equipment for readiness.
	Maintain emergency rations, water, clothing, and bedding at the maintenance shops sufficient for 72 hours.
	Secure equipment and supplies in exposed areas; secure buildings; install storm shutters, if available and appropriate.
MATERIALS	Review possible repair materials for local purchase of items on short notice in an emergency.
	Arrange with local suppliers and nearby utilities for access to stored chemicals, tools, repair parts, etc., which may be required immediately after the disaster.
	Determine the need to relocate certain materials to outlying sites.

9.12 CONDITIONS OF SERVICE

Throughout the year, three distinctive conditions of service (green, yellow, or red) can exist. The conditions are explained below. The Water Superintendent is responsible for making all changes in the condition or service, with the approval of the Public Works Director.

1. Condition Green – Normal water use. Notification of Water Department Control Center is required for all unusual or excessive water/hydrant use.
2. Condition Yellow – Caution is necessary with all water/hydrant use. All inspections/water main flushing and/or hydrant flows must be cleared through the Water Department Control Center in advance.
3. Condition Red -
   - Level #1 – No hydrant use. No inspection water flows. Contact Water Department Control Center on all emergency hydrant use or water flows.
   - Level #2 – Same as Level #1 except public irrigation is authorized on alternate days based on street address (odd/even), ONLY.
   - Level #3 – Same as Level #1 except that public irrigation is prohibited.

9.12.1 Public Notifications

Many of the City's water quality monitoring and emergency response plans call for notification of the public of emergency conditions and of required demand curtailment measures. Sample announcements are presented here in increasing order of severity. The City should contact newspapers and several local radio and television stations, which broadcast in the service area, to make prior arrangements concerning emergency announcements.

Sample I

For Immediate Release:

The City of Kent is experiencing unusually high water demand and is having difficulty maintaining adequate reservoir reserves. Residents of the City are requested to reduce water consumption and to avoid wasting water wherever possible. It will be particularly helpful if homeowners will make every effort to reduce lawn irrigation. The problem is expected to be temporary in nature, and a public announcement will be made when normal water consumption can be resumed.

Sample II

For Immediate Release:

The City of Kent is experiencing a major loss of its water production capacity. The City's customers are directed to stop all irrigation and to make every effort to conserve potable water. Failure to do so may result in the application of fines of up to $50/day, according to City ordinance #2227. The City is doing everything possible to correct the situation, and will make a public announcement as soon as the problem has been rectified.

Sample III

For Immediate Release:

This is a Community Emergency Announcement. The City of Kent has experienced a major loss of its water production capacity, and, therefore, is unable to maintain normal water deliveries. It is mandatory that all irrigation, industrial, and commercial use be discontinued. Water must be conserved for sanitary and potable use only. Your cooperation is urgently requested. Failure to eliminate unessential uses of water may result in the application of fines of up to $50/day, according to City ordinance #2227. The City is doing everything possible to restore the water system to normal operations. You

will be notified of any change in the situation. Note: repeat the above message.

Sample IV

For immediate Release:

The City of Kent has experienced a total loss of its water production capacity; as a result, the water mains have been shut off and normal water deliveries have been discontinued. The City has made arrangements to deliver water by tanker truck or bottled water to residential areas for potable and sanitary uses only.

When picking up water at the tank truck locations, please bring your own clean containers. The City is doing everything possible to resume normal water service and will notify you as soon as water service has been restored.

State law, WAC 248-54-750, Reporting and Public Notification, clearly outlines the City's responsibilities for both oral and written communication with water users in situations which may be caused by emergencies. All staff with authority for public announcements should be familiar with these regulations.

In addition to public announcements, communication with emergency services is vital. Important phone numbers are included on the following page and should be posted at all phones.

9.13 CUSTOMER COMPLAINT RESPONSE PROGRAM

The City has adopted the following policy and procedures for taking and responding to complaints/inquiries.

