1230021
[0081075H]

HNF-35051
Revision 8

Small Water Systems Management Program for Group A Water Systems Managed by Mission Support Alliance, LLC

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

RECEIVED
JUN 24 2015
EDMC

Approved for Public Release;
Further Dissemination Unlimited

194

HNF-35051
Revision 8

Small Water Systems Management Program for Group A Water Systems Managed by Mission Support Alliance, LLC

Document Type: RPT

S. L. Camp
Mission Support Alliance

L. M. Kelly
Mission Support Alliance

Date Published
September 2014

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-09RL14728

P.O. Box 650
Richland, Washington 99352

APPROVED
By Janis D. Aardal at 11:55 am, Sep 30, 2014

Release Approval | Date

Approved for Public Release;
Further Dissemination Unlimited

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by tradename, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

HNF-35051, Rev. 8

APPROVALS

D. G. Sauceda, Director
Site Infrastructure Services

09/29/14
Date

Samuel L. Camp for
J. G. Caudill, Manager
Water/Sewer Utilities

9/29/14
Date

Samuel L. Camp
S. L. Camp
Water Purveyor

9/29/14
Date

APPROVALS

_This page intentionally left blank.

CONTENTS

1.0 INTRODUCTION 1-1

2.0 REGULATORY REQUIREMENTS 2-1
2.1 GENERAL INFORMATION 2-1
2.2 COMPLIANCE ACTIVITIES 2-1

3.0 HANFORD GROUP A PUBLIC WATER SYSTEMS 3-1
3.1 100-K AREA PUBLIC WATER SYSTEM 3-1
3.2 200 EAST AREA SECTION OF THE 200 WEST PUBLIC WATER SYSTEM 3-2
3.3 200 WEST PUBLIC WATER SYSTEM 3-2
3.4 400 AREA PUBLIC WATER SYSTEM 3-3
3.5 300 AREA PUBLIC WATER SYSTEM 3-4

4.0 ELEMENT 1 – WATER FACILITIES INVENTORY (4.c of 246-290-105) 4-1
4.1 PURPOSE 4-1
4.2 BACKGROUND 4-1
4.3 DISCUSSION 4-1

5.0 ELEMENT 2 – WATER QUALITY MONITORING PROGRAM (4.p of 246-290-105) 5-1
5.1 PURPOSE 5-1
5.2 BACKGROUND 5-1
5.3 DISCUSSION 5-3

6.0 ELEMENT 3 – CONSUMER CONFIDENCE REPORT (not listed in 246-290-105) 6-1
6.1 PURPOSE 6-1
6.2 BACKGROUND 6-1
6.3 DISCUSSION 6-1

7.0 ELEMENT 4 – PREPARING FOR YOUR SANITARY SURVEY (not listed in 246-290-105) 7-1
7.1 PURPOSE 7-1
7.2 BACKGROUND 7-1
7.3 DISCUSSION 7-1

8.0 ELEMENT 5 – ANNUAL OPERATING PERMIT (4.b of 246-290-105) 8-1
8.1 PURPOSE 8-1
8.2 BACKGROUND 8-1
8.3 DISCUSSION 8-2

9.0 ELEMENT 6 – CROSS-CONNECTION CONTROL PROGRAM 9-1
9.1 PURPOSE 9-1

9.2 BACKGROUND 9-1
9.3 DISCUSSION 9-1

10.0 ELEMENT 7 – EMERGENCY RESPONSE PLAN (4.s OF 246-290-105) 10-1
10.1 PURPOSE 10-1
10.2 BACKGROUND 10-1
10.3 DISCUSSION 10-1
10.4 100-K AREA PUBLIC WATER SYSTEM 10-2
10.5 400 AREA PUBLIC WATER SYSTEM 10-2

11.0 ELEMENT 8 – SERVICE AREA AND FACILITY MAP & discription of sources (4.D & f of 246-290-105) 11-1
11.1 PURPOSE 11-1
11.2 BACKGROUND 11-1
11.3 DISCUSSION 11-1

12.0 ELEMENT 9 – OPERATION AND MAINTENANCE PROGRAM (4.q of 246-290-105) 12-1
12.1 PURPOSE 12-1
12.2 BACKGROUND 12-1
12.3 DISCUSSION 12-1

13.0 ELEMENT 10 – WELL HEAD PROTECTION PROGRAM (4.m of 246-290-105 and 246-290-135) 13-1
13.1 PURPOSE 13-1
13.2 BACKGROUND 13-1
13.3 DISCUSSION 13-1

14.0 ELEMENT 11 – WATER RIGHT DOCUMENTATION (4.e of 246-290-105) 14-1
14.1 PURPOSE 14-1
14.2 BACKGROUND 14-1
14.3 DISCUSSION 14-1

15.0 ELEMENT 12 – Water Production and consumption/ RECORD OF SOURCE WATER PUMPED (4.h of 246-290-105) 15-1
15.1 PURPOSE 15-1
15.2 BACKGROUND 15-1
15.3 DISCUSSION 15-1

16.0 ELEMENT 13 – WATER USE (4.h of 246-290-105) 16-1
16.1 PURPOSE 16-1
16.2 BACKGROUND 16-1
16.3 DISCUSSION 16-1

17.0 ELEMENT 14 – WATER CONSERVATION PROGRAM (4.l & g of 246-290-105) 17-1
17.1 PURPOSE 17-1

17.2 BACKGROUND 17-1
17.3 DISCUSSION 17-1

18.0 ELEMENT 15 – COMPONENT INVENTORY AND ASSESSMENT (4.n of 246-290-105) 18-1
18.1 PURPOSE 18-1
18.2 BACKGROUND 18-1
18.3 DISCUSSION 18-1

19.0 ELEMENT 16 – LIST OF SYSTEM IMPROVEMENTS (4.o of 246-290-105) 19-1
19.1 PURPOSE 19-1
19.2 BACKGROUND 19-1
19.3 DISCUSSION 19-1
19.4 100-K AREA PUBLIC WATER SYSTEM 19-1
19.5 200 EAST AREA AND 200 WEST AREA PUBLIC WATER SYSTEMS 19-1
19.6 400 AREA PUBLIC WATER SYSTEM 19-1

20.0 ELEMENT 17 – BUDGET (4.t of 246-290-105) 20-1
20.1 PURPOSE 20-1
20.2 BACKGROUND 20-1
20.3 DISCUSSION 20-1

21.0 ELEMENT 18 – SYSTEM MANAGEMENT (4.a of 246-290-105) 21-1
21.1 PURPOSE 21-1
21.2 BACKGROUND 21-1
21.3 DISCUSSION 21-1
21.4 100-K AREA PUBLIC WATER SYSTEM 21-1
21.5 200 WEST PUBLIC WATER SYSTEM 21-2
21.6 400 AREA PUBLIC WATER SYSTEM 21-2

22.0 REFERENCES 22-1

APPENDICES

APPENDIX A HANFORD SITE WELL HEAD PROTECTION PLAN ..... A-i

APPENDIX B SITE INFRASTRUCTURE AND UTILILIES ORGANIZATION CHART ..... B-i

APPENDIX C COMPREHENSIVE MONITORING PROGRAM PLAN FOR CONTAMINANTS UNDER WAC 246-290-300 ELEMENTS ..... C-i

APPENDIX D COMPREHENSIVE CROSS-CONNECTION CONTROL PROGRAM PLAN ..... D-i

TABLES

Table 3-1. Drinking Water Wells in the 400 Area. 3-3
Table 5-1. Type of Contaminants, Sampling Frequency, Location, and Waivers. 5-2
Table 8-1. Operating Permit Colors and Their Significance. 8-1
Table 15-1. Record of Water Treated at 100-K Area Public Water System for 2013. 15-1
Table 15-2. Record of Water Treated at 200 West Public Water System for 2013 15-2
Table 15-3. Record of Water Treated at 400 Area Public Water System for 2013 15-2
Table 15-4. Record of Water Treated at 300 Area Public Water System for 2013 15-4
Table 16-1. Record of Water Treated at 100-K Area Public Water System for 2013. 16-1
Table 16-2. Record of Water Treated at 200 West Public Water System for 2013 16-2
Table 16-3. Record of Water Treated at 400 Area Public Water System for 2013 16-2
Table 16-4. Record of Water Treated at 300 Area Public Water System for 2013 16-4

TERMS

AHP	Analytical Hierarchy Process
ACH	Aluminum Chlorohydrate
CCCP	Cross-Connection Control Program
CFR	*Code of Federal Regulations*
CHPRC	CH2M HILL Plateau Remediation Company
CIP	Clean in Place
D&D	Deactivation and Decommissioning
DOE	U.S. Department of Energy
ECO	Environmental Compliance Officer
EFM	Enhanced Flux Maintenance
EPA	U.S. Environmental Protection Agency
EPCRA	*Emergency Planning and Community Right-To-Know Act*
FFTF	Fast Flux Testing Facility
IAMPO	International Association of Plumbing and Mechanical Officials
MASF	Maintenance and Storage Facility
MCL	Maximum Contaminant level
MRDL	Maximum residual Disinfectant Level
MSA	Mission Support Alliance, LLC
NTNC	Non-Transient Non-Community
PRV	Pressure-Reducing Valve
PW	Potable Water
RCW	*Revised Code of Washington*
SI&U	Site Infrastructure and Utilities
SMF	Standard Monitoring Framework
SOC	Synthetic Organic Chemical
SWSMP	Small Water System Management Plan
TNC	Transient Non-Community
VOC	Volatile Organic Compound
WAC	*Washington Administrative Code*
WCH	Washington Closure Hanford, LLC
WDOH	Washington State Department of Health
WFI	Water Facilities Inventory
WQMR	Water Quality Monitoring Report
WSP	Comprehensive Water System Plan

This page intentionally left blank.

1.0 INTRODUCTION

Existing water systems not intending to expand either their service area or approved number of connections are required to develop a Small Water System Management Program (SWSMP) (*Washington Administrative Code* (WAC) 246-290-105, "Group A Public Water Supplies,"). This document includes the requirements of WAC 246-290-105 and indicates how the four Group A public water systems meet the intent of the requirement. Details and content are consistent with the size, complexity, past performance, and use of the four public water systems. DOH-331-134, *Small Water Systems Management Program Guide*, published by the Washington State Department of Health (WDOH), (April 2008 update) and (October 2011 revised) were used in the development of this document. The format of the April 2008 SWSMP guide was maintained. Both guide books were used to collect and assess information and determine the type and level of action needed to secure the Hanford Site Water systems' future. Both SWSMP guides are intended for "Community" water systems and portions of some of the elements may not be appropriate for non-community systems.

The WDOH uses the term "Group A" to designate those public water systems that meet the federal definition of a public water system. This includes all public water systems that serve 25 or more persons or 15 or more connections (WAC 246-290-020, "Applicability"). All Group A public water systems at the Hanford Site are owned by the U.S. Department of Energy (DOE) and are managed by contactors for DOE. The Group A public water systems at the Hanford Site are non-transient non-community (NTNC) systems. WAC 246-290-105(2) states that "all non-community and all community systems not required to complete a water system plan as described under WAC 246-290-100(2) shall develop and implement a small water system management program." This SWSMP is prepared because the four Group A public water systems addressed in this document do not meet the requirements listed in WAC 246-290-100(2) for a water system plan as identified in WAC 246-290-100, "Water System Plan."

The Group A public water systems at the Hanford Site differ from other similar water utilities in that no bills are sent out to the customer. The money to operate the public water systems is approved by the United States Congress each year. Many of the practices recommended and discussed by WDOH for water system operations, do not apply to Hanford public water systems because of the different nature of the Federal government's ownership and the management organization. These exceptions are identified in this document.

The Hanford Site is served by four Group A public water systems and four Group B public water systems. The Group A water system in the 300 Area is included in this document since operational responsibility for the 300 Area will be transferred from Washington Closure Hanford, LLC (WCH) to Mission Support Alliance, LLC (MSA), and effective October 1, 2014. The water for the 300 Area is purchased from the City of Richland. That said, two Hanford Site contractors, MSA and CH2M HILL Plateau Remediation Company (CHPRC), manage the four active Group A public water systems on Hanford Site. MSA has the responsibility for managing the four Group B systems. The scope of this document is limited to the Group A public water systems managed by MSA and CHPRC.

The DOE's Hanford Site lies within the semi-arid shrub-steppe Pasco Basin of the Columbia Plateau in south-central Washington State. The Hanford Site occupies an area of approximately

1,518 km^2 (586 mi^2) north of the confluence of the Snake and Yakima Rivers with the Columbia River. The Columbia River flows through the northern portion of the Hanford Site, turns south, and forms part of the Site's eastern boundary. The Yakima River runs along part of the southern boundary and joins the Columbia River at the city of Richland, which bounds the Hanford Site on the southeast. Rattlesnake Mountain, Yakima Ridge, and Umtanum Ridge form the southwestern and western boundaries. The Saddle Mountains form the Site's northern boundary.

The Hanford Site is currently in decontamination and decommissioning mode. Several facilities are shut down while several other facilities are being prepared for closure and cleanup. Currently there are very few active facilities on the Hanford Site.

Past activities on the Hanford Site were centralized in numerically designated areas. The 300 Area is bordered by the Columbia River on the east and is in the process of shutdown, demolition and remediation. There are currently several research and development (R&D) facilities, package boiler annexes, a fire station, a telephone exchange facility, and a records retention center in the 300 Area. The 100 Area is located along the Columbia River and includes deactivated reactors and burial sites. The processing units are located in the 200 Areas, which are on a plateau approximately 11 km (7 mi) from the Columbia River. The 400 Area, which is 8 km (5 mi) northwest of Richland, contained the Fast Flux Test Facility (FFTF), which was used for testing liquid metal reactor systems. The 600 Area covers all locations not specifically given an area designation. Additional administrative offices are located in the 1100 just north of Richland and the 700 Area located in downtown Richland.

2.0 REGULATORY REQUIREMENTS

2.1 GENERAL INFORMATION

WAC 246-290-105 requires that Group A non-community and all community systems not required to complete a water system plan, shall develop and implement a small water system management program. The purpose of the program is to demonstrate the system's operational, technical, managerial, and financial capability to achieve and maintain compliance with all relevant local, state, and federal plans and regulations.

WAC 246-290-020(4) defines a Group A water system as a public water system providing services such that it meets the definition of a public water system provided in the 1996 amendments to the federal Safe Drinking Water Act (Public Law 104-182, Section 101, Subsection b).

Based on Public Law 104-182, the U.S. Environmental Protection Agency (EPA) defines a public water system as a system for the provision to the public of water for human consumption through pipes or other constructed conveyances, if such system has at least 15 service connections or regularly serves at least 25 individuals. These public drinking water systems serve at least 25 people or 15 service connections for at least 60 days per year.

WAC 246-290-020(5)(b) offers the following definitions:

Non-community water system means a Group A water system that is not a community water system. Non-community water systems are further defined as:

Non-transient (NTNC) water system that provides service opportunity to 25 or more of the same non-residential people for 180 or more days within a calendar year.

The four public water systems managed by MSA and CHPRC are Group A NTNC water systems.

WAC 246-290-105(3) requires that the purveyor submit the Small Water System Management Program for review under specific conditions identified in the regulations. The Group A public water systems managed by MSA and CHPRC do not meet the conditions for submittal identified in WAC 246-290-105(3)(a)(b) or (c). This Small Water System Management Program (SWSMP) for four Groups A public water systems will be maintained by the MSA Water Purveyors and will be updated annually as appropriate.

2.2 COMPLIANCE ACTIVITIES

MSA has developed and implemented several procedures, plans, and programs to ensure all applicable activities relative to the management and delivery of safe drinking water are conducted consistent with regulatory requirements. In addition to these mechanisms, this Small Water System Management Program provides the following regulatory guidance for non-reoccurring and/or infrequent operations and other activities associated with the water distribution system. It is expected that the identified operations and activities be conducted in accordance with the relevant regulatory requirements, as identified:

Personnel are directed to WAC 246-294 for questions/concerns/actions associated with **Drinking Water Operating Permits** and associated fees.

GROUP A PUBLIC WATER SUPPLIES

Engineering Requirements relative to the qualification expectations for engineers in accordance with WAC 246-290-040.

Actions associated with **Variances, Exemptions, and/or Waivers** will be conducted consistent with WAC 246-290-060 and WAC 246-290-300.

Actions associated with **Project Reports, Construction Documents, and/or Existing System As-Built Approval** will be conducted consistent with WAC 246-290-110, WAC 246-290-120, WAC 246-290-125, and WAC 246-290-140.

Actions associated with water system **Source Approval** (including development and/or modification) will be conducted consistent with WAC 246-290-130.

Actions associated with **Source Water Protection** (including sanitary control areas) will be conducted consistent with WAC 246-290-135.

Actions associated with water system design will be conducted consistent with the following regulations:

- **Design Standards** (including engineering criteria)
  - WAC 246-290-200
- **Drinking Water Materials and Additives** (including application of substantial contact criteria)
  - WAC 246-290-220
- **Water Demand Design Criteria** (including expanding systems consideration of average day demand, maximum day demand, and peak hourly demand)
  - WAC 246-290-221
- **Water System Physical Capacity and Distribution System** (including total equivalent residential units, daily source capacity, hydraulic analyses, fire flow maximum daily demand)
  - WAC 246-290-222 and WAC 246-290-230
- **Finished Water Storage Facilities** (including design criteria to prevent external contamination)
  - WAC 246-290-235
- **Treatment Design** (including required pilot studies)
  - WAC 246-290-250

Actions associated with **Alternate/Composite Sampling and Invalid Sampling** will be conducted consistent with the applicable sections of WAC 246-290-300.

Actions associated with **Reliability and Emergency Response** (including water pressure at the consumer's meter, fire flow requirements, abnormal operating conditions), will be conducted consistent with WAC 246-290-420.

Actions associated with **Metering Requirements** will be conducted consistent with WAC 246-290-496.

Actions associated with proposed **Changes to any Disinfection Treatment System** will be conducted consistent with WAC 246-290-630(12) – (16).

Actions associated with **Follow-up to Treatment Technique Violations** (specifically, guidance relative to public notices) will be conducted consistent with WAC 246-290-634.

Actions associated with **Determination of Disinfectant Contact Time (T)** (specifically, guidance relative to tracer studies) will be conducted consistent with WAC 246-290-636.

Actions associated with **Analytical Requirements** will be conducted consistent with WAC 246-290-638.

Actions associated with **SWTR Records** will be conducted consistent with WAC 246-290-639.

Specific actions associated with **Disinfection for Filtered Systems** relative to inactivation failures will be conducted consistent with WAC 246-290-662.

Actions associated with **Filtration Technology and Design Criteria** will be conducted consistent with WAC 246-290-676.

Actions associated with **Reliability for Filtered Systems** will be conducted consistent with WAC 246-290-678.

GROUP B PUBLIC WATER SYSTEMS

While not required by regulation this Small Water System Management Program also provides the following regulatory guidance for operations and activities associated with Group B Public Water Systems. It is expected that the identified operations and activities be conducted in accordance with all relevant Part 291 regulations as required, in general and specifically, as identified below:

- **Existing Group B Systems** in accordance with WAC 246-291-280.
- **General Requirements** in accordance with WAC 246-291-300.
- **Public Notification Requirements** in accordance with WAC 246-291-360.

This page intentionally left blank.

3.0 HANFORD GROUP A PUBLIC WATER SYSTEMS

MSA manages the following Group A public water system: 200 West (ID 00100 4) and the 300 Area (ID 418408).

CHPRC manages the following two Group A public water systems:

- 100-K Area (ID# 00177 J)
- 400 Area (ID# 41947 0).