To contact the Water Department, citizens contact the Public Works Operations Department through the public number which is (253) 856-5600. The phone is operated by City employees Monday through Friday (except Holidays) between the hours of 7:30 a.m. and 4:00 p.m. During non-working hours, the phones are answered by a voice message system. In the case of emergencies during non-working hours, the calls are forwarded to the City Police Department who contact the Water Department employees on a callback list, the employees on Standby or the Water Superintendent.

During standard working hours, the individual receiving the call shall record all of the pertinent information (i.e. - name, address, location of the problem, date, phone number, and the nature of the call) on a complaint/inquiry form in the Hansen IMS System for assignment and tracking. Each form has a unique identifying number to assist in tracking. Once all of the pertinent information is recorded, a copy of the form is given to the corresponding supervisor or superintendent.

Field Supervisors/Superintendents are responsible for contacting the citizen as soon as possible within a 24 hour period. After the citizen has been contacted and the situation assessed, the response given to the citizen is recorded on the complaint/inquiry form. When the form is fully completed, it is returned to the superintendent who in-turn gives it to office staff for filing/archiving.

Table 9-8 below shows the number of complaints/inquiries for the year 2004-2007. The records show that the number of complaints/inquiries has increased over the past few years for distribution related complaints/inquiries and decreased for water treatment complaints/inquiries. The increase in distribution related complaints/inquires was anticipated with growth within the system and the effects of planned maintenance and the cleaning of water mains on the Annual Cleaning Program.

TABLE 9-8: CUSTOMER COMPLAINT/INQUIRY HISTORY
CITY OF KENT WATER DEPARTMENT

	Year			
	2004	2005	2006	2007
Water Turn On Request	7	4	20	11
Flow Test Request	0	0	1	8
Low Pressure/No Water	117	42	80	40
High Pressure	14	19	11	18
Water System Leaks	46	59	108	43
Meter Leaks/Repairs/Problems	213	125	135	154
Hydrant Leaking	31	19	20	34
Hydrant out of service/hit/down	16	14	14	4
Hydrants need painting/cleaning	0	1	3	3
Valve box cover casing/damaged	24	13	10	3
Air in Lines	6	3	6	0
Water System Questions/General	74	18	104	143
Questions related to chlorine in water	9	7	3	1
Discolored Water	27	65	46	23
Questions related to health effects of water	10	5	0	16
General Water Quality Info/Analysis	33	55	62	35
Copper Stains	1	2	0	0

9.13.1 Complaint Response

Following are the established procedures for responding to the most common complaints/inquiry.

High chlorine – Contact customer by phone, explain chlorination practices and monitoring, follow up with visit to customer location (if necessary) and perform field analysis – Explain results to customer and give advice on procedures to lessen chlorine tastes and odors if normal levels have become objectionable to the customer.

Stains on Plumbing Fixtures – Contact customer by phone, determine type of stain (i.e., result of type of plumbing), explain water quality and need to eliminate leakage that is leaving stain.

Request for Water Quality Results – Contact customer by phone to determine type of result they are looking for or reason for needing the information. Follow up with mailing or faxing results needed by customer.

Inquiry on Fluoride – Contact customer by phone. Generally customer inquiry is "do we fluoridate the water?" Check customer address to verify City of Kent customer, inform them of fluoride concentration.

Bad Tasting/Smelling Water – Contact customer by phone to determine type of smell or taste causing concern. Set up site visit to check water quality; check chlorine residuals to determine quality of water. Meet with customer to review concerns, ways to eliminate or lessen concerns (i.e., flushing, refrigeration), dispatch distribution crews for main flushing if necessary.