3.1 100-K AREA PUBLIC WATER SYSTEM

The 100-K Area Public Water system, ID 00177J, is a NTNC system with5 service connections serving approximately 210 people. The source of water for this system, identified as SO2, is the Columbia River via the Export Line.

The raw water source for the 100-K Water Treatment Facility is the Columbia River. An existing Columbia River raw water intake is currently located southwest of the 100-K Area, in the 100-B/C Area. The raw water is pumped to the 200 Area (south of the 100-K site) via a 42-in concrete/steel line known as the 100 Area Export Water line. A 12-in raw water supply line (source S02) originating at a connection to the 100 Area Export Water line continues north east until it terminates at the 189K Water Treatment Facility, located in the 100-K Area. The raw water line supplies a 750,000-gal tank that provides temporary storage for raw water intended for a variety of uses in the 100-K Area. The uses include fire protection, nuclear safety, service water, and potable water. The tank is sized to provide water for fire suppression (360,000 gal), emergency basin make-up/nuclear safety (180,000 gal), and up to 24 hours of potable water demand at a nominal rate of 50 gal/min (72,000 gal). A bypass line equipped with a pressure-reducing valve (PRV), set at 110 lb. /in^2 is used in the event the 750,000-gal tank is taken out of service for maintenance.

The water treatment facility includes a 60-ft by 100-ft building (approx.), a 12,000-gal potable water storage tank located inside the water treatment building, a water treatment process incorporating coagulation, filtration and chlorination functions, a recycle sump, a wastewater cistern, and associated system electrical power distribution and controls. The potable water treatment facility is capable of providing potable water at a production rate of 50 gal/ min, which will meet the current demand of approximately 42,000 gal/day (the average use at 100-K has been approximately 138 gal per day, per person). Currently, approximately 150 are people located at 100-K.

The potable water treatment facility employ conventional strainers, coagulation using aluminum chlorohydrate (ACH), pre-chlorination using sodium hypochlorite, two microfiltration units (Pall AP-2) in parallel, post-chlorination using sodium hypochlorite, and contact piping to produce potable water meeting applicable WDOH quality and disinfection requirements. The Pall AP-2 microfilters use Pall Microza™[1] pressure membrane technology.

---

[1]Microza is a trademark of Asahi Kasei Kogyo Kabushiki Kaisha Corporation, Osaka, Japan.

The microfilters modules are periodically backwashed and cleaned by enhanced flux maintenance (EFM) or a clean-in-place (CIP) process. The EFM uses a combination of sodium hypochlorite and warm water. The CIP process uses sodium hypochlorite, citric acid, sodium hydroxide, and neutralization with sodium bisulfate. Discharge of the CIP solution goes to an underground waste cistern located south of the 189-K water treatment facility.

Following treatment, the potable water is distributed to the 100-K Area facilities. Currently, there are five service connections. These include the 105KW and Cold Vacuum Drying facilities, and three mobile trailers, including the 189K Water Treatment Facility.

3.2 200 EAST AREA SECTION OF THE 200 WEST PUBLIC WATER SYSTEM

The 200 East Area section of the 200 West Public Water System provides water to approximately 3,000 people. The 283-E water treatment plant has been placed in an out-of-service condition and is not used for potable water production. Treated water is provided from the 200 West water system (ID 001004) (SO4) to the 283-E water treatment plant clearwells, which serve as reservoirs to supply the 200 East Area potable water distribution system. The two 283E clearwells have a combined capacity of approximately 365,000 gal. A booster sodium hypo chlorinator system located at the 283-E facility increases the chlorine residual of the treated water before it reaches the clearwells. In addition to the clearwells, a 1.1-million-gal reservoir equipped with a 4,500-gal/min fire pump provides storage and serves as a backup in case of primary system failure.

With an engineering effort and approval from WDOH, the 283-E treatment plant could be placed in service in the future to support activities such as maintenance outages at the 283-W water treatment plant or other major system failures.

The 200 East and 200 West distribution system mains comprise 16-in 12-in, 8-in, 6-in, and 4-in piping. Distribution system pressure is maintained at approximately 110lb. /in^2. Approximately 12,000 linear ft. of 12-in. piping connect the 200 East and 200 West Area water systems.

3.3 200 WEST AREAPUBLIC WATER SYSTEM

The 200 West Public Water System, ID 001004, is a NTNC system serving approximately 2,300 people (2E/2W combined 5,5299 people indicated on the WFI) with 189 service connections. The 200 West Public Water System also supplies the 200 East Area distribution system. The primary source of water for this system is identified as SO3, the Export System. If the plant is removed from service in support of maintenance activities, the 283-E Plant (SO4) would provide potable water to the 200 West and 200 East Area distribution systems.

Under normal operating conditions, the 100-B or 100-D Area supplies water to the 283-W water treatment plant. Each area pumps water from the Columbia River to a 25,000,000-gal reservoir where primary coarse settling takes place and may be supplied directly to the grid. From the reservoir, the water is transferred via the Export Water System to the three million –gal raw water reservoirs in 200-E and 200-W areas. The raw water is then pumped into the distribution piping and to the 283-W Potable Water Treatment Plant where the following treatment processes occur: coagulation, flocculation, sedimentation, filtration and disinfection.

Aluminum sulfate is introduced at the flash mixing chamber where coagulation occurs. Variable speed flocculators at the inlet to each sedimentation basin provide productive flocculation. Baffles downstream of the flocculators reduce turbulence and promote a laminar flow of the water to aid in the sedimentation process. Each sedimentation basin and flocculator section has a capacity of approximately 169,700 gal.

Disinfection is accomplished through the use of chlorine. The plant may pre-chlorinate the raw water before it enters the sedimentation basins. After sedimentation, the water passes over a weir and is passed through one or two of a bank of four filters. The maximum rated design capacity of each filter is 896 gal/min, giving a total rated filtration capacity of 3,584 gal/min for the 283-W plant.

Filtered water flows from the bottom of each filter into a common filter effluent discharge header before flowing to the common influent flume to the clearwells. The 283W Water Treatment Plants has a maximum output flow of 1,500gal/min, based upon the last WDOH required Tracer Study, which determines Clearwell Disinfection Contact Time (CT). This is a very important management data point. In order to meet some of the needs for the WTP PW demand during their operational phase, Water Utilities will need to perform another Tracer Study to obtain additional data points which will allow for higher operational flow rates. Gallery pipe size will limit the maximum combined filter effluent flow rate capacity of the effluent header to approximately 2000 gpm. Chlorine is injected into each filter effluent discharge for primary disinfection purposes. The 200 West Area plant houses two clearwells, each with a storage capacity of approximately 200,000 gal. In addition to the clearwells, a 1.1-million-gal reservoir equipped with a 4,500-gal/min fire pump provides storage and serves as a backup in case of primary system failure.

The plant's backwash water and settling basin drains are collected in an equalization tank before being pumped into the Effluent Treatment Plant piping.

The 200 East and 200 West Area distribution system mains comprise 16-in, 12-in, 10-in, 8-in, and 6-in. piping. Distribution system pressure is maintained at approximately 105 lb. /in^2. Approximately 12,000 linear feet of 12-in piping connect the 200 East and 200 West Area water systems.

3.4 400 AREA PUBLIC WATER SYSTEM

The 400 Area Public Water System, ID 419470, is a Non Transient Non Community (NTNC) system with 5 service connections serving approximately 26 people.

The 400 Area receives water from three underground deep water wells (P-14, P-15 and P-16).

Table 3-1. Drinking Water Wells in the 400 Area.

Well Identification Number	Installation Date	Well Depth	Average Pumping Rate (Gallons/minute)
P-16 (499-S1-8J)	1985	122 m (401 ft)	220
P-14 (499-SO-8)	1972	90 m (280 ft)	200
P-15 (499-SO-7)	1972	122 m (395 ft)	220

Of the three pumps, P-16 (499-S1-8J) is the primary well. The FFTF Complex has been deactivated and is in long-term surveillance and maintenance mode. The Maintenance and Storage Facility (MASF) is being utilized by the Sludge Treatment Project, which accounts for the majority of the personnel in the 400 Area. As the facilities within the complex are shut down, the drinking water need also goes down. In 2013, 13,101,000 gals were pumped from the primary P-16 well. Emergency backup wells P-14 (499-SO-8) and P-15 (499-SO-7) did not supply water to 400 Area consumers during 2013. The P-16 water well provides water to a common header that supplies two aboveground storage tanks having a total capacity of approximately 1 million gal. Tank T-58 is located at 482A Building, and Tank T-87 is located at 482B Building. The raw water is chlorinated (sodium hypochlorite) at the common header before being pumped to the storage tanks to prevent algae growth in the storage tanks. The water is then distributed throughout the 400 Area for potable, process, and fire protection use.

The primary pump house (481 Building) houses two potable water pumps and serves as the distribution pumping station for the 400 Area. Both of the potable water pumps are rated at 400 gal/min. Normal operation is satisfied by one of these pumps. When required, the second pump is placed in service. Additionally, an electrically driven fire pump, rated at 1,500 gal/min, is automatically activated under low-pressure conditions (100 psi). The second pump house (481A Building) has been removed from service.

3.5 300 AREA PUBLIC WATER SYSTEM

The 300 Area water system, identification number 418408, is a NTNC (non-transient non-community) system with 18 non-residential service connections, serving approximately 715 people. The system is supplied from the City of Richland, source number SO-2 (#72250W, Richland) through redundant 16-inch feeds to the 385 pumping station building. This source provides normal flows at a pressure of 60 to 70 psig, and can supply in excess of 4000 gallons per minute (gpm) at 36 pounds per square inch (psig) for 4 hours.

The distribution system flows and pressure are controlled by four variable-speed drive booster pumps located inside the 385 building based on system parameters monitored by a programmable logic controller (PLC). Pumps 1 and 2 are 83 gpm, 10 hp, 480V electrical motors, and pumps 3 and 4 are 267 gpm, 25 hp, 480V electrical motors. At times of peak system demand, typically due to the activation of a fire suppression system in the 300 Area, two additional pumps are available. The electric fire pump is a 2,000 gpm, 125 hp, 480V electrical motor. The diesel fire pump is a 2,000 gpm, 123 hp diesel engine powered pump. A programmable logic controller (PLC) is used to control system operation with Pumps 1 – 4 operating to provide for normal system flows, the electric fire pump used for high system flows and the diesel pump used during periods of very high system demand.

During operations, the chlorine residual is monitored and recorded. A pair of variable-speed injection pumps supply sodium hypochlorite as needed to maintain free chlorine residual between 0.5 and 1.5 milligrams per liter (mg/L).

4.0 ELEMENT 1 – WATER FACILITIES INVENTORY (4.C OF 246-290-105)

4.1 PURPOSE

WDOH sends a WFI form with the instructions for completing the WFI to all operators of Group A water systems each year. The WFI provides useful contact information about the water system, including current names, addresses, and telephone numbers of system owners, operators, and emergency contact persons. The purpose of this element is to document current system information on the water facilities inventory (WFI) issued by WDOH.

4.2 BACKGROUND

WAC 246-290-105 requires that water system operators have a copy of their WFI in their SWSMP. WDOH sends a WFI to Group A system operators every year.
WAC 246-290-480(2)(e), "Recordkeeping and Reporting," requires systems to notify WDOH within 30 days if there have been changes to the system name, category, ownership, or management responsibility. The information on the WFI is reviewed by the water purveyor and necessary changes are made. After WDOH receives a corrected WFI, WDOH updates its computer database to reflect any changes and sends an updated WFI back to the system operator. The water purveyor maintains the WFI on file.

4.3 DISCUSSION

The WFIs for the 200 West Area, ID 00100 4 (which includes 200 East Area), 100-K Area, ID 00177 J, 300 Area, ID 418408 and 400 Area, ID 419470, are included in this section.

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 3
Updated: 04/09/2014
Printed: 9/17/2014
WFI Printed For: On-Demand
Submission Reason: Pop/Connect

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
00177 J	ENERGY, DEPT OF/100K	BENTON	A	N NC

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 012914
MARY ANN GREEN [WATER PURVEYOR] PO BOX 1600 MS:X3-20 RICHLAND, WA 99352	ENERGY DEPT OF, US-RLOO SHEILA HAHN PO BOX 550 MS: A2-15 RICHLAND, WA 99352	TITLE: PROGRAM ENGINEER
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP	STREET ADDRESS IF DIFFERENT FROM ATTN SHEILA HAHN ADDRESS 825 JADWIN CITY RICHLAND STATE WA ZIP 99352	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (509) 373-1463	Owner Daytime Phone: (509) 376-5940
Primary Contact Mobile/Cell Phone: (509) 480-1567	Owner Mobile/Cell Phone: (509) 205-7824
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax:(509) 376-5314 | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [ ] Commercial / Business
- [ ] Day Care
- [ ] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [x] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [ ] Residential
- [ ] School
- [ ] Temporary Farm Worker
- [ ] Other (church, fire station, etc.):

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [ ] City / Town
- [ ] County
- [x] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons): 12,000

15 Source Number	16 SOURCE NAME (LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456. IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE)	17 INTERTIE (INTERTIE SYSTEM ID NUMBER)	18 SOURCE CATEGORY: WELL	WELL FIELD	WELL IN A WELL	SPRING	SPRING FIELD	SPRING IN	SEA WATER	SURFACE WATER	TRANSFER INF.	OTHER	19 USE: PERMANENT	SEASONAL	EMERGENCY	20 SOURCE METERED	21 TREATMENT: NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	22 DEPTH: OPEN INTERVAL IN FEET	DEPTH TO FIRST	23 CAPACITY (GALLONS PER MINUTE)	24 SOURCE LOCATION: 1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 04/07/2011 COLUMBIA RIVER									X			X					X	X			X			32000	NE SE	32	14N	26E
S02	Export Line									X			X			N		X	X			X			50	SE SW	02	13N	25E

DOH 331-011 (Rev. 06/03)

Page: 1

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
00177 J	ENERGY, DEPT OF/100K	BENTON	A	NTNC

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	0	Undetermined
A. Full Time Single Family Residences (Occupied 180 days or more per year)	0		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	5	5	
28. TOTAL SERVICE CONNECTIONS		5	

29. FULL-TIME RESIDENTIAL POPULATION	
A. How many residents are served by this system 180 or more days per	0

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												
31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												
32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	210	210	210	210	210	210	210	210	210	210	210	210
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31
33. ROUTINE COLIFORM SCHEDULE	1	1	1	1	1	1	1	1	1	1	1	1

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____
DATE: _____

PRINT NAME: _____
TITLE: _____

DOH 331-011 (Rev. 06/03) Page: 2

Washington State Department of Health

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 3
Updated: 04/09/2014
Printed: 9/17/2014
WFI Printed For: On-Demand
Submission Reason: Contact Update

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
41947 0	ENERGY, DEPT OF/400 AREA	BENTON	A	NTNC

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 012914
MARY ANN GREEN [WATER PURVEYOR] PO BOX 1600 MS:X3-20 RICHLAND, WA 99352	ENERGY DEPT OF, US-RLOO SHEILA HAHN PO BOX 550 MS: A2-15 RICHLAND, WA 99352	TITLE: PROGRAM ENGINEER
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP	STREET ADDRESS IF DIFFERENT FROM ATTN SHEILA HAHN ADDRESS 825 JADWIN CITY RICHLAND STATE WA ZIP 99352	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (509) 373-1463	Owner Daytime Phone: (509) 376-5940
Primary Contact Mobile/Cell Phone: (509) 480-1567	Owner Mobile/Cell Phone: (509) 205-7824
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax: | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [ ] Commercial / Business
- [ ] Day Care
- [ ] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [x] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [ ] Residential
- [ ] School
- [ ] Temporary Farm Worker
- [ ] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [ ] City / Town
- [ ] County
- [x] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons): 606,000

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY									19 USE			20	21 TREATMENT					22 DEPTH	23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SPATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL	SPRING	SPRING FIELD	DRAINGLITH	SEA WATER	SURFACE WATER	RAINWATER	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL, IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	499-S07 P-15		X												X			X					395	220	NW SW	18	11N	28E
S02	499-S08 P-14		X												X			X					280	200	NW SW	18	11N	28E
S03	499-S1-8J P-16		X										X					X					401	220	NW SW	18	11N	28E

DOH 331-011 (Rev. 06/03)

Page: 1

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
41947 0	ENERGY, DEPT OF/400 AREA	BENTON	A	NTNC

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	0	Undetermined
A. Full Time Single Family Residences (Occupied 180 days or more per year)	0		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	5	5	
28. TOTAL SERVICE CONNECTIONS		5	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per: 0

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	26	26	26	26	26	26	26	26	26	26	26	26
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	1	1	1	1	1	1	1	1	1	1	1	1

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____
DATE: _____

PRINT NAME: _____
TITLE: _____

DOH 331-011 (Rev. 06/03) Page: 2

Washington State Department of Health

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 3
Updated: 05/07/2014
Printed: 9/17/2014
WFI Printed For: On-Demand
Submission Reason: Pop/Connect

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
00100 4	ENERGY, DEPT OF/200W	BENTON	A	NTNC

6. PRIMARY CONTACT NAME & MAILING ADDRESS	7. OWNER NAME & MAILING ADDRESS	8. Owner Number 012914
SAMUEL L. CAMP, JR [WATER PURVEYOR] PO BOX 650 MS:S0-20 RICHLAND, WA 99352	ENERGY DEPT OF, US-RLOO SHEILA HAHN PO BOX 550 MS: A2-15 RICHLAND, WA 99352	TITLE: PROGRAM ENGINEER
STREET ADDRESS IF DIFFERENT FROM ABOVE ATTN ADDRESS CITY STATE ZIP	STREET ADDRESS IF DIFFERENT FROM ATTN SHEILA HAHN ADDRESS 825 JADWIN CITY RICHLAND STATE WA ZIP 99352	

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (509) 372-0175	Owner Daytime Phone: (509) 376-5940
Primary Contact Mobile/Cell Phone:	Owner Mobile/Cell Phone: (509) 205-7824
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax: | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)

- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)

- [ ] Agricultural
- [ ] Commercial / Business
- [ ] Day Care
- [ ] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [x] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [ ] Residential
- [ ] School
- [ ] Temporary Farm Worker
- [ ] Other (church, fire station, etc.): _____

13. WATER SYSTEM OWNERSHIP (mark only one)

- [ ] Association
- [ ] City / Town
- [ ] County
- [x] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons): 2,200,000

15	16 SOURCE NAME	17 INTERTIE	18 SOURCE CATEGORY									19 USE			20	21 TREATMENT					22 DEPTH		23	24 SOURCE LOCATION			
Source Number	LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XY2456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SEATTLE	INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL IN A WELL	SPRING	SPRING FIELD	SPRING IN SPRING FIELD	SEA WATER	SURFACE WATER	RAINWATER	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	UV DISINFECTION	OTHER	OPEN INTERVAL IN FEET	DEPTH TO FIRST	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	InAct 07/12/1991 COLUMBIA RIVER									X			X			Y		X	X			X			4400	NW NE	11	13N	25E
S02	InAct 07/12/1991 COLUMBIA RIVER									X			X			Y		X	X			X			5100	SW SE	15	14N	26E
S03	EXPORT LINE									X			X					X	X			X			5100		02	13N	25E

DOH 331-011 (Rev. 06/03)

Page: 1

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
00100 4	ENERGY, DEPT OF/200W	BENTON	A	NTNC

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	0	Undetermined
A. Full Time Single Family Residences (Occupied 180 days or more per year)	0		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	189	189	
28. TOTAL SERVICE CONNECTIONS		189	

29. FULL-TIME RESIDENTIAL POPULATION

A. How many residents are served by this system 180 or more days per 0

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												
31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												
32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	5299	5299	5299	5299	5299	5299	5299	5299	5299	5299	5299	5299
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31
33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	6	6	6	6	6	6	6	6	6	6	6	6

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____

DATE: _____

PRINT NAME: _____

TITLE: _____

DOH 331-011 (Rev. 06/03) Page: 2

Washington State Department of Health

WATER FACILITIES INVENTORY (WFI) FORM

ONE FORM PER SYSTEM

Quarter: 3
Updated: 06/25/2014
Printed: 9/17/2014
WFI Printed For: On-Demand
Submission Reason: Contact Update

RETURN TO: Eastern Regional Office, 16201 E Indiana, Suite 1500, Spokane Valley, WA, 99216

1. SYSTEM ID NO.	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
41840 8	ENERGY, DEPT OF/300 AREA	BENTON	A	NTNC

6. PRIMARY CONTACT NAME & MAILING ADDRESS
GREGORY L. FUNNELL [WATER PURVEYOR]
WASHINGTON CLOSURE HANFORD, LLC
2620 FERMI AVE MSIN L1-04
RICHLAND, WA 99354

STREET ADDRESS IF DIFFERENT FROM ABOVE
ATTN
ADDRESS
CITY STATE ZIP

7. OWNER NAME & MAILING ADDRESS
ENERGY DEPT OF, US-RLOO
SHEILA HAHN
PO BOX 550 MS: A2-15
RICHLAND, WA 99352

8. Owner Number 012914
TITLE: PROGRAM ENGINEER

STREET ADDRESS IF DIFFERENT FROM
ATTN SHEILA HAHN
ADDRESS 825 JADWIN
CITY RICHLAND STATE WA ZIP 99352

9. 24 HOUR PRIMARY CONTACT INFORMATION	10. OWNER CONTACT INFORMATION
Primary Contact Daytime Phone: (509) 531-8162	Owner Daytime Phone: (509) 376-5940
Primary Contact Mobile/Cell Phone: (509) 205-8012	Owner Mobile/Cell Phone: (509) 205-7824
Primary Contact Evening Phone: (xxx) xxx-xxxx	Owner Evening Phone: (xxx) xxx-xxxx
Fax: | E-mail: XXXXXX	Owner Fax Phone: | E-mail: XXXXXX

WAC 246-290-420(9) requires that water systems provide 24-hour contact information for emergencies.

11. SATELLITE MANAGEMENT AGENCY - SMA (check only one)
- [x] Not applicable (Skip to #12)
- [ ] Owned and Managed SMA NAME: _____ SMA Number:
- [ ] Managed Only
- [ ] Owned Only

12. WATER SYSTEM CHARACTERISTICS (mark all that apply)
- [ ] Agricultural
- [ ] Commercial / Business
- [ ] Day Care
- [ ] Food Service/Food Permit
- [ ] 1,000 or more person event for 2 or more days per year
- [ ] Hospital/Clinic
- [x] Industrial
- [ ] Licensed Residential Facility
- [ ] Lodging
- [ ] Recreational / RV Park
- [ ] Residential
- [ ] School
- [ ] Temporary Farm Worker
- [ ] Other (church, fire station, etc.).

13. WATER SYSTEM OWNERSHIP (mark only one)
- [ ] Association
- [ ] City / Town
- [ ] County
- [x] Federal
- [ ] Investor
- [ ] Private
- [ ] Special District
- [ ] State

14. STORAGE CAPACITY (gallons)
0

15	16	17	18								19			20	21					22	23	24			
Source Number	SOURCE NAME LIST UTILITY'S NAME FOR SOURCE AND WELL TAG ID NUMBER. Example: WELL #1 XYZ456 IF SOURCE IS PURCHASED OR INTERTIED, LIST SELLER'S NAME Example: SPATTLE	INTERTIE INTERTIE SYSTEM ID NUMBER	WELL	WELL FIELD	WELL W/A WELL	SPRING	SPRING FIELD	SPRING IN SEA WATER	SURFACE WATER	RAINWT INF.	OTHER	PERMANENT	SEASONAL	EMERGENCY	SOURCE METERED	NONE	CHLORINATION	FILTRATION	FLUORIDATION	IRRADIATION (UV)	OTHER	DEPTH TO FIRST OPEN INTERVAL IN FEET	CAPACITY (GALLONS PER MINUTE)	1/4, 1/4 SECTION	SECTION NUMBER	TOWNSHIP	RANGE
S01	COLUMBIA RIVER								X					X			X	X			X		3200	SW NW	11	10N	28E
S02	72250W/RICHLAND	72250 W										X					X						0			00N	00E

DOH 331-011 (Rev. 06/03)

Page: 1

WATER FACILITIES INVENTORY (WFI) FORM - Continued

1. SYSTEM ID	2. SYSTEM NAME	3. COUNTY	4. GROUP	5. TYPE
41840 8	ENERGY, DEPT OF/300 AREA	BENTON	A	NTNC

	ACTIVE SERVICE CONNECTIONS	DOH USE ONLY! CALCULATED ACTIVE CONNECTIONS	DOH USE ONLY! APPROVED CONNECTIONS
25. SINGLE FAMILY RESIDENCES (How many of the following do you have?)	0	0	Undetermined
A. Full Time Single Family Residences (Occupied 180 days or more per year)	0		
B. Part Time Single Family Residences (Occupied less than 180 days per year)	0		
26. MULTI-FAMILY RESIDENTIAL BUILDINGS (How many of the following do you have?)			
A. Apartment Buildings, condos, duplexes, barracks, dorms	0		
B. Full Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied more than 180 days/year	0		
C. Part Time Residential Units in the Apartments, Condos, Duplexes, Dorms that are occupied less than 180 days/year	0		
27. NON-RESIDENTIAL CONNECTIONS (How many of the following do you have?)			
A. Recreational Services and/or Transient Accommodations (Campsites, RV sites, hotel/motel/overnight units)	0	0	
B. Institutional, Commercial/Business, School, Day Care, Industrial Services, etc.	20	20	
28. TOTAL SERVICE CONNECTIONS		20	

29. FULL-TIME RESIDENTIAL POPULATION	
A. How many residents are served by this system 180 or more days per	0

30. PART-TIME RESIDENTIAL POPULATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many part-time residents are present each month?												
B. How many days per month are they present?												

31. TEMPORARY & TRANSIENT USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. How many total visitors, attendees, travelers, campers, patients or customers have access to the water system each month?												
B. How many days per month is water accessible to the public?												

32. REGULAR NON-RESIDENTIAL USERS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
A. If you have schools, daycares, or businesses connected to your water system, how many students daycare children and/or employees are present each month?	715	715	715	715	715	715	715	715	715	715	715	715
B. How many days per month are they present?	31	28	31	30	31	30	31	31	30	31	30	31

33. ROUTINE COLIFORM SCHEDULE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	1	1	1	1	1	1	1	1	1	1	1	1

35. Reason for Submitting WFI:

☐ Update - Change ☐ Update - No Change ☐ Inactivate ☐ Re-Activate ☐ Name Change ☐ New System ☐ Other _____

36. I certify that the information stated on this WFI form is correct to the best of my knowledge.

SIGNATURE: _____
DATE: _____

PRINT NAME: _____
TITLE: _____

DOH 331-011 (Rev. 06/03) Page: 2

This page intentionally left blank.

5.0 ELEMENT 2 – WATER QUALITY MONITORING PROGRAM (4.P OF 246-290-105)

5.1 PURPOSE

The purpose of this element is to identify the type, frequency, and location of baseline water quality monitoring (testing) required by regulations.

5.2 BACKGROUND

The national primary drinking water regulations (40 *Code of Federal Regulations* [CFR] 141, "National Primary Drinking Water Regulations") under the *Safe Drinking Water Act* set water quality standards for public water supplies (maximum contaminant levels [MCL]), and the regulations also establish monitoring and public notification requirements for public water systems. To establish synchronized, standardized, and simplified compliance monitoring across several existing and upcoming rules, EPA established the standard monitoring framework (SMF). Under the SMF, most of the chemical monitoring requirements were phased into a 9-year standard monitoring cycle made up of initial sampling requirements (1 year), periods (3 years), and cycles (3 periods, or 9 years). Monitoring has three levels of activity:

- Initial monitoring
- Baseline monitoring
- Follow-up monitoring.

Initial monitoring applies to new source development and/or new groups of contaminants and is in effect for a short period of time. Baseline monitoring is routine monitoring assigned to a source/system over a long period based on results of the initial monitoring. Finally, follow-up monitoring reflects an increase in monitoring activity from the baseline because chemicals or contaminants were detected in the water. Whenever a detection is above an identified trigger and/or MCL, the assigned monitoring frequency shifts from the baseline schedule to the appropriate follow-up monitoring schedule.

WAC 246-290-300, "Monitoring Requirements," contains state regulations that outline water quality monitoring requirements. Each public water system is required to develop and carry out a schedule of required monitoring. In addition, each Group A public water system is required by WAC 246-290-415 to maintain a comprehensive monitoring plan for all contaminants under WAC 246-290-300. The Comprehensive Chemical/Physical Contaminant Monitoring Program Plan is included in Appendix C. Public water systems are expected to collect the appropriate samples and send them to a WDOH-certified laboratory for analysis, along with a request for the laboratory to send a copy of the analysis to both the water purveyor and the WDOH.

For each test conducted, the laboratory report should include the following:

- Results of the analysis for each required compound.
- A list of trigger levels and MCLs for each compound analyzed.

If the test results exceed the "trigger" levels, the water purveyor will be required to begin a follow-up monitoring program (i.e., a program with an increase in the number of samples

required). If the test results exceed the MCL, the water purveyor will be required to perform the following:

- Start a follow-up monitoring program.
- Satisfy public notification requirements.
- Notify WDOH and, if appropriate, take steps to correct the problem.

Table 5-1 describes the types of contaminants required to be tested, when to sample, where to sample, and if waivers are available. This table is updated when the monitoring requirements change. Waivers are the mechanism that allows WDOH to reduce monitoring requirements for selective contaminants to less than the baseline schedule. Waivers are granted by WDOH on a source-specific basis, as well as on a state-wide basis, where the risk of contamination has been determined to be low.

Table 5-1. Type of Contaminants, Sampling Frequency, Location, and Waivers. (2 sheets)

Contaminant	When to Sample	Where to Sample	Waiver?
Total Coliform Bacteria	Number of samples required per WAC 246-290-300-1. This monthly requirement to be shown in system's Coliform Monitoring Plan.	From representative points throughout distribution systems as indicated in the Coliform Monitoring Plan.	No
Nitrate	Baseline: One sample every years.* Follow-up: One sample every 3 months after a detection above the trigger of 5.0 mg/L. **NOTE: Nitrate is included as a standard part of a complete inorganic chemical analysis.*	From each active permanent and seasonal source after treatment and prior to entering the distribution system.	No
Complete Inorganic Chemical and Physical	Baseline (for groundwater sources): One sample every 3 years. Baseline (for surface sources): One sample annually. Follow-up: One sample every 3 months after a chemical detection above a trigger value.	From each active permanent and seasonal source after treatment and prior to entering the distribution system.	Yes
Volatile Organic Compound (VOC)	Baseline (for groundwater sources): One sample every 3 years. Baseline (for surface sources): One sample annually. Follow-up: One sample every 3 months after a detection of any compound in excess of the trigger of 0.5 µg/L.	From each active permanent and seasonal source after treatment and prior to entering the distribution system.	Yes
Synthetic Organic Chemicals (SOC)	Baseline (for systems with populations <3,300): One set of samples every 3 years.* Follow-up: One sample every 3 months for any individual test method that showed detection above a trigger. **NOTE: A standard set of SOC samples includes test methods 525.2, 515.1, and 531.1.*	From each active permanent and seasonal source after treatment and prior to entering the distribution system.	Yes
Lead and Copper	This is an ongoing monitoring program. Sampling requirements may change depending on the findings of previous monitoring.	Samples taken from the distribution system at targeted sample tap locations.	No

Table 5-1. Type of Contaminants, Sampling Frequency, Location, and Waivers. (2 sheets)

Contaminant	When to Sample	Where to Sample	Waiver?
Radionuclides	Monitoring for radionuclides shall be conducted under 40 CFR 141. 26.	From each active permanent and seasonal source after treatment and prior to entering the distribution system.	N/A
Asbestos	One sample every 9 years.	From the distribution system or if required by WDOH, from the source	Yes
Cryptosporidium and E. Coli	Sampling per WAC 246-290-630(16)[1] and 40 CFR141.701 and 702[2].	Source water in accordance with 40 CFR 141.703	N/A
Disinfection Byproducts – TTHMs and HAA5s	Sampling per WAC 246-290-300(6)[1 and 40 CFR 141.132(b)(1) and 40 CFR 141.600-629].	Samples taken from the distribution system at targeted sample tap locations.	N/A
Disinfectant Residuals – Chlorine	Sampling per 40 CFR 141.132(c)(1).[2]	Samples taken after treatment prior to distribution and from the distribution system at targeted sample tap locations.	N/A
Disinfection Precursors – Total Organic Carbon	Sampling per 40 CFR 141.132(d).[2]	Samples collected from the source and	N/A

[1]WAC-246-290, "Group A Public Water Supplies," *Washington Administrative Code*, as amended, Olympia, Washington.
[2]40 CFR 141, "National Primary Drinking Water Regulations," Title 40, *Code of Federal Regulations*, Part 141, as amended.

Each spring, WDOH will send each system operator a water quality monitoring schedule (WQMS) that identifies the core water quality monitoring requirements for the next calendar year. The purpose is to provide a simple reminder of upcoming water quality sampling requirements. The requirements in the report will reflect the current system status based on regulatory requirements and the monitoring history of the public water system. As waivers are applied for and granted, the listed monitoring requirements will be edited to reflect those changes. If the monitoring requirements change as a result of the detection of regulated compounds above their trigger values (moving from baseline monitoring to follow-up), WDOH will update the WQMS for the next year. The water purveyor must adjust the sampling schedule to reflect these types of changes. It is very important that the public water system operator keep a copy of all laboratory sample results, as this will help the public water system operator document that required monitoring has been completed.

5.3 DISCUSSION

To ensure uniform interpretation and application of the state and federal water regulations across the Hanford Site, to provide the most cost-effective sampling program, and to ensure that appropriate monitoring is performed for the diverse public water systems on Site, all monitoring plans, procedures, and schedules for the CHPRC 100-K, 400 Area, MSA 200 and 300 Area

public water systems are prepared and implemented by the MSA Water/Sewer Projects & Programs Department. Sampling frequency requirements for all Hanford Site public water systems have been determined through the use of the SMF and WDOH WQMSs.

Samples are collected by state-certified personnel and are shipped to a state-accredited laboratory for analysis on the same day of sample collection. State-approved procedures and/or laboratory-specific procedures are followed for the collection and timely transport of the samples. Chain-of-custody control further ensures that the requirements are met for documenting and maintaining custody of the samples from their point of origin to receipt at the laboratory. Results of testing are reported to the Water Monitoring Department and WDOH directly from the state-certified laboratories performing the analyses.

The WQMS for the 100-K Area, 200 West Area, 300 and 400 Area public water systems are maintained in the MSA Water/Sewer Projects & Programs Department repositories.

The following plans are required by WDOH for the 100-K Area, 200 West Area, 300 Area and 400 Area public water systems. They are maintained at the MSA Water/Sewer Projects & Programs Department,

- CY 2014, *Hanford Site Comprehensive Coliform Monitoring Plan*
- CY 2014, *Hanford Site Comprehensive Organic Monitoring Plan*
- CY 2014, *Hanford Site Comprehensive Inorganic Monitoring Plan*
- CY 2014, *Hanford Site Comprehensive Disinfection/Disinfectant Byproducts Rule Stage II Monitoring Plan*.

6.0 ELEMENT 3 – CONSUMER CONFIDENCE REPORT (NOT LISTED IN 246-290-105)

6.1 PURPOSE

A Consumer Confidence Report is a brief educational water quality report that summarizes the results of the previous year's monitoring. It can be distributed to your customers each year.

6.2 BACKGROUND

The consumer confidence report regulation (40 CFR 141, Subpart O) applies to Group A community water systems only. The regulation requires system operators to develop and send a report to their user that declares whether or not their water meets state and federal health standards. The report will help people make informed choices about the water that they drink. The first annual report was due October 19, 1999. Future reports are due by July 1 each year.

6.3 DISCUSSION

In accordance with WAC 246-290-72001(1), "Purpose and Applicability of the Consumer Confidence Report Requirements," the consumer confidence report applies only to community water systems. This regulation does not apply to transient non-community (TNC), NTNC, or Group B water systems. Because the 100-K Area, 200 Areas, 300 Area and 400 Area public water systems are NTNC, this regulation does not apply and a consumer confidence report is not required.

This page intentionally left blank.

7.0 ELEMENT 4 – PREPARING FOR YOUR SANITARY SURVEY (NOT LISTED IN 246-290-105)

7.1 PURPOSE

The purpose of this element is to identify how to prepare for and follow up on a sanitary survey.

7.2 BACKGROUND

WAC 246-290-416, "Sanitary Surveys," requires routine sanitary surveys for all Group A systems at least once every 5 years for groundwater sources and every 3 years for surface water sources. Sanitary surveys are periodic inspections of water system facilities, operations, and recordkeeping by WDOH staff or by a WDOH-qualified designee (i.e., third-party sanitary surveyor). These inspections identify conditions that may present a potential or existing sanitary risk, such as failing infrastructure or lack of certain maintenance practices. The surveyor will provide a standard "WDOH Survey Report Checklist" or a WDOH letter stating the findings of the survey and recommendations on how to correct any problems. The content of the inspection will vary depending on whether WDOH personnel or a third-party surveyor conduct the survey. All surveys, however, will include, at a minimum, a review of the following issues:

- WFI
- Coliform monitoring history and coliform monitoring plan
- Source water quality monitoring
- Inspection of sources and storage facilities.

In addition, WDOH surveys may include discussion of the following issues:

- Well head or watershed protection program
- Status of cross-connection control program (CCCP)
- Water right discussion and self-assessment requirements
- Water use records
- Operator certification status and amount of training support.

7.3 DISCUSSION

WDOH Eastern Regional Office in Spokane, Washington, conducts sanitary surveys at the 100-K Area, 400 Area, 200 West Area and 300 Area public water systems. The water purveyor receives advanced notice from WDOH regarding the scheduled sanitary survey. MSA protocols for regulatory inspections are followed during the sanitary survey.

This page intentionally left blank.

8.0 ELEMENT 5 – ANNUAL OPERATING PERMIT (4.B OF 246-290-105)

8.1 PURPOSE

The purpose of this element is to document the system's compliance status at the time the permit is issued and for noncomplying systems to develop a plan to achieve compliance.

8.2 BACKGROUND

The *Revised Code of Washington* (RCW) 70.119A.110, "Public Health and Safety, Public water systems – Penalties and compliance," requires that all Group A water systems obtain an annual operating permit from WDOH. Each system receives a permit with a designated color (i.e., green, yellow, red, or blue) that signifies the system's current compliance status. Table 8-1 summarizes what each color designation signifies.