"Ill Because of Water" – Contact customer by phone and get information on the reason for this concern and schedule an appointment for meeting with the customer. Meet with customer, take chlorine residual to determine possibility of high chlorine demand; determine necessity of bacteriological sampling and sample if necessary with sample going to certified laboratory for analysis. Contact customer with results and also inform them of physician responsibility to report suspected waterborne illness to local Health Department and the fact that the Health Department is not reporting a problem, advise customer to follow up with a doctor if necessary. If concern is related to other causes such as minerals or chlorine we inform them of water quality, and methods for lessening exposure to these areas. If customer is still concerned, suggestion may be made to drink bottled water.

Inquiry of Lead Content – Inform customer of the absence of lead in the City water supply, but explain the potential for lead in plumbing piping and fixtures. Explain lead/copper monitoring program, City water quality characteristics, Corrosion Control Facilities, and ways to eliminate exposure (i.e., flushing standing water, using cold water for cooking and drinking), provide customers with lead information packets.

Specks of Material in Water – Call customer and determine type of specks. Schedule an appointment with customer for determination of material. If it is related to the customers plumbing, suggest ways to clear. If related to distribution system, dispatch distribution crew for main flushing and determine cause.

Rusty Water – Call customer and determine if problem is internal to building or if it is from distribution system. If internal, suggest ways to clear problem. If external, dispatch distribution crew for main flushing and determine cause (i.e., dead-end main, contractor activity or water system surges).

9.13.2 Procedures for Record Reporting to DOH

For coliform monitoring and chemical analysis of water for compliance issues, the contracted certified laboratory sends a copy of the results to the City and a copy of the results directly to the State Department of Health. The City maintains water quality analysis results and provides these results to the Department of Health upon request. For special programs such as lead/copper rule or synthetic organic susceptibility, the City mails results directly to the Department of Health Drinking Water offices in Olympia.

9.13.2.1 Reporting to the Department of Health

For coliform monitoring any instance of a positive coliform present analysis the City follows procedures outlined in the Coliform Monitoring Plan.

9.14 RECORDKEEPING AND REPORTING

TABLE 9-9 RECORD KEEPING AND REPORTING
CITY OF KENT WATER SYSTEM

Type of Record	Period	Storage Location			Length of Retention
		Records Room	Supervisor Office	Electronic	
Customer Complaints	1984-Present	x	x	x	Permanent
DOH Water Facilities Inventory (WFI)	1974-Present		x	x	Permanent
Ground Water Under Direct Surface Influence (GWUI)	1988-Present	x	x	x	Permanent
Wellhead Protection Plan Monitoring (WHPP)	1997-Present		x	x	Permanent
Source Production	1946-Present	x	x	x	Permanent
Water Quality Analysis	1972-Present	x	x	x	Permanent
Coliform Monitoring	1938-1953 1972-Present	x	x	x	Permanent
Fluoride/Chlorine	1972-Present	x	x	x	Permanent
Inorganics (IOC's)	1972-Present	x	x	x	Permanent
Volatile Organics (VOC's)	1988-Present	x	x	x	Permanent
Synthetic Organics (SOC's)	1995		x	x	Permanent
Trihalomethanes (THM's)	1982-Present	x	x	x	Permanent
Radionuclides	1995		x	x	Permanent
Lead/Copper Rule (LCR) Monitoring	1992-Present		x	x	Permanent
Water Department Time Books/Journals/Log Books	1933-Present	x	x		Permanent

The most recent sanitary survey of the Kent Water System by the Department of Health (DOH) was conducted in June 2005, and no major deficiencies were found. The Department of Health found that the Kent Water System is in good sanitary condition, and that the water system is being operated and managed in a diligent manner. DOH also determined that the

City has a functional operations and maintenance group with routine tasks documented and followed, has added additional security measures, is improving its telemetry system, offers reliability with the capability to move flow between zones and utilize different sources, and has auxiliary power available. The City continues to stay in compliance with its water quality sampling requirements.

It was also very evident to DOH that the City staff take their responsibilities seriously and are dedicated toward delivering safe and reliable drinking water to all customers. The June 2005 sanitary survey report is in Appendix K.