Table 8-1. Operating Permit Colors and Their Significance. (2 sheets)

Operating Permit Color	Operating Permit Compliance Parameters
Green	The water system is in substantial compliance with operating permit criteria in WAC 246-294-040(2), "Operating Permit Categories."[1]
Yellow	One or more of the following conditions exist: • The system has not complied with water system plan provision of WAC 246-290-100[1]. • The system has not complied with water system financial viability provisions of RCW 70.119A.100[2] and WAC 246-290-100(4) (h)[1]. • The system has not complied with operator certification provisions of WAC 246-292, "Water Works Operator Certification."[1] • The system has not complied with coliform or inorganic chemical monitoring provisions of WAC 246-290-300[1]. • The system has not complied with inorganic or volatile organic chemical MCLs in accordance with WAC 246-290-310, "Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs)."[1]
Red	One or more of the following conditions exist: • The system has been issued a health order in accordance with WAC 246-290-050, "Enforcement."[1] • The system is in violation of any departmental order issued under WAC 246-290-050[1] or federal administrative order issued under Section 1414(g) of the *Safe Drinking Water Act*.[3] • The system is confirmed by the department as an unresolved significant non-complier. • The system has exceeded the maximum number of services allowed in the distribution system by departmental approval.

Table 8-1. Operating Permit Colors and Their Significance. (2 sheets)

Operating Permit Color	Operating Permit Compliance Parameters
Blue	One or more of the following conditions exist: • The system exceeded the maximum number of connections approved by WDOH. • The system has not received design approval by WDOH.

[1]WAC-246-290, "Group A Public Water Supplies," *Washington Administrative Code*, as amended, Olympia, Washington.
[2]RCW 70.119A, "Public Health and Safety, Public water systems – Penalties and compliance," *Revised Code of Washington*, as amended, Olympia, Washington.
[3]*Safe Drinking Water Act*, Public Law 93-523, 88 Stat. 1660 (Title 21), as amended.
WDOH = Washington State Department of Health.

8.3 DISCUSSION

Currently, the 100-K Area, 200 West Area, 300 Area and 400 Area public water systems are category colored Blue. Systems in a Blue category are considered adequate for existing uses, but are not considered adequate for adding new service connections without WDOH approval. The current operating permits for the 100-K Area, 200 West Area, 300 Area and 400 Area public water systems are available upon request to the MSA Water Purveyor.

9.0 ELEMENT 6 – CROSS-CONNECTION CONTROL PROGRAM

9.1 PURPOSE

The purpose of this element is to present information required to implement a CCCP (Cross-Connection Control Program) to protect the water distribution system from any actual or potential physical connection between a water system and any source of non-potable liquid, solid, or gas.

9.2 BACKGROUND

WAC 246-290-105, WAC 246-290-415, and WAC 246-290-490 require that Group A water systems develop and implement a CCCP. A cross-connection is any actual or potential physical connection between a public or consumer water system and any non-potable liquid, solid, or gas that could contaminate the potable water or supply water via backflow. Submerged garden hoses, irrigation systems, and auxiliary water supplies are examples of typical cross-connections. Each Group A water system must have a CCCP to protect the public water system from contamination via cross-connections.

The basic method of protecting a water system is by installing an approved air gap or backflow prevention assembly at the consumer's service connection (premises isolation). Premises isolation is required for certain types of premises in accordance with Table 9 of WAC 246-290-490. For other types of premises, protection at the point of hazard (in-premises protection) in accordance with the Uniform Plumbing Code is generally acceptable.

9.3 DISCUSSION

DOE has granted MSA authority to administer the site CCCP. This authority is described in Contract DE-AC06-09RL14728. Section C.2.2.9.2 of the Contract requires MSA to, "Establish and implement a cross-connection control program in accordance with state regulations." This Contract establishes the legal authority for the contractor to implement a cross-connection control program. MSA and CHPRC have certified personnel on staff to implement the CCCP. The water purveyors maintain a list of certified water works operators, which includes cross-connection control specialists and backflow assembly testers. MSA monitors the annual testing of backflow prevention assemblies. An initial hazard evaluation of applicable facilities is conducted to assess cross-connection controls. Based on this evaluation, facilities are graded as low/ high/severe hazard facilities and are subsequently placed on a 1-year, 3-year, and/or 5-year assessment cycle for cross-connection control inspections. New services are evaluated at the design stage and are inspected prior to occupancy. The CCCP records are maintained in the Water Monitoring Department.

As required by WAC 246-290-105/415/490, MSA has developed a CCCP which is included in Appendix D.

This page intentionally left blank.

10.0 ELEMENT 7 – EMERGENCY RESPONSE PLAN (4.S OF 246-290-105)

10.1 PURPOSE

The purpose of this element is to identify processes for the following:

- System personnel to notify system users about an emergency
- System users to notify system personnel about an emergency
- System personnel to create a system emergency reference list.

10.2 BACKGROUND

WAC 246-290-105 (4.s) requires water systems to create and implement an emergency response plan. Proper reaction includes two-way communication of information. System personnel need to be able to notify system users and develop a plan of action to solve any emergency problems that may arise.

10.3 DISCUSSION

Emergencies at the MSA-managed and CHPRC-managed Group A public water systems are managed in accordance with Hanford Site wide procedures; DOE/RL-94-02, *Hanford Emergency Management Plan*; and DOE-0223, RLEP 1.1, *Hanford Incident Command System and Event Recognition and Classification*. Requirements and points of contacts for notifying emergency response organizations (i.e., Hanford Fire Department and Hanford Patrol) and regulatory notifications are included in these procedures. The Patrol Operations Center (phone 911(site phone system only) or 373-0911(all phone systems)) is the single point of contact to report emergencies and obtain emergency assistance for the Hanford Site, and the Emergency Operations Center (phone 376-2900) is the single point of contact for regulatory notifications. For water users to obtain assistance with water-related problems or for system operators to obtain assistance, call lists are maintained (including the Hanford Site weekly on-call directory).

In addition to Site wide procedures, facilities that contain significant quantities of hazardous materials are required to maintain facility-specific emergency plans and/or procedures. The Water Treatment Plant 283 West associated with the 200 West Area Public Water System falls into this category because it uses gaseous chlorine in the water treatment process.

All four Group A public water systems addressed in this plan have specific procedures to deal with emergencies related to water system operations. These procedures are included in the operating procedures for the water system.

The water purveyor is responsible for notifying water users in the case of water system operation-related emergencies. These emergencies include water system contamination. The 100-K Area, 200 Area, 300 Area and 400 Area public water systems have their own additional guidance on notifying water users. The water purveyor's responsibilities are identified in several procedures. These procedures are available on facility-specific servers.

The emergency response plans for the 100K and 400 Area water systems are discussed in Sections 10.4 and 10.5.

10.4 100-K AREA PUBLIC WATER SYSTEM

In addition to Site wide plans and procedures, HNF-IP-0263-SNF, *Building Emergency Plan for100K Basins and Cold Vacuum Drying Facility*, provides the building emergency response organization and facility-specific emergency response actions in response to emergencies for the 100-K Area public water system. Other procedures related to specific water system operation emergencies (e.g., pump room flooding) are available on a facility-specific server.

200 West Public Water System

In addition to Site wide plans and procedures, HNF-IP-0263-283W, *Building Emergency Plan for 283W Water Treatment Plant*, provides facility-specific emergency response actions in response to emergencies at the 283W Facility. Other procedures related to specific emergencies (e.g., loss of export water line pressure) are available on a facility-specific server. The operating procedure, U1-A-00.14, "200 Areas Water Systems Operations Program," describes water system operation-related emergency responses for the 200 West public water system.

Procedure U1-A-00.14 addresses the following emergency response items:

- Emergency call list. If a water system emergency arises, the emergency notification lists maintained in the facilities identify those personnel who need to be contacted.
- Vulnerability analysis. The Hanford Site watershed control plan documents the protection and control measures established to protect the watershed at the Hanford Site.
- Contingency plan. In the event of a potable water system emergency, actions to mitigate the emergency will be taken by water utilities stationary operating engineers in accordance with the approved operating procedures and emergency procedures. Other aspects of emergency planning and response are described in a series of procedures issued by MSA.
- Emergency response plan. Occurrence notification is directed by *Reporting Occurrences and Processing Operations Information* (MSC-PRO-060), and event evaluation and emergency response is also directed by a series of MSA emergency plan procedures in accordance with DOE O 0223, *U.S. Department of Energy, Richland Operations Office Emergency Plan Implementing Procedures.*

10.5 400 AREA PUBLIC WATER SYSTEM

In addition to Site wide plans and procedures, the FFTF operating procedure 4W- SN-23.2-1, *Operation of Sanitary Water System*, describes the water system operation-related emergency responses. A CH2MHill memorandum dated December 14, 2009, provides clarification and guidance for specific action and Notifications within the 400 Area for their potable water system. This memorandum requires purchasing bottled water if the tritium concentration approaches 14,000 pCi/L and notifying non-FFTF facilities within 400 Area.

11.0 ELEMENT 8 – SERVICE AREA AND FACILITY MAP & DISCRIPTION OF SOURCES (4.D & F OF 246-290-105)

11.1 PURPOSE

The purpose of this element is to identify the existing service area and the location of critical system facilities.

11.2 BACKGROUND

WAC 246-290-105 (4.d) requires water systems to have a service area and facility map. A map that identifies the location of facilities is helpful to system personnel (e.g., in making repairs taking samples, or reading meters). A service area map identifies where you currently serve customers and where you intend to serve future customers. A facility map shows the locations of your systems facilities. It will be useful for preparing emergency response plans and when explaining to new customers where and how you provide service.

11.3 DISCUSSION

The service area and facility maps for the 100-K Area, 200 Areas, 300 Area and 400 Area public water systems are maintained at the MSA Drinking Water Program office and the CHPRC water purveyor's offices.

This page intentionally left blank.

12.0 ELEMENT 9 – OPERATION AND MAINTENANCE PROGRAM (4.Q OF 246-290-105)

12.1 PURPOSE

The purpose of this element is to identify the duties and activities to operate and maintain the water distribution system in compliance with WAC 246-290-105/415/654 and other regulations, as applicable.

12.2 BACKGROUND

WAC 246-290-105, WAC 246-290-415, and WAC 246-290-654 require that Group A water systems are operated and maintained in accordance with an established operations and maintenance program. This program includes the following major elements:

- Water system management and personnel
- Operator certification
- Comprehensive monitoring plan for all contaminants under WAC 246-290-300
- Emergency response program
- Cross-connection control program
- Maintenance of service reliability.

Additionally, the water purveyor is to ensure that the water distribution system is operated in accordance with good operations procedures.

12.3 DISCUSSION

The MSA contract requires MSA-managed public water systems to have an operations and maintenance program consistent with all applicable regulations. The water purveyor ensures that operations and/or maintenance documents are in place to support and implement the required major elements of the program. This information may be included in this small water system plan, may exist to cover all water systems, and/or may be in place for the operation and maintenance of each specific system. Each water system has its own set of procedures. The operation and maintenance procedures are not included in this document but are available on servers specific to the projects and are available for internal use.

This page intentionally left blank.

13.0 ELEMENT 10 – WELL HEAD PROTECTION PROGRAM (4.M OF 246-290-105 AND 246-290-135)

13.1 PURPOSE

The purpose of this element is to protect source water used by public water systems by identifying and reducing known and potential contaminants.

13.2 BACKGROUND

WAC 246-290- 105 (4.m) and 246-290-135, "Source Protection," requires all Group A public water systems using their own wells or springs to develop a well head protection program.

13.3 DISCUSSION

The 400 Area public water system is the only Group A public water system at the Hanford Site that uses well water as its source of water and, thus, is required to have a well head protection program. Three wells located within the 400 Area site boundary provide water for the 400 Area public water system. The Hanford Site's well head protection plan is included in Appendix A.

This page intentionally left blank.

14.0 ELEMENT 11 – WATER RIGHT DOCUMENTATION (4.E OF 246-290-105)

14.1 PURPOSE

The purpose of this element is to document that the system can legally withdraw and use water consistent with current and projected water needs.

14.2 BACKGROUND

Water can only be put to use after a person has a water right permit from Washington Department of Ecology (WDOE) (state water code, 1917n for surface water and 1945 for ground water). All public water systems using surface water and those using groundwater with wells pumping 5,000 gal or more per day, or irrigating one-half acre or more, must have a water right.

14.3 DISCUSSION

Water supplied to the 100, 200, and 600 Areas, as well as other DOE-approved activities on the Hanford Site, is pumped from the Columbia River. The water is withdrawn under the "Federal Reserved Water Rights Doctrine" (Winters' Doctrine) for land set aside as the Hanford Site by the United States government to support the conduct of activities authorized under the *Atomic Energy Act of 1954*. Federally reserved water rights associated with such land actions are not express but implied and are considered valid in support of DOE missions. Thus, the Hanford Site's water rights are the property of the United States government. The Site holds no water right documents, certificates, or deeded rights to water at this time. Therefore, as a general rule, water rights should not be considered available for transfer to entities outside the United States government without WDOE approval.

On July 7, 1998, DOE filed the following two claims with Ecology:

- Surface Water - Water Rights Claim # 98-003371, Registration Number 301963.
- Ground Water - Water Rights Claim # 98-003872, Registration Number 301964.

As stated in the opening paragraph of Claim # 98-003371, DOE makes the assertion that the continued pumping from the Columbia River, the point of withdrawal being the intake in the 100-K Area, is covered by the Winters' Doctrine. The 100-K Area no longer pumps from the Columbia River. Water is supplied to 100-K Area from the export line.

As stated in the opening paragraph of Claim # 98-003872, DOE makes the assertion that the continued pumping from a well, also located near the 100-K Area, is covered by the Winters' Doctrine. This well has been decommissioned.

Both claims include the following paragraph:

"The U. S. Department of Energy currently maintains its water withdrawal rights under the Federal Water Rights Doctrine. This application to preserve formerly acquired water rights is intended to maximize the potential for beneficial reuse of Hanford Site lands."

This page intentionally left blank.

15.0 ELEMENT 12 – WATER PRODUCTION AND CONSUMPTION/ RECORD OF SOURCE WATER PUMPED (4.H OF 246-290-105)

15.1 PURPOSE

The purpose of this element is to document how many gallons of untreated water are converted to treated potable water (PW) from each source. The number of gallons treated equates to the number of gallons distributed to the customer.

15.2 BACKGROUND

WAC 246-290-105(4.h) and WAC 246-290-480(2)(e) require systems to record total annual water production for each source. The records of potable water pumped for the 100-K Area, 200 West Area, and 400 Area public water systems are included in Tables 15-1, 15-2, and 15-3 for Calendar Year 2013. Current records are maintained in the MSA Drinking Water Program Office. A system must submit this information to WDOH upon request.

A record of potable water pumped can help system personnel determine if the system is functioning properly (e.g., sudden leaks) and if system use is within the normally observed contractor use for each specific area.

15.3 DISCUSSION

Site water untreated (raw) and treated (PW) water consumption has decreased steadily over the past 10 to 12 years, primarily because of the closure of processing facilities, the closure of the 200 East and 200 West Area steam production plants, and the reduced number of Site personnel on the plateau. Mortar lining of major sections of potable and raw water piping has also had a positive effect on reducing water use. Pipe joints have been sealed, an overall elimination of any undetectable water leaks that may have existed.

The records of potable water pumped for the 100-K Area, 200 West Area, and 400 Area public water systems are included in Tables 15-1, 15-2, and 15-3. Separate records are maintained by the MSA Water Purveyor, of the number of gallons pumped from the source (Columbia River) as raw water, with the majority of that water being used for services other than potable water production. Those data are available on demand from the MSA Water Purveyor.

Table 15-1. Record of Water Treated at 100-K Area Public Water System for 2013.

Month	Water Treated (in 1,000 gallons)
January	275.17
February	267.36
March	294.63
April	226.70
May	291.35

Table 15-1. Record of Water Treated at 100-K Area Public Water System for 2013.

Month	Water Treated (in 1,000 gallons)
June	266.64
July	314.02
August	306.71
September	380.43
October	298.07
November	271.13
December	256.50
Total	**3,449**

Table 15-2. Record of Water Treated at 200 West Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	3674
February	4148
March	3968
April	5977
May	10900
June	10955
July	13081
August	13515
September	12441
October	9055
November	8153
December	8680
Total	**104547**

Table 15-3. Record of Water Treated at 400 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	1021.7
February	769.6

Table 15-3. Record of Water Treated at 400 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
March	790.7
April	809.2
May	726.0
June	733.9
July	801.2
August	751.1
September	1157.6
October	1921.9
November	2032.8
December	1585.3
Total	**13101.0**

Table 15-4. Record of Water Treated at 300 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	1300.0
February	1255.9
March	1385.3
April	1196.1
May	1447.4
June	1330.7
July	2070.5
August	2849.1
September	1868.5
October	986.6
November	1114.4
December	1063.7
Total	**17868.2**

This page intentionally left blank.

16.0 ELEMENT 13 – WATER USE (4.H OF 246-290-105)

16.1 PURPOSE

The purpose of this element is to document how much water is being used now by system users and to estimate how much they may use at total system build out. See Element 12 for additional discussion on PW production and use. The four Groups A water systems included in this document do not sell water to other public water systems. MSA supplies raw water to 100-K (source SO2 Export Line); however, MSA does not charge for the water provided. Background

WAC 246-290-105 (4.h) (i) (ii) (iii), (4.i) (4.j), (4.k) (i) (ii) requires water systems to record water use. It is very important to know how much water the system will need to provide in the future. By forecasting future use, whether additional plant capacity will be needed or new system facilities will be needed to serve future in-fill system users. See HNF-5828, *Hanford Site Water System Master Plan*, Sections 5.0 and 6.0 for more details related to how MSA Water Utilities deals with this element.

16.2 DISCUSSION

The demand drivers for PW production are fire protection and workforce population, or domestic use. During peak flow conditions, fire protection demand for PW exceeds that used for domestic purposes.

The assumed standard design rate for PW consumption is 15 gal/person/day for industrial building and office employees according to EPA 625/1-80-012, *Design Manual - Onsite Wastewater Treatment and Disposal Systems*. Flows per person could be as high as 30 gal/day if a facility is used by personnel taking showers. In addition to this general guideline, additional quantities of water are used for water treatment plant back flushing activities, waterline flushing activities, construction activities, dust control, and irrigation.

Once PW leaves the treatment facility, it is not tracked by Group A public water systems at the Hanford Site. There is no residential metering or facility metering. The Group A public water systems at the Hanford Site are different from similar Group A public water systems in Washington State in that bills based on water use are not sent to the customers.

The records of potable water consumed/pumped for the 100-K Area, 200 West Area, and 400 Area public water systems are included in Tables 16-1, 16-2, and 16-3.

Table 16-1. Record of Water Treated at 100-K Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	–same as Table 15.1
February	–same as Table 15.1
March	–same as Table 15.1
April	–same as Table 15.1

Table 16-1. Record of Water Treated at 100-K Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
May	–same as Table 15.1
June	–same as Table 15.1
July	–same as Table 15.1
August	–same as Table 15.1
September	–same as Table 15.1
October	–same as Table 15.1
November	–same as Table 15.1
December	–same as Table 15.1
Total	**–same as Table 15.1**

Table 16-2. Record of Water Treated at 200 West Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	-same as Table 15.2
February	-same as Table 15.2
March	-same as Table 15.2
April	-same as Table 15.2
May	-same as Table 15.2
June	-same as Table 15.2
July	-same as Table 15.2
August	-same as Table 15.2
September	-same as Table 15.2
October	-same as Table 15.2
November	-same as Table 15.2
December	-same as Table 15.2
Total	**-same as Table 15.2**

Table 16-3. Record of Water Treated at 400 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	-same as Table 15.3

Table 16-3. Record of Water Treated at 400 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
February	same as Table 15.3
March	same as Table 15.3
April	same as Table 15.3
May	same as Table 15.3
June	same as Table 15.3
July	same as Table 15.3
August	same as Table 15.3
September	same as Table 15.3
October	same as Table 15.3
November	same as Table 15.3
December	same as Table 15.3
Total	**same as Table 15.3**

Table 16-4. Record of Water Treated at 300 Area Public Water System for 2013

Month	Water Treated (in 1,000 gallons)
January	-same as Table 15.4
February	same as Table 15.4
March	same as Table 15.4
April	same as Table 15.4
May	same as Table 15.4
June	same as Table 15.4
July	same as Table 15.4
August	same as Table 15.4
September	same as Table 15.4
October	same as Table 15.4
November	same as Table 15.4
December	same as Table 15.4
Total	**same as Table 15.4**

This page intentionally left blank.

17.0 ELEMENT 14 – WATER CONSERVATION PROGRAM (4.L & G OF 246-290-105)

17.1 PURPOSE

The purpose of this element is to identify the system's water conservation program efforts to promote conservation of water.

17.2 BACKGROUND

WAC 246-290-105 requires systems to develop a conservation program as part of the SWSMP. Some of the ideas noted in Article 105 are not applicable to Hanford Site water systems. The Hanford Site water systems are not municipal water suppliers and are not required to follow WAC 246-290-810, "Water Use Efficiency Program." The Hanford water systems do not have a "rate" structure or consumption use charges that could be used to implement or encourage water demand efficiency. At the Hanford Site, attempts are made to educate water system users about the true value of water and about using water wisely. This process will likely reduce consumption and help prevent water shortages.

17.3 DISCUSSION

MSA has adopted mortar lining of major sections of potable and raw water piping as a conservation measure. This process has had a positive effect on reducing water use. Pipe joints have been sealed, resulting in an overall elimination of any undetectable water leaks that may have existed.

The water purveyor continues to work with DOE Site Infrastructure and the Washington State Department of Ecology, Yakima Office, to identify the applicability of water conservation program requirements to Group A public water systems at the Hanford Site. This plan will be updated as new concepts or products become available.

This page intentionally left blank.

18.0 ELEMENT 15 – COMPONENT INVENTORY AND ASSESSMENT (4.N OF 246-290-105)

18.1 PURPOSE

The purpose of this element is to assess approval status of system facilities and to determine the timing for future improvements.

18.2 BACKGROUND

WAC 246-290-110, "Project Report," and WAC 246-290-120, "Construction Documents," require approval for project reports and construction documents before installation or construction of any system facility. WAC 246-290-105 (4.n) requires water systems to conduct a component inventory and assessment. This assessment should include the following:

- Verification that all system facilities have either an approved project report or construction document.
- Assessment of each of the system facilities to determine if any parts require replacement within the next 6 years.

18.3 DISCUSSION

See HNF-5828, Section 3.0, for a detailed facility inventory and assessment of MSA items.

Additionally, the job control system includes a component inventory for Group A public water systems at the Hanford Site. The 100-K Area, 300 Area and 400 Area public water systems rely solely on the job control system for component inventory. The 200 West Area public water system inventory is maintained in MAXIMO, a database that is a computerized maintenance management system. The 300 Area water system will be incorporated into MAXIMO during 2014. MAXIMO has nine modules: work order tracking, preventive maintenance (recall), inventory, equipment, purchasing, job plans (procedures), labor, calendar, and resources (vendors). Three additional modules are used for system administration and customization. The component inventory is maintained on file at the MSA Water Utilities Work Control office in the 200 East Area, as well as by the MSA Water Purveyor.

An internal project is currently in progress to expand the component inventory. This inventory is also being prioritized with an analytical hierarchy process using regulatory drivers, safety considerations, criticality of the component, cost/schedule impacts and management preference as the weighting factors.

This page intentionally left blank.

19.0 ELEMENT 16 – LIST OF SYSTEM IMPROVEMENTS (4.O OF 246-290-105)

19.1 PURPOSE

The purpose of this element is to list facility and non-facility improvements identified in Element 15 and to identify the intended financing source for the improvements.

19.2 BACKGROUND

WAC 246-290-105 (4.o) requires water system operators to create a list of system improvements. The list of system improvements contains the description of each project, the project start date, the cost of the project, and the financing plan for the project. These items are necessary to successfully build any project.

19.3 DISCUSSION

Sections 19.4 through 19.6 summarize four Group A MSA- and CHPRC-managed public water systems improvements at the Hanford Site.

19.4 100-K AREA PUBLIC WATER SYSTEM

The 100-K Site is in a shutdown mode. There are no major water system improvements currently scheduled.

19.5 200 WEST PUBLIC WATER SYSTEM

See HNF-5828, Sections 7.0, 8.0, and 9.0, for more details related to how MSA Water Utilities deals with this element.

19.6 400 AREA PUBLIC WATER SYSTEM

The 400 Area Site is in a shutdown mode. There are no major water system improvements currently scheduled.

19.7 300 AREA PUBLIC WATER SYSTEM

There are no major water system improvements currently scheduled.

This page intentionally left blank.

20.0 ELEMENT 17 – BUDGET (4.T OF 246-290-105)

20.1 PURPOSE

The purpose of this element is to illustrate development of an operating budget, to be recalculated annually, that includes financial information about system revenues, expenses, and component financing.

20.2 BACKGROUND

WAC 246-290-105 (4.t) requires water systems to develop an operating budget. All systems must demonstrate that they are and will continue to be financially viable (RCW 70.119A.100). Financial viability is defined as the ability to obtain sufficient funds to develop, construct, operate, maintain, and manage a public water system on a continuing basis, in full compliance with Federal, state, and local requirements.

20.3 DISCUSSION

Preliminary technical study options and results are derived by alternatives analyses, including the analytical hierarchy process. Subsequent discussions of the analyses and results with RL produced direction from RL to allocate risks and costs of the system improvement options, as they related to RL requirements.

The DOE owns all Group A public water systems at the Hanford Site. The operations of the public water systems are funded by DOE, and the United States Congress approves the DOE budget every year. Each contractor evaluates his needs to support the shutdown effort and allocates approved budget funds for that effort.

This page intentionally left blank.

21.0 ELEMENT 18 – SYSTEM MANAGEMENT (4.A OF 246-290-105)

21.1 PURPOSE

The purpose of this element is to document current system management practices, including decision-making processes.

21.2 BACKGROUND

WAC 246-290-105 (4.a) requires water systems to identify their system management practices. This element applies to ownership, existence of written rules, and decision making responsibilities. The form included in the study guide contains several areas where information is filled in to describe the system's management practices. WDOH meets with RL (the system owner), MSA, and CHPRC (system operators) (see Element 4, Sanitary Surveys) for site tours and open discussions regarding compliance with the WAC requirements. The interface during sanitary surveys meetings is very beneficial for all parties.

21.3 DISCUSSION

DOE has a contract with MSA and CHPRC to manage the four Groups A public water systems at the Hanford Site. DE-AC06-09RL14728, Section C.2.2.9.2, requires MSA to maintain a drinking water program that includes source, production, distribution, monitoring, and CCCPs in accordance with Federal drinking water regulations and the applicable Site WAC. MSA also manages the four Group B public water systems at the Hanford Site; however, Group B water systems are not considered here because only Group A public water systems are required to have a Small Water Systems Management Program. The funding to maintain the public water systems is provided by DOE.

The MSA Environmental Integration group is responsible for regulatory compliance for all MSA-managed public water systems. The MSA Environmental Integration group works with the MSA Water Purveyor, Water Utilities manager, and the MSA Drinking Water Program office to ensure compliance with the regulations.

The CHPRC water purveyor is responsible for regulatory compliance. The water purveyor works with the CHPRC Regulatory Services & Reporting group and the Environmental Compliance Officers to ensure compliance with the regulations.

The organizational responsibilities for operating and maintaining the MSA-managed Group A public water systems are described in Section 21.4 through 21.6.

21.4 100-K AREA PUBLIC WATER SYSTEM

The 100-K Area public water system is maintained by the CHPRC - K-Basins Closure Project. The balance of plant manager for the 100-K East Facility is responsible for operations and maintenance of the 100-K Area public water system.

21.5 200 WEST AND 300 AREA PUBLIC WATER SYSTEMS

The 200 West and 300 Area public water systems are managed by MSA's Site Infrastructure and Utilities (SI&U) Project. The Water Utilities group of the SI&L Project operates and maintains the 200 West and 300 Area public water systems.

21.6 400 AREA PUBLIC WATER SYSTEM

The 400 Area public water system is maintained by CHPRC. The manager for the 400 Area power operator team responsible for operating and maintaining the 400 Area public water system.

Organization charts for the 100-K Area and 400 Area public water systems do not clearly delineate the responsibilities for maintaining the public water systems; however, the responsibilities are included in the specific job descriptions. The organization charts for these two public water systems are not included in this document, but the relevant organization chart for the SI&L Project is included in Appendix B.

22.0 REFERENCES

40 CFR 141, "National Primary Drinking Water Regulations," Title 40, *Code of Federal Regulations*, Part 141, as amended.

Atomic Energy Act of 1954, 42 USC 2011 et seq.

DE-AC06-09RL14728, *Mission Support Contract*, as amended, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DI-WP-00-01, "Backflow Prevention Assembly Annual Testing," Rev. 1, Mission Support Alliance, LLC , Richland, Washington.

DOE O 0223, *U.S. Department of Energy, Richland Operations Office Emergency Plan Implementing Procedures*, U.S. Department of Energy, Washington, D.C.

DOE-0223, RLEP 1.1, *Hanford Incident Command System and Event Recognition and Classification*.as amended, U.S. Department of Energy, Washington, D.C.

DOE/RL-94-02, *Hanford Emergency Management Plan*, Rev. 2, U.S. Department of Energy, Richland Operations Office, Richland, Washington.

DOH-331-134, 2008, *Small Water System Management Program Guide*, update, Washington State Department of Health, Olympia, Washington.

DOH-331-134, 2011, *Small Water System Management Program Guide*, revised, Washington State Department of Health, Olympia, Washington.

Ecology, EPA, and DOE-RL, 2003, *Hanford Federal Facility Agreement and Consent Order*, Washington State Department of Ecology, U.S. Environmental Protection Agency, U.S. Department of Energy, Richland Operations Office, Olympia, Washington, amended periodically. http://www.hanford.gov/?page=91&parent=0

Emergency Planning and Community Right-to-Know Act, 42 USC 116, et seq.

EPA 625/1-80-012, 1980, *Design Manual - Onsite Wastewater Treatment and Disposal Systems*, U.S. Environmental Protection Agency, Office of Water Program Operations, Washington, D.C.

CY 2013, *Hanford Site Comprehensive Coliform Monitoring Plan*, Mission Support Alliance, LLC, Richland, Washington.

CY 2013, *Hanford Site Comprehensive Organic Monitoring Plan*, Mission Support Alliance, LLC , Richland, Washington.

CY 2013, *Hanford Site Comprehensive Inorganic Monitoring Plan*, Mission Support Alliance, LLC , Richland, Washington.

CY 2013, *Hanford Site Comprehensive Disinfection/Disinfectant Byproducts Rule Plan*, Mission Support Alliance, LLC, Richland, Washington.

HNF-IP-0263-SNF, 2012, *Building Emergency Plan for100K Basins and Cold Vacuum Drying Facility*, Rev. 16, CH2M HILL Plateau Remediation Company, Richland, Washington.

MSA-IP-0263-283W, *Building Emergency Plan for Water Treatment Plant*, Rev. 10, Mission Support Alliance, LLC, Richland, Washington.

HNF-IP-0263-SNF, *Building Emergency Plan for100K Basins and Cold Vacuum Drying Facility*, Rev. 16, CH2M HILL Plateau Remediation Company, Richland, Washington..

HNF- 5828, *Hanford Site Water System Master Plan*, Rev. 4, Mission Support Alliance, LLC, Richland, Washington.

IAPMO, 2012, *Uniform Plumbing Code*, International Association of Plumbing and Mechanical Officials, Ontario, California

Memorandum, 2009, *Long Term Timely Order (LTTO#10-02) 400 Area Potable Water System*, CH2MHILL, Richland, Washington.

MSC-PRO-060, *Reporting Occurrences and Processing Operations Information*, Mission Support Alliance, LLC, Richland, Washington.

MSC-RD-10361, *Controlling Cross-Connections*, Rev. 3, Mission Support Alliance, LLC, Richland, Washington.

RCW 70.119A.110, "Public Health and Safety, Public water systems – Penalties and compliance," *Revised Code of Washington*, as amended, Olympia, Washington.

Safe Drinking Water Act, Public Law 93-523, 88 Stat. 1660 (Title 21), as amended.

4W-SN-23.2-1, 2012 *Operation of Sanitary Water System*, Rev. 1, CH2MHILL, Richard, Washington.

S-WP-0006, "Facility Cross-Connection Control Inspection," Rev. 5, Mission Support Alliance, LLC, , Richland, Washington.

U1-A-00.14, *Water Utilities Administrative Procedure, 200 Area Water Systems Operations Program*, Rev 5 Mission Support Alliance, LLC, Richland, Washington.

WAC 246-290, "Group A Public Water Supplies," *Washington Administrative Code*, as amended, Olympia, Washington.

WAC 246-290, Subpart A, "Public Notification and Consumer Information," *Washington Administrative Code*, Olympia, Washington.

Winters' Doctrine, 1908, "Federal Reserved Water Rights Doctrine," *Winters v. United States*, 207 US 564.

APPENDIX A
HANFORD SITE WELL HEAD PROTECTION PLAN

This page intentionally left blank.

CONTENTS

A.1 INTRODUCTION 1
A.2 SITE DESCRIPTION 1
A.2.1 HANFORD SITE 1
A2.2 400 AREA 2
A.2.2.1 Water Resources 5
A.2.3 400 AREA WATER SYSTEM 5
A.3 ROLES AND RESPONSIBILITIES 6
A.3.1 Water Purveyor 6
A.3.2 Operations Supervisor 7
A.3.3 Maintenance Supervisor 7
A.3.4 Operators 7
A.4 WELLHEAD PROTECTION AREAS 8
A.4.1 Sanitary Control Area 8
A.4.2 Three Primary Zones 8
A.4.3 Zone 1 - One-Year Horizontal Time of Travel Boundary 9
A.4.4 Zone 2 - Five-Year Horizontal Time of Travel Boundary 9
A.4.5 Zone 3 - Ten-Year Horizontal Time of Travel Boundary 9
A.5 INVENTORY OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION 10

ATTACHMENTS

A CALCULATED FIXED RADIUS CALCULATIONS A-15
B WELLHEAD PROTECTION FORMS A-18

FIGURES

Figure A-1. Hanford Site Map Showing 400 Area. 3
Figure A-2. Hanford Site 400 Area Map. 4
Figure A-3. Three Primary Wellhead Protection Area Zones for P-14 (499-SO-8) Drinking Water Well. 11

Figure A-4. Three Primary Wellhead Protection Area Zones for P-15 (499-SO-7) Drinking Water Well. 12

Figure A-5. Three Primary Wellhead Protection Area Zones for P-16 (499-S1-8J) Drinking Water Well. 13

TABLES

Table A-1. Drinking Water Wells in the 400 Area. 6

Table A-2. Inventory of Potential Sources of Contamination. 14

Table 1. Summary of Travel Time for P-14 (499-SO-8) Well. 16

Table 2. Summary of Travel Time for P-15 (499-SO-7) Well. 17

A.1 INTRODUCTION

The *Safe Drinking Water Act Amendments of 1986* requires that all federally defined public water systems using groundwater as their source, implement a wellhead protection program. The WDOH uses the term "Group A" to designate those public water systems which meet the federal definition of a public water system. This includes all public water systems that serve 25 or more persons or 15 or more connections (Washington Administrative Code [WAC] 246-290-020). In July of 1994, the WAC, addressing requirements for Group A public water systems, was modified to include mandatory wellhead protection measures for all Group A public water systems in the state using wells or springs (excluding systems using purchased sources or interties) as their source of water supply.

In 1995, the *Hanford Site Wellhead Protection Plan* was prepared by Westinghouse Hanford Company for the U.S. Department of Energy (DOE). The Plan covered several Group A and Group B water systems on the Hanford Site. The Plan required revision because the Group B systems covered in the Plan have been closed. The existing Group B systems on the Hanford Site do not use wells or springs as their source of water supply. Therefore, Group B water systems are not addressed in this document.

On the Hanford Site, only the 400 Area Group A water system, Public Water System ID# 419470, uses groundwater wells as its source of water supply. This document, which describes the Hanford Site Wellhead Protection Plan, has been prepared to meet the requirements of WAC 246-290-135(3), "Wellhead Protection." The guidance offered in the publication *Washington State Wellhead Protection Program Guidance Document* (WDOH 1995) was used to prepare this document.

A.2 SITE DESCRIPTION

This section gives description of the Hanford Site and the 400 Area.

A.2.1 HANFORD SITE

General information regarding the Hanford Site may be found in the *National Environmental Policy Act of 1969* (NEPA) Characterization Report (PNNL-6415). In addition, Hanford Site descriptions can be found in recent NEPA documents prepared for the Hanford Site including the *Hanford Site Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement* (DOE/EIS-0286F).

The Hanford Site, established in 1943 as one of the three original Manhattan Project sites, is located on approximately 148,000 hectares (365,000 acres) in the southeastern portion of the State of Washington extending over parts of Adams, Benton, Grant, and Franklin counties. The Hanford Site was a U.S. Government defense materials production site that included nuclear reactor operation, uranium and plutonium processing, storage and processing of spent nuclear fuel. The Fast Flux Test Facility (FFTF) was a Nuclear Energy funded project and was not associated with the defense materials production program. Present Hanford Site programs are diversified and include: Management of radioactive wastes; cleanup of soil and groundwater related to past releases at waste sites; stabilization and storage of spent nuclear fuel; development of renewable energy technologies and waste disposal technologies; contamination cleanup; and

plutonium stabilization and storage. The primary emphasis on the Hanford Site is cleanup activities.

The Hanford Site is a semiarid region with topography ranging from generally flat to gently rolling. Rattlesnake Mountain, rising to 1,060 meters (3,480 ft) above mean sea level, forms the southwestern boundary of the site. Gable Mountain and Gable Butte are the highest land forms within the site, rising approximately 60 meters (200 ft) and 180 meters (590 ft), respectively. The Columbia River flows through the northern part of the Hanford Site, and turning south, forms part of the eastern site boundary.

Typical of the regional shrub-steppe desert, the site is dominated by widely spaced, low-brush grasslands. A large area of unvegetated, stabilized sand dunes extends along the eastern boundary, and unvegetated blowouts are scattered throughout the site. The Hanford Site is characterized by mostly underdeveloped land, with only about six percent of the land area disturbed and being actively used. Widely spaced clusters of industrial buildings are located along the southern and western banks of the Columbia River and at several interior locations. Extensive site development around the 400 Area facilities has removed most of the native vegetative cover.

The Hanford Site is characterized as having a mild climate with 15 to 17 centimeters (6 to 7 inches) of annual precipitation, and occasional high winds of up to 129 kilometers (80 miles) per hour. Tornadoes are extremely rare. The region is categorized as one of low-to-moderate seismicity.

A2.2 400 AREA

The 400 Area came into existence when the FFTF Complex was built in the 1970s. FFTF is located in the southern part of the Hanford Site (Figure B-1). The nearest natural watercourse is the Columbia River, about 7 kilometers (4.5 miles) away. The nearest population center is Richland, Washington, about 19 kilometers (12 miles) from the 400 Area. The 400 Area is more than 30 meters (100 ft) above the groundwater table, and about 165 meters (550 ft) above sea level. This location is more than 30 meters (100 ft) above the probable maximum flood and not located in a wetland (FFTF-18346, *Technical Information Document for the Fast Flux Test Facility Closure Project Environmental Impact Statement*).

The 400 Area is comprised of 77 buildings or structures (Figure B-2). The term FFTF Complex is used for the area inside the fence. It includes the reactor, the containment building, and various utilities and ancillary facilities. The 400 Area contains administrative, security, health and safety, utility and maintenance, communications, waste treatment, and environmental monitoring. DOE ceased operation of FFTF in April 1992 and initiated deactivation activities to place the reactor complex in a safe shutdown condition that would be economical to monitor and maintain for an extended period, until the final deactivation and decommissioning (D&D) could be completed (FFTF-18346). On April 4, 2003, the DOE directed that Fluor Hanford continue with permanent closure of the reactor facility. Milestones were established in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 2003) and the facility was placed in a long term surveillance and maintenance mode in February 2009. All but a few buildings in the FFTF Complex are vacant and ready for D&D activities.

Figure A-1. Hanford Site Map Showing 400 Area.

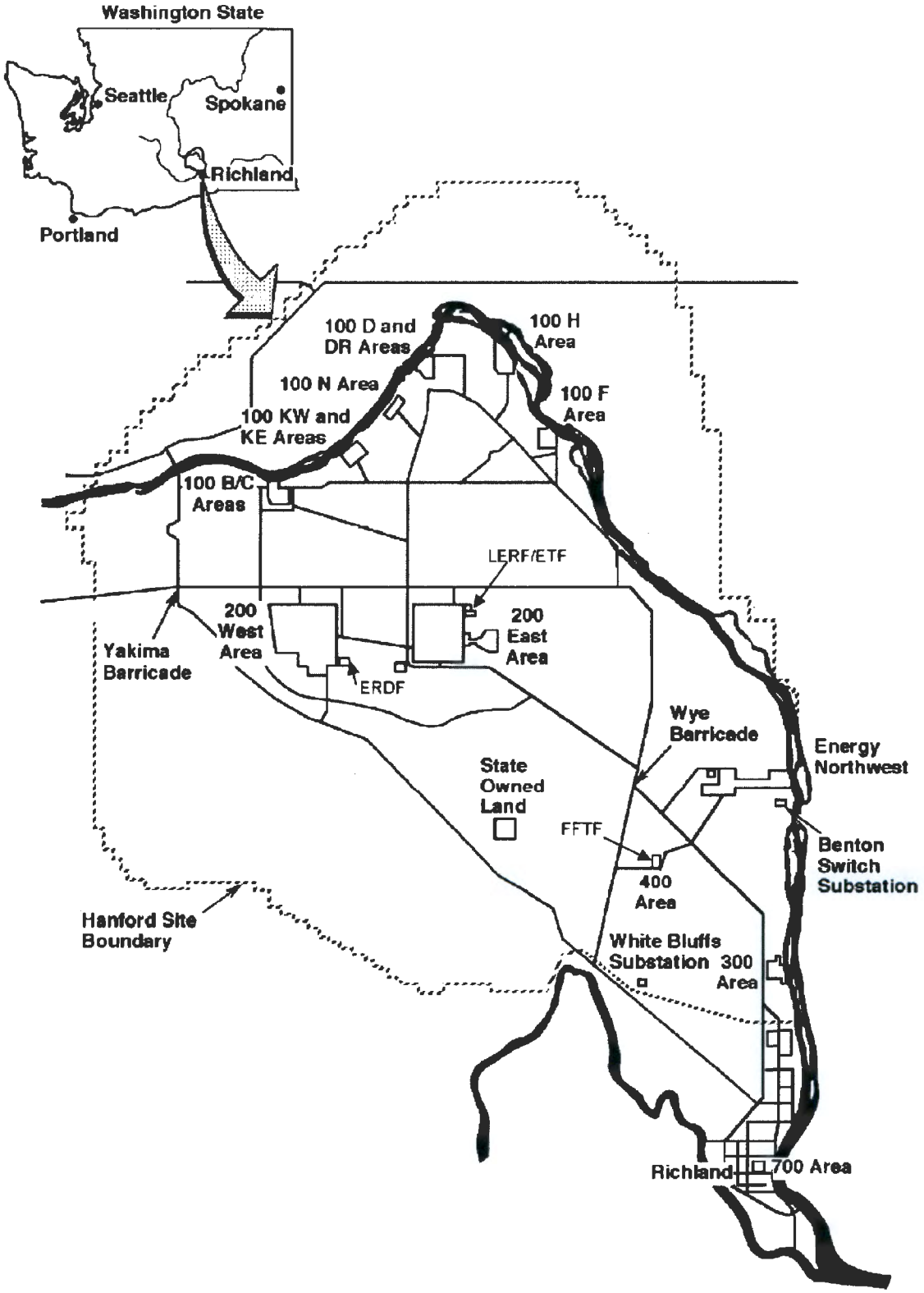
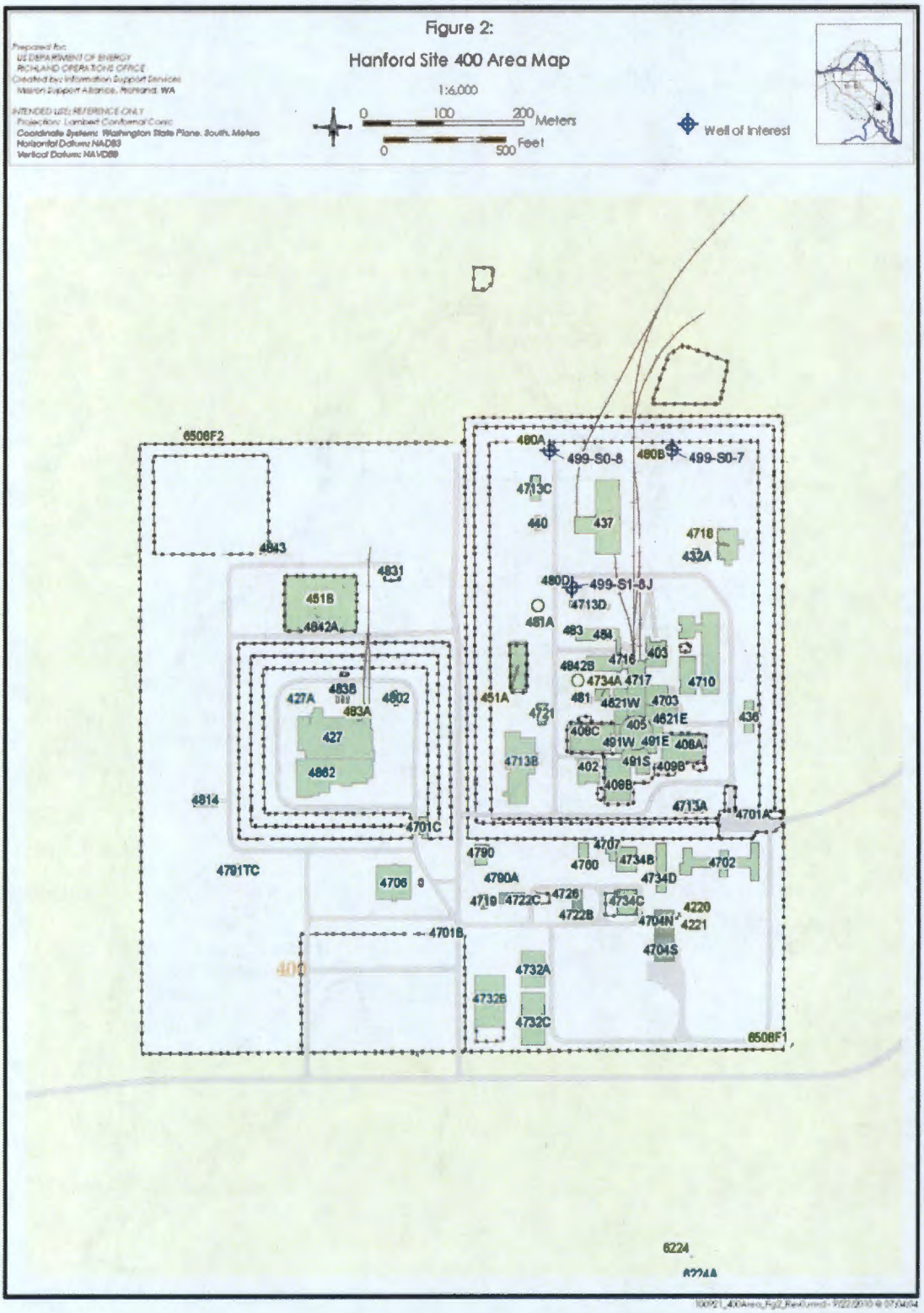


Figure A-2. Hanford Site 400 Area Map.



A.2.2.1 Water Resources

The 400 Area surface and groundwater resources and geology are discussed in the following sections.

- **Surface Water**

The 400 Area is located approximately 7 kilometers (4.5 miles) from the west bank of the Columbia River. No specific flooding analyses have been completed for the 400 Area, but analyses have been completed for the site as a whole. According to the sitewide data, the elevation of the ground surface in the 400 Area is about 30 meters (100 ft) above that of the maximum calculated flood from a 50 percent breach of the Grand Coulee Dam. Also, the 400 Area is above the elevation of the maximum historical floods of 1894 and 1948. The only surface water body in the vicinity of the 400 Area is the 400 Area pond (i.e., 400 Area Pond or 4608 B/X ponds) located just north of the 400 Area. It is designed and used to dispose of nonradioactive process wastewater collected by the 400 Area Industrial Process Wastewater system from Material and Storage Facility (MASF). The 400 Area pond consists of two cells measuring 15 by 30 meters (50 by 100 ft) with 1.2-meter (3.9-ft) walls. Individual effluent streams are collected at a central drain line that runs to the ponds, with the effluent monitored before discharge. The wastewater rapidly percolates into the ground, leaving the ponds dry under normal conditions. The discharges are regulated under State Waste Discharge Permit No. ST 4501 and the effluent is monitored. There are no radiological liquid effluent pathways to the environment from FFTF Groundwater

Groundwater flow across the 400 Area is generally from west to east. The Hanford formation, immediately underlying the area, consists mainly of sand-dominated sediments. The water table is located near the contact between the Hanford formation and Ringold Formation, with the depth to the water table in the 400 Area ranging from about 45 to 50 meters (148 to 164 ft). Hanford formation sediments dominate groundwater flow in the 400 Area because of their relatively high permeability, compared to that of the Ringold Formation sediments. The Ringold Formation consists of gravelly sand, sandy gravel, silty sand and fluvial gravels, and overbank and lacustrine silt and clay. The saturated thickness of this aquifer system is about 140 meters (460 ft).

- **Geology and Soils**

The major geologic units underlying Hanford are, in ascending order: sub-basalt (basement) rocks; the Columbia River Basalt Group; and the Ringold Formation, the Plio-Pleistocene unit, early "Palouse" soil, and the Hanford formation, collectively known as the Suprabasalt Sediments. The 400 Area stratigraphy consist of sand-dominated sediments of the Hanford formation which attain a thickness of about 50 meters (164 ft) beneath the site. Locally, surface sediments also consist of stabilized sands deposited in dune fields. The predominant soil type in the 400 Area is the Quincy (Rupert) sand, and the soils and surface sediments are not subject to liquefaction or other instabilities. The nearest capable fault to the 400 Area (Central Gable Mountain Fault) is 19 kilometers (12 miles) away.

A.2.3 400 AREA WATER SYSTEM

The 400 Area public water system (ID# 419470) is a nontransient noncommunity (NTNC) system with 15 service connections, serving approximately 250 people. WAC 246-290-020,

"Applicability," defines NTNC water system as a system that provides service opportunity to 25 or more of the same nonresidential people for 180 or more days within a calendar year.

The 400 Area public water system receives water from three underground deep water wells (P-14, P-15, and P-16). Table 1 provides additional information on these wells.

Table A-1. Drinking Water Wells in the 400 Area.

Well Identification Number	Installation Date	Well Depth	Average Pumping Rate (Gallons/minute)
P-16 (499-S1-8J)	1985	122 m (401 ft)	220
P-14 (499-SO-8)	1972	90 m (280 ft)	200
P-15 (499-SO-7)	1972	122 m (395 ft)	220

P-16 (499-S1-8J) is the primary well. The FFTF Complex has been deactivated and is in long term surveillance and maintenance mode. MASF is being utilized by the Waste Treatment Project which accounts for the majority of the personnel in the 400 Area. As the facilities within the complex are shut down, the drinking water need also goes down. In 2010, 11,670 million gallons were pumped from P-16 well. P-14 (499-SO-8) is used as a backup well and was utilized half of the year. In 2010, 9,558 million gallons were pumped from P-14 well. P-15 (499-SO-7) is designated for emergency use only and was used only for sampling purposes.

The P-16 water well provides water to a common header that supplies two aboveground storage tanks having a total capacity of approximately 3.8 million L (1 million gallon). Tank T-58 is located at 482A Building and tank T-87 is located at 482B Building. The raw water is chlorinated (sodium hypochlorite) at the common header prior to the storage tanks to prevent algae growth in the storage tanks. The water is then distributed throughout the 400 Area for potable, process, and fire protection use.

The primary pump house (481 Building) houses two potable water pumps and serves as the distribution pumping station for the 400 Area. Both of the potable water pumps are rated at 1,514 L/min (400 gpm). Normal operation is satisfied by one of these pumps. When required, the second pump is placed in service. Additionally, an electrically driven fire pump, rated at 5,678 L/min (1,500 gpm), is automatically activated under low-pressure conditions (100 psi). The second pump house (481A Building) has been removed from service.

A.3 ROLES AND RESPONSIBILITIES

The 400 Area Public Water System supplies potable water to FFTF and ancillary facilities. The role and responsibilities to operate the water system are described in the following sections.

A.3.1 Water Purveyor

The Water Purveyor provides administrative support to all Hanford Site public water systems in the following areas:

- Interpretation of drinking water regulations; development and implementation of the Hanford Site cross connection program;

- Development and implementation of the groundwater protection program and watershed control program;
- Updating present monitoring programs such as radionuclide, coliform bacteria, chlorine residual, inorganic chemicals, volatile organic chemicals, and synthetic organic chemicals;
- Perform sampling for subordinate water systems;
- Update WDOH permits;
- Completion of new permit applications;
- Assist in emergency response actions as required;
- Assist in implementation of improvements and budget formulation;
- Perform impact assessments for new drinking water regulations.

The Water Purveyor also is responsible for:

- Providing technical direction to site organizations such as, engineering services and project management, including documentation review and approval; maps/drawing administration;
- Problem resolution;
- Project support;
- Cross connection control inspections;
- Overview and assessment of all water system operations;
- System monitoring of the Hanford Site water systems to determine level of compliance to federal and state drinking water laws.

A.3.2 Operations Supervisor

The Operations Supervisor provides supervision of day-to-day operations and review of preventive maintenance, field engineering, water quality monitoring, troubleshooting, and emergency response actions. The Operations Supervisor is the lead position for implementation of improvements, cross-connection control, and budget formulation, and coordinates with the Water Purveyor to develop responses to complaints and regulatory requirements.

A.3.3 Maintenance Supervisor

The Maintenance Supervisor identifies and schedules required periodic maintenance for water system components. The Maintenance Supervisor also identifies required corrective actions and records completion of maintenance items.

A.3.4 Operators

Operators conduct the day-to-day operation, maintenance, and troubleshooting of the water system. Operators also provide the initial actions for emergency response and identify requirements for field engineering and system improvements.

A.4 WELLHEAD PROTECTION AREAS

Wellhead protection areas (WHPAs) are defined in the *Safe Drinking Water Act Amendments* as: "The surface and subsurface area surrounding water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water or well field."

The purpose of delineating WHPAs is to define the geographic limits most critical to the protection of a well field. Water yielded by a well may have traveled thousands of feet along surface (e.g., river) and subsurface routes to reach the well. Any areas that receive recharge that contributes water to municipal supply systems are known as "zones of contribution." These zones are subject to alterations in shape and size depending on well pumping rates and other factors. Zones of contribution should be defined in order to begin protective management practices that could prevent contamination from reaching a well.

A WHPA is the area managed to protect groundwater based public drinking water supplies. As the distance from the pumping well is increased, the hypothetical travel time of a particle of water traveling in the aquifer to the well is lengthened.

WHPAs are defined primarily based on the time of travel rates of ground water. A typical WHPA consists of five zones:

- The sanitary control area
- Three primary zones, based on 1-, 5- and 10-year time of travel rates
- A buffer zone if necessary.

A.4.1 Sanitary Control Area

The first component of a WHPA is the protective area required by WAC 246-290-135 (sanitary control area). This is a protective area meant to prevent any direct contamination at the wellhead. Wells P-14, P-15, and P-16 are protected by well houses. All three wells are located inside the 400 Area perimeter security fence.

The sanitary control area is marked with signs stating the area is a WHPA. Other information on the sign includes: applicable regulation (WAC 264-290-135), activity restrictions, and the Hanford Site Purveyor's phone number. The wells in the 400 area are all posted at a radius of about 30.4 meters (100 ft.).

A.4.2 Three Primary Zones

As recommended in the *Wellhead Protection Requirements* (WDOH 2006), the Calculated Fixed Radius method was used to delineate the WHPAs. The Calculated Fixed Radius method is used if the well is of low or moderate susceptibility. The wells in the 400 area are low or moderately susceptible as shown by the susceptibility assessment described in Section 5. Figures B-3, B-4, and B-5 show the three zones for each drinking water well.

The Calculated Fixed Radius calculations were based on the amount of water pumped from each pump in calendar year 2007. As stated previously, the FFTF Complex is in a long term surveillance and maintenance mode. Demand for drinking water is declining every year. The calculations are presented in Attachment A.

A.4.3 Zone 1 - One-Year Horizontal Time of Travel Boundary

Proper management of Zone 1 can protect the drinking water supply from viral, microbial, and direct chemical contamination. This zone is defined by the surface area overlying the portion of the aquifer which contributes water to the well within a one-year period. Within Zone 1, potential sources of microbial contamination should be strictly managed to eliminate or reduce the possibility that microbial contamination of the water supply will occur.

The criterion threshold of a one-year time of travel is considered appropriate to protect the well field from microbial contamination. Existing literature suggests that bacteria and viruses survive less than one year in groundwater, therefore travel times of greater than one year are not necessary. A threshold of less than one year may not provide adequate protection against possible microbial or viral contamination.

The one-year time of travel also defines the area for intensive management to protect the wellhead from direct chemical contamination. Within Zone 1, chemicals capable of contaminating groundwater should not be stored or used, or should be stored and used with sufficient precautions to protect the groundwater resource. A serious chemical release within Zone 1 may provide only a very limited time for a purveyor/community to respond aggressively, identify the spill, implement emergency remedial actions, and prevent the contamination from reaching the distribution system.

Laboratory confirmation of the contamination, characterization of the contaminant plume, plus development and implementation of an on-the-ground remediation response traditionally takes a minimum of six months. Twelve to twenty four months is a more typical period for an initial (preliminary) remedial response. Because of these concerns, most management plans for Zone 1 include strong elements for the identification of potential contaminant sources and risk management. For this reason, the one-year time of travel functions as a buffer area and provides response time.

A.4.4 Zone 2 - Five-Year Horizontal Time of Travel Boundary

The entire area within the five-year time of travel boundary defines Zone 2. This zone is actively managed for control of potential chemical contaminants. While any significant chemical release within Zone 1 has the potential to contaminate the drinking water supply and render it unusable, the area lying between the one- and five-year time of travel boundaries also needs to be carefully managed to protect future water supplies.

The primary difference between potential contaminant sources in Zones 1 and 2 is that release in Zone 2 provides more time for response (less of an acute crisis situation). All potential contaminant sources should be identified and controlled, with an emphasis on pollution prevention and risk reduction management. Both the one-year and the five-year zones are used by many state and local agencies as a prioritizing tool for directing technical assistance, outreach programs, and for targeting inspections and enforcement actions.

A.4.5 Zone 3 - Ten-Year Horizontal Time of Travel Boundary

The outer border of Zone 3, the area within the ten-year time of travel boundary, determines the boundary of the WHPA. Within Zone 3, an inventory for potential contaminant sources should be conducted. High-risk operations and facilities should be identified, and steps taken to reduce

contaminant loading. A primary purpose of Zone 3 is to encourage decision makers and planners to recognize the long-term source of the drinking water supplying community water systems. This allows the FFTF Complex and the other water users in the 400 Area to plan and site future high-risk and medium-risk sources of groundwater contamination outside WHPAs.

The three primary zones are determined by estimating the travel paths (based on one-, five-, and ten-year travel times) of a hypothetical particle of water traveling through the aquifer to the pumping well that can be used to identify potential sources of contamination that may (if not controlled) impact the water supply. These travel-time based aquifer management zones can create an "early warning system" providing the 400 Area water system with time to respond to a contaminant moving in an aquifer before it arrives at the water supply well. It is recognized that contaminants released at the surface will take additional time to move from the surface down to the water-bearing zone. However, the vertical travel time of a contaminant is not considered when calculating the time of travel estimates.

A.5 INVENTORY OF POTENTIAL SOURCES OF GROUNDWATER CONTAMINATION

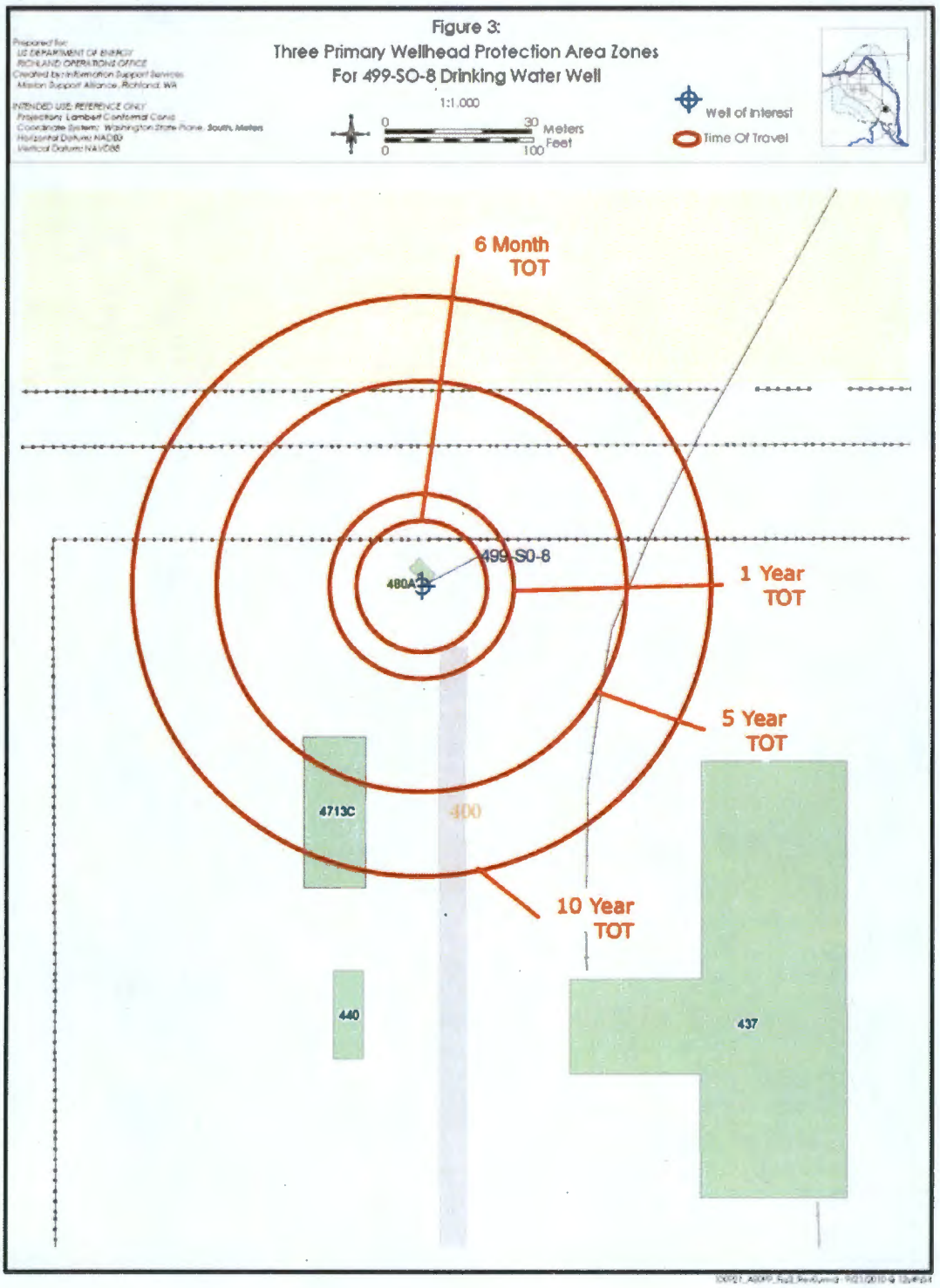
An inventory of potential sources of groundwater contamination was originally conducted in 1996, within one year of WHPA delineation. The 400 Area is currently in the decommissioning mode. Several structures in the 400 Area within the WHPA have been removed. This revision updates the inventory.

In addition to the potential sources identified by the inventories, there are widespread groundwater contamination plumes as a result of past wastewater disposal practices in the 400 Area and at the Hanford Site. In particular, elevated concentrations of tritium and nitrate associated with the groundwater plume from the 200-East Area were identified in the 400 Area drinking water wells in 1996. However, the wastewater disposal practices have been discontinued and the nitrate concentration in drinking water is reduced to well below drinking water standards. Well P-16 was drilled to the lower part of the unconfined aquifer to reach water with tritium levels below drinking water standards. The tritium levels in water from well P-16 remain below the drinking water standards. *Washington State Wellhead Protection Program Guidance Document* (WDOH 1995) recommends that a wellhead protection program, at a minimum, shall include completed susceptibility assessment forms. These forms were prepared and sent to WDOH in 1995. However, the forms have been updated for each well and are included in Attachment B.

This revision updates the inventory conducted in 1996. The Environmental Compliance Officer (ECO) for FFTF and the water purveyor for the 400 Area Water System were interviewed for the update. The ECO is also responsible for annual *Emergency Planning and Community Right-To-Know Act of 1986* (EPCRA) reporting. An inventory of chemicals is conducted for EPCRA reporting every year.

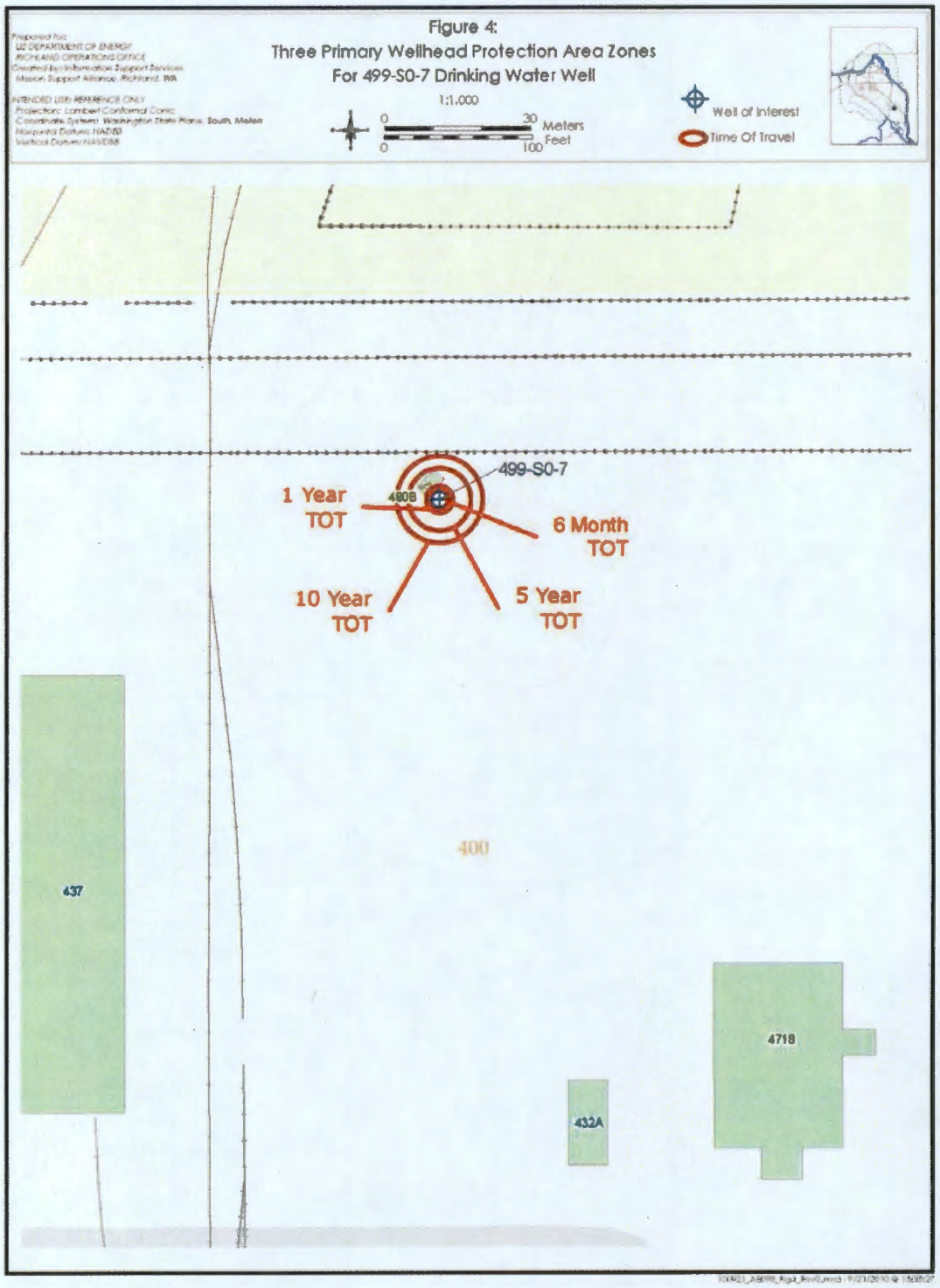
This section evaluates the risk posed to the groundwater, by the potential sources of contamination that have been identified previously. During this evaluation process, any built-in control measures, primary and secondary containment, and monitoring associated with the potential sources are taken into consideration. The risk associated with any potential source of contamination is assigned to one of three categories: negligible (N), moderate (M), and high (H).

Figure A-3. Three Primary Wellhead Protection Area Zones for P-14 (499-SO-8) Drinking Water Well.



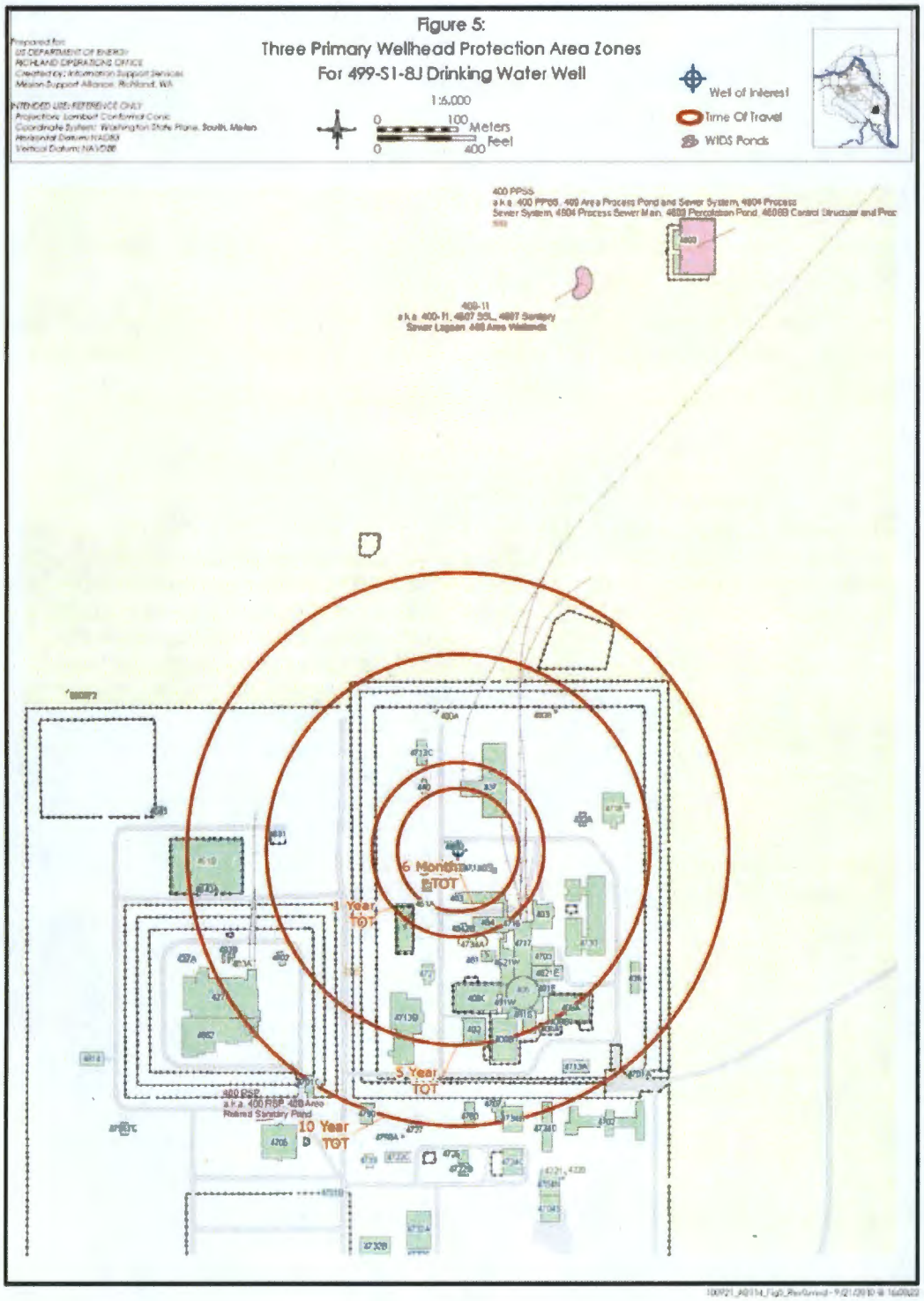
TOT = Time of Travel

Figure A-4. Three Primary Wellhead Protection Area Zones for P-15 (499-SO-7) Drinking Water Well.



TOT = time of travel

Figure A-5. Three Primary Wellhead Protection Area Zones for P-16 (499-S1-8J) Drinking Water Well.



TOT = time of travel

All of the potential sources of contamination in the 400 Area are listed in Table B-2. This table provides a brief description of the item and associated controls. Each item was assigned a qualitative risk category based on the location, type of controls available, and readiness to respond to spills. The 400 Area has a spill control procedure. The spill control materials are placed at strategic locations easily available to respond to any spill in the 400 Area.

All the potential sources of contamination have negligible risk. The low risk is due to one or more of the following factors:

- Indoor location and curbing around the container
- Alarm system and 24-hour alarm response
- Strict compliance with spill control procedure and environmental regulations which require reporting and cleanup of the spill.

Due to the stringent environmental regulations and physical control of chemical and radioactive substances in the 400 Area, there is little potential risk to the groundwater from activities conducted in this area.

Table A-2. Inventory of Potential Sources of Contamination.

Item	Description of the Potential Hazard/Name	Zone Location of the Potential Hazard[a]	Containment/Remarks	Risk
1	MASF Storage Tanks	1	Two 5,000 gallon tanks located inside the MASF building, in a belowgrade cement cell. Only one tank online at one time. 24-hour alarm with a sump for overflow. Tanks store water from radioactive decontamination processes.	N
2	MASF Railroad Tank Car Transfer Station	1	Located inside the MASF building, manned at all times during transfer operations, curbed overflow area under tank car which drains to the empty tank.	N
3	MASF Glycol Pumps, Mechanical Seals	1	24-hour surveillance.	N
4	Building 402	2	400 Area Waste Management Unit, storage of sodium contaminated low level radioactive equipment storage, all fixed contamination, equipment wrapped in plastic and packaged in a sealed container, and maintained in a controlled access area.	N
5	4718 Pad, 400 Area Interim Storage Area	3	400 Area Waste Management Unit, storage of sodium contaminated low level radioactive equipment, packaged in sealed containers and maintained in a controlled access area.	N

[a] Refer to Figures B-3, B-4, and B-5.

ATTACHMENT A

CALCULATED FIXED RADIUS CALCULATIONS

Equation for Calculated Fixed Radius:

$$R = \sqrt{\frac{QT}{\pi \eta H}}$$

Where,

R = radius of zone (feet) for time period t
Q = maximum pumping capacity of well (ft^3/year)
T = travel time (years)
π = 3.1416
η = effective porosity (decimal percent) (0.22 for this report)
H= screened interval of well (feet)

The calculations for all three wells are based on actual use in 2010. P-16 is the primary operating well. Other wells are used only as backup and during the sampling events.

Calculations for P-14 (499-SO-8) Well

H = 85 ft Screen Length
Q =Pumping Capacity = 1,672,800 gallons per year = 223,633 ft^3/year (1ft^3 = 7.4801 gallons)

Six-Month Travel Time

T= 0.5 years

$$R = \sqrt{\frac{223{,}633 \times 0.5}{3.1416 \times 0.22 \times 85}} \quad \text{R} = 44 \text{ ft}$$

T= 1 year

$$R = \sqrt{\frac{223{,}633 \times 1}{3.1416 \times 0.22 \times 85}} \quad \text{R} = 62 \text{ ft}$$

Five-Year Travel Time

T= 5 years

$$R = \sqrt{\frac{223{,}633 \times 5}{3.1416 \times 0.22 \times 85}} \quad \text{R} = 138 \text{ ft}$$

Ten-Year Travel Time

T= 10 years

$$R = \sqrt{\frac{223{,}633 \times 10}{3.1416 \times 0.22 \times 85}} \quad \text{R} = 195 \text{ ft}$$

Table 1. Summary of Travel Time for P-14 (499-SO-8) Well.

Travel Time	T (years)	R (ft)
6 months	0.5	44
1 Year	1	62
5 Year	5	138
10 Year	10	195

Calculations for P-15 (499-So-7) Well

H = 140 ft Screen Length
Q =Pumping Capacity = 61,900 gallons per year = 8,275 ft^3/year (1ft^3 = 7.4801 gallons)

Six-Month Travel Time

T = 0.5 year

$$R = \sqrt{\frac{8275 \times 0.5}{3.1416 \times 0.22 \times 140}} \quad \text{R} = 7\ \text{ft}$$

One-Year Travel Time

T= 1 year

$$R = \sqrt{\frac{8275 \times 1}{3.1416 \times 0.22 \times 140}} \quad \text{R} = 9\ \text{ft}$$

Five-Year Travel Time

T= 5 years

$$R = \sqrt{\frac{8275 \times 5}{3.1416 \times 0.22 \times 140}} \quad \text{R} = 21\ \text{ft}$$

Ten-Year Travel Time

T= 10 years

$$R = \sqrt{\frac{8275 \times 10}{3.1416 \times 0.22 \times 140}} \quad \text{R} = 29\ \text{ft}$$

Table 2. Summary of Travel Time for P-15 (499-SO-7) Well.

Travel Time	T (years)	R (ft)
6 months	0.5	7
1 Year	1	9
5 Year	5	21
10 Year	10	29

Calculations for P-16 (499-SI-8J)

H = 30 ft

Q =Pumping Capacity = 19,135,900 gallons per year = 2,558,241 ft^3/year (1ft^3 = 7.4801 gallons)

Six-Month Travel Time

T= 0.5 year

$$R = \sqrt{\frac{2558241 \times 0.5}{3.1416 \times 0.22 \times 30}}$$

R = 248 ft

One-Year Travel Time

T= 1 year

$$R = \sqrt{\frac{2558241 \times 1}{3.1416 \times 0.22 \times 30}}$$

R = 351 ft

Five-Year Travel Time

T = 5 years

$$R = \sqrt{\frac{2558241 \times 5}{3.1416 \times 0.22 \times 30}}$$

R= 785 ft

Ten-Year Travel Time

T = 10 years

$$R = \sqrt{\frac{2558241 \times 10}{3.1416 \times 0.22 \times 30}}$$

R = 1111 ft

Table 3. Summary of Travel Time for P-16 (499-SI-8J) Well.

Travel Time	T (years)	R (ft)
6 months	0.5	248
1 Year	1	351
5 Year	5	785
10 Year	10	1111

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Ground Water Contamination Susceptibility Assessment Survey Form

Version 2.3

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

PART I: System Information

Well owner / manager: Department of Energy

Water System Name: 400 Area Group A water System

County: Benton

Water System Number: 419470 Source Number: S02

Well Depth: 270 (ft) (From WFI form)

Source Name: 499-S-08; P-14

WA well identification tag number: ___ ___ ___ - ___ ___ ___ ___ Well not tagged

Number of connections: 19 Population served: 214

Township: 11N Range: 28E

Section: 18 1/4 1/4 Section: NW/SW

Latitude / longitude (if available) _____ / _____

How was lat. / long. determined?

___ Global Positioning device ___ Survey ___ Topographic Map

___ Other: _____

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

PART II: Well Construction and Source Information

1) Date well originally constructed: 3 / ___ / 1972 (month/day/year)

last reconstruction: ___ / ___ / _____ (month/day/year)

___ Information unavailable

2) Well Driller:

Bechtel National Inc.

___ Well Driller unknown

3) Type of Well:

___ Drilled: ___ Rotary ___ Bored ___ Dug

X Cable (percussion) ___ Unspecified

___ Other: ___ Spring(s) ___ Driven ___ Jetted

___ Lateral collector (Ranney) ___ Unspecified

Additional comments:

4) Well report available? X YES ___ 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: 200 (gallons / min)

Source of information: Water Facilities Inventory Form

If not documented, how was pumping rate determined?

___ Pumping rate unknown

6) Is source treated? No If so what type of treatment:

___ Disinfection ___ Filtration ___ Carbon Filter

___ Air Stripper ___ Other ___ Unknown

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

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

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

PART III: Hydrogeologic Information

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

____ (less than) 20ft ____ 20 - 50ft ____ 50 - 100ft X 100 - 200ft

____ (greater than) 200ft ____ Information unavailable

2) Depth to ground water (static water level)

____ (less than) 20ft ____ 20 - 50ft ____ 50 - 100ft X (greater than) 100ft

____ Flowing well spring (artesian) ____ Depth to Ground water unknown

How was water level determined?

X Well log ____ Other: _____ ____ Unknown

3) If source is a flowing well or spring, what is the confining pressure: The source is not a flowing well or spring

_____ 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 the source?

____ YES ____ NO

5) Wellhead elevation (height above mean sea level): 546.9 (ft)

How was elevation determined?

____ Topographic map X 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

X 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 bottom of the lowest confining layer?

____ YES ____ NO

____ Information Unavailable

7) Sanitary setback:

___ (Less than) 100ft* X 100 - 200ft ___ 120 - 200ft ___ (greater than) 200ft

* if less than 100 ft describe the site conditions:

8) Wellhead construction:

X Wellhead enclosed in a wellhouse

X Controlled access (describe below in comments):

___ Other uses for wellhouse (describe below in comments):

___ No wellhead control

Wellhead construction comments

There is a security fence around the Fast Flux Test Facility Complex. Access to the complex is controlled. Access to the wellhouse is also controlled.

9) Surface seal:

___ 18 ft

___ (less than) 18ft (No Department of Ecology approval)

___ (less than) 18ft (Approved by Ecology, include documentation)

X (greater than) 18 ft

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year)

X (less than) 10 in/yr ___ 10 - 25 in/yr ___ (greater than) 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 99600 (gallons)

How was this determined?

___ Meter

___ Estimated: X Pumping Rate (12,000 gph X 8.3 h Run) Time for 2007

___ Pump Capacity (_____)

___ Other:

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

6 Month ground water travel time: 11 (ft)

1 Year ground water travel time: 15 (ft)

5 Year ground water travel time: 34 (ft)

10 Year ground water travel time: 48 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/ open interval: 85 (ft)

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

___ YES X NO (Mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon or holding pond located within the 6 month time of travel boundary?

___ YES X NO (Mark and identify on map).

Comments:

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

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

None of the following are present within any travel time zones	6 Mo	1 Yr	5 yrs	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 (greater than) 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 occurance of any test results since 1986 that might meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL – 10 mg/l)	YES
Results greater than MCL	
(less than) 2 mg/liter nitrate	X
2 - 5 mg/liter nitrate	
(greater than) 5 mg/liter nitrate	
Nitrate sampling records unavailable	

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l)	YES
Results greater than MCL or SAL	
VOCs detected at least once	
VOCs never detected	X
VOC sampling records unavailable	

C. EDB/DBCP: (EDB MCL = 0.05 ug/l or 0.00005 mg/l) (DBCP MCL = 0.2 ug/l or 0.0002 mg.l)	YES
EDB/DBCP detected below MCL at least once	
EDB/DBCP detected above MCL at least once	
EDB/DBCP never detected	X
EDB/DBCP test required but not yet completed	
EDB/DBCP tests not required	

D. Other SOCs (Pesticides):	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	
Other SOC tests performed but none detected (List test methods in comments)	X
Other SOC tests not performed	

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

EPA Methods 508.1, 515.1, 525.2, and 531.2

E. Bacterial contamination: YES

Any bacterial detection(s) in the last 3 years in samples taken from the source (not distribution sampling records) ..... None

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 Hydrological 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 calculation 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 the sources. As a system developes its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

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

___ YES X NO ___ Unknown

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 undereground conditions are identified as fractured rock and/or basalt terrain?

___ YES X NO ___ Unknown

b) 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 primarily identified as coarse sand and gravel?

X YES ___ NO ___ Unknown

3) Is the source located in an aquafer 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 ___ Unknown

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

___ YES X NO ___ Unknown

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

	YES	NO	Unknown
6 Month travel time		X	
6 Month - 1 yr travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

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

	YES	NO	Unknown
1 year travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

Please identify or describe additional hydrological 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

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? 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

_____

_____

_____

_____

_____

_____

_____

_____

_____

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.3

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

PART I: System Information

Well owner / manager: Department of Energy

Water System Name: 400 Area Group A Water System

County: Benton

Water System Number: 419470 Source Number: S0-1

Well Depth: 399 (ft) (From WFI form)

Source Name: 499-S-08; P-15

WA well identification tag number: ___ ___ ___ - ___ ___ ___ ___ Well not tagged

Number of connections: 19 Population served: 214

Township: 11N Range: 28E

Section: 18 1/4 1/4 Section: NW/SW

Latitude / longitude (if available) _____ / _____

How was lat. / long. determined?

___ Global Positioning device ___ Survey ___ Topographic Map

___ Other: _____

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

PART II: Well Construction and Source Information

1) Date well originally constructed: 03 / ___ / 1972 (month/day/year)

last reconstruction: ___ / ___ / _____ (month/day/year)

___ Information unavailable

2) Well Driller:

Bechtel National Inc.

___ Well Driller unknown

3) Type of Well:

___ Drilled: ___ Rotary ___ Bored ___ Dug

X Cable (percussion) ___ Unspecified

___ Other: ___ Spring(s) ___ Driven ___ Jetted

___ Lateral collector (Ranney) ___ Unspecified

Additional comments:

4) Well report available? X YES ___ 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: 220 (gallons / min)

Source of information: Water Facilities Inventory Form

If not documented, how was pumping rate determined?

___ Pumping rate unknown

6) Is source treated? No If so what type of treatment:

___ Disinfection ___ Filtration ___ Carbon Filter

___ Air Stripper ___ Other ___ Unknown

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

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

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

PART III: Hydrogeologic Information

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

___ (less than) 20ft ___ 20 - 50ft ___ 50 - 100ft ___ 100 - 200ft

_X_ (greater than) 200ft ___ Information unavailable

2) Depth to ground water (static water level)

___ (less than) 20ft ___ 20 - 50ft ___ 50 - 100ft _X_ (greater than) 100ft

___ Flowing well spring (artesian) ___ Depth to Ground water unknown

How was water level determined?

_X_ Well log ___ Other: _____ ___ Unknown

3) If source is a flowing well or spring, what is the confining pressure: The source is not a flowing well or spring

_____ 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 the source?

___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 548.6 (ft)

How was elevation determined?

___ Topographic map _X_ 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

_X_ 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 bottom of the lowest confining layer?

___ YES ___ NO

___ Information Unavailable

7) Sanitary setback:

___ (Less than) 100ft* X 100 - 200ft ___ 120 - 200ft ___ (greater than) 200ft

* if less than 100 ft describe the site conditions:

8) Wellhead construction:

X Wellhead enclosed in a wellhouse

X Controlled access (describe below in comments):

___ Other uses for wellhouse (describe below in comments):

___ No wellhead control

Wellhead construction comments

There is a security fence around the Fast Flux Test Facility Complex. Access to the Complex is controlled. Access to wellhouse is also controlled.

9) Surface seal:

___ 18 ft

___ (less than) 18ft (No Department of Ecology approval)

___ (less than) 18ft (Approved by Ecology, include documentation)

X (greater than) 18 ft

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year)

X (less than) 10 in/yr ___ 10 - 25 in/yr ___ (greater than) 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 97,600 (gallons)

How was this determined?

___ Meter

___ Estimated: ___ Pumping Rate (13,200 gph X 7.4 h run) time in 2007

___ Pump Capacity (_____)

___ Other:

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

6 Month ground water travel time: 8 (ft)

1 Year ground water travel time: 12 (ft)

5 Year ground water travel time: 26 (ft)

10 Year ground water travel time: 37 (ft)

Information available on length of screened/open interval?

X YES ___ NO

Length of screened/ open interval: 140 (ft)

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

___ YES X NO (Mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon or holding pond located within the 6 month time of travel boundary?

___ YES X NO (Mark and identify on map).

Comments:

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

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

None of the following are present within all the travel time zones

	6 Mo	1 Yr	5 yrs	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 (greater than) 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 occurance of any test results since 1986 that might meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL – 10 mg/l)	YES
Results greater than MCL	___
(less than) 2 mg/liter nitrate	X
2 - 5 mg/liter nitrate	___
(greater than) 5 mg/liter nitrate	___
Nitrate sampling records unavailable	___

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l)	YES
Results greater than MCL or SAL	___
VOCs detected at least once	___
VOCs never detected	X
VOC sampling records unavailable	___

C. EDB/DBCP: (EDB MCL = 0.05 ug/l or 0.00005 mg/l) (DBCP MCL = 0.2 ug/l or 0.0002 mg.l)	YES
EDB/DBCP detected below MCL at least once	___
EDB/DBCP detected above MCL at least once	___
EDB/DBCP never detected	X
EDB/DBCP test required but not yet completed	___
EDB/DBCP tests not required	___

D. Other SOCs (Pesticides):	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	___
Other SOC tests performed but none detected (List test methods in comments)	X
Other SOC tests not performed	___

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

EPA Methods 508.1, 515.1, and 525.2

E. Bacterial contamination: YES

Any bacterial detection(s) in the last 3 years in samples taken from the source (not distribution sampling records) ..... No

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

Source sampling records for bacteria unavailable ..... ____

Part VI: Geographic or Hydrological 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 calculation 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 the sources. As a system developes its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

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

____ YES X NO ____ Unknown

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 undereround conditions are identified as fractured rock and/or basalt terrain?

____ YES X NO ____ Unknown

b) 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 primarily identified as coarse sand and gravel?

____ YES X NO ____ Unknown

3) Is the source located in an aquafer 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 ___ Unknown

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

___ YES X NO ___ Unknown

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

	YES	NO	Unknown
6 Month travel time		X	
6 Month - 1 yr travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

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

	YES	NO	Unknown
1 year travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

Please identify or describe additional hydrological 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

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? 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

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

Washington State Department of Health
Division of Environmental Health
Office of Drinking Water

Ground Water Contamination
Susceptibility Assessment Survey Form
Version 2.3

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

PART I: System Information

Well owner / manager: Department of Energy

Water System Name: 400 Area Group A Water System

County: Benton

Water System Number: PWS ID # 419470 Source Number: S0-3

Well Depth: 390 (ft) (From WFI form)

Source Name: 499-S1-8J, P-16

WA well identification tag number: ___ ___ ___ - ___ ___ ___ ___ Well not tagged

Number of connections: 19 Population served: 214

Township: 11N Range: 28E

Section: 18 1/4 1/4 Section: NW/SW

Latitude / longitude (if available) 46 26 12.83869 / _____

How was lat. / long. determined?

___ Global Positioning device ___ Survey ___ Topographic Map

___ Other: Hanford Well Information System

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

PART II: Well Construction and Source Information

1) Date well originally constructed: 4 / ___ / 1985 (month/day/year)

last reconstruction: ___ / ___ / _____ (month/day/year)

___ Information unavailable

2) Well Driller:

ONWIGO

___ Well Driller unknown

3) Type of Well:

___ Drilled: ___ Rotary ___ Bored ___ Dug

X Cable (percussion) ___ Unspecified

___ Other: ___ Spring(s) ___ Driven ___ Jetted

___ Lateral collector (Ranney) ___ Unspecified

Additional comments:

4) Well report available? X YES ___ 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: 220 (gallons / min)

Source of information: Water Facilities Inventory Form

If not documented, how was pumping rate determined?

___ Pumping rate unknown

6) Is source treated? No If so what type of treatment:

___ Disinfection ___ Filtration ___ Carbon Filter

___ Air Stripper ___ Other ___ Unknown

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

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

Residual level: 0.235 mg/l (At point closest to the source)
(Average value for 2007)

PART III: Hydrogeologic Information

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

___ (less than) 20ft ___ 20 - 50ft ___ 50 - 100ft ___ 100 - 200ft

_X_ (greater than) 200ft ___ Information unavailable

2) Depth to ground water (static water level)

___ (less than) 20ft ___ 20 - 50ft ___ 50 - 100ft _X_ (greater than) 100ft

___ Flowing well spring (artesian) ___ Depth to Ground water unknown

How was water level determined?

_X_ Well log ___ Other: _____ ___ 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 the source?

___ YES ___ NO

5) Wellhead elevation (height above mean sea level): 549 (ft)

How was elevation determined?

___ Topographic map _X_ 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

_X_ 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 bottom of the lowest confining layer?

___ YES _X_ NO

___ Information Unavailable

7) Sanitary setback:

___ (Less than) 100ft* X 100 - 200ft ___ 120 - 200ft ___ (greater than) 200ft

* if less than 100 ft describe the site conditions:

8) Wellhead construction:

X Wellhead enclosed in a wellhouse

X Controlled access (describe below in comments):

___ Other uses for wellhouse (describe below in comments):

___ No wellhead control

Wellhead construction comments

There is a security fence around the Fast Flux Test Facility complex. Access to the complex is controlled. Access to the wellhouse is also controlled.

9) Surface seal:

X 18 ft

___ (less than) 18ft (No Department of Ecology approval)

___ (less than) 18ft (Approved by Ecology, include documentation)

___ (greater than) 18 ft

___ depth of seal unknown

___ no surface seal

10) Annual rainfall (inches per year)

X (less than) 10 in/yr ___ 10 - 25 in/yr ___ (greater than) 25 in/yr

PART IV: Mapping Your Ground Water Resource

1) Annual volume of water pumped: 30935200 (gallons)

How was this determined?

x Meter Run Time

___ Estimated: x Pumping Rate (13,200 gph X 2343.6 run) time in 2007

___ Pump Capacity (_____)

___ Other:

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

6 Month ground water travel time: 316 (ft)

1 Year ground water travel time: 447 (ft)

5 Year ground water travel time: 999 (ft)

10 Year ground water travel time: 1413 (ft)

Information available on length of screened/open interval?

x YES ___ NO

Length of screened/ open interval: 30 (ft)

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

___ YES x NO (Mark and identify on map).

4) Is there a stormwater and/or wastewater facility, treatment lagoon or holding pond located within the 6 month time of travel boundary?

___ YES x NO (Mark and identify on map).

Comments:

PART V: Assessment of Water Quality

1) Regional sources of risk to ground water:

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

None of the following are present within any travel time zones	6 Mo	1 Yr	5 yrs	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 (greater than) 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 occurance of any test results since 1986 that might meet the following conditions: (Unless listed on assessment, MCLs are listed in assistance package.)

A. Nitrate: (Nitrate MCL - 10 mg/l)	YES
Results greater than MCL	
(less than) 2 mg/liter nitrate	X
2 - 5 mg/liter nitrate	
(greater than) 5 mg/liter nitrate	
Nitrate sampling records unavailable	

B. VOCs: (VOC detection level 0.5 ug/l or 0.0005 mg/l)	YES
Results greater than MCL or SAL	
VOCs detected at least once	
VOCs never detected	X
VOC sampling records unavailable	

C. EDB/DBCP: (EDB MCL = 0.05 ug/l or 0.00005 mg/l) (DBCP MCL = 0.2 ug/l or 0.0002 mg.l)	YES
EDB/DBCP detected below MCL at least once	
EDB/DBCP detected above MCL at least once	
EDB/DBCP never detected	X
EDB/DBCP test required but not yet completed	
EDB/DBCP tests not required	

D. Other SOCs (Pesticides):	YES
Other SOCs detected (pesticides and other synthetic organic chemicals)	
Other SOC tests performed but none detected (List test methods in comments)	X
Other SOC tests not performed	

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

EPA Methods 515.1, 525.2, 508.1, 531.1, and 531.2

E. Bacterial contamination: YES

Any bacterial detection(s) in the last 3 years in samples taken from the source (not distribution sampling records) ..... None

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 Hydrological 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 calculation 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 the sources. As a system developes its Wellhead Protection Plan for these sources, a more detailed delineation method should be considered.

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

___ YES _x_ NO ___ Unknown

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 undereground conditions are identified as fractured rock and/or basalt terrain?

___ YES ___ NO ___ Unknown

b) 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 primarily identified as coarse sand and gravel?

_x_ YES ___ NO ___ Unknown

3) Is the source located in an aquafer 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 ___ Unknown

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

___ YES ___ NO ___ Unknown

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

	YES	NO	Unknown
6 Month travel time		X	
6 Month - 1 yr travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

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

	YES	NO	Unknown
1 year travel time		X	
1 - 5 year travel time		X	
5 - 10 year travel time		X	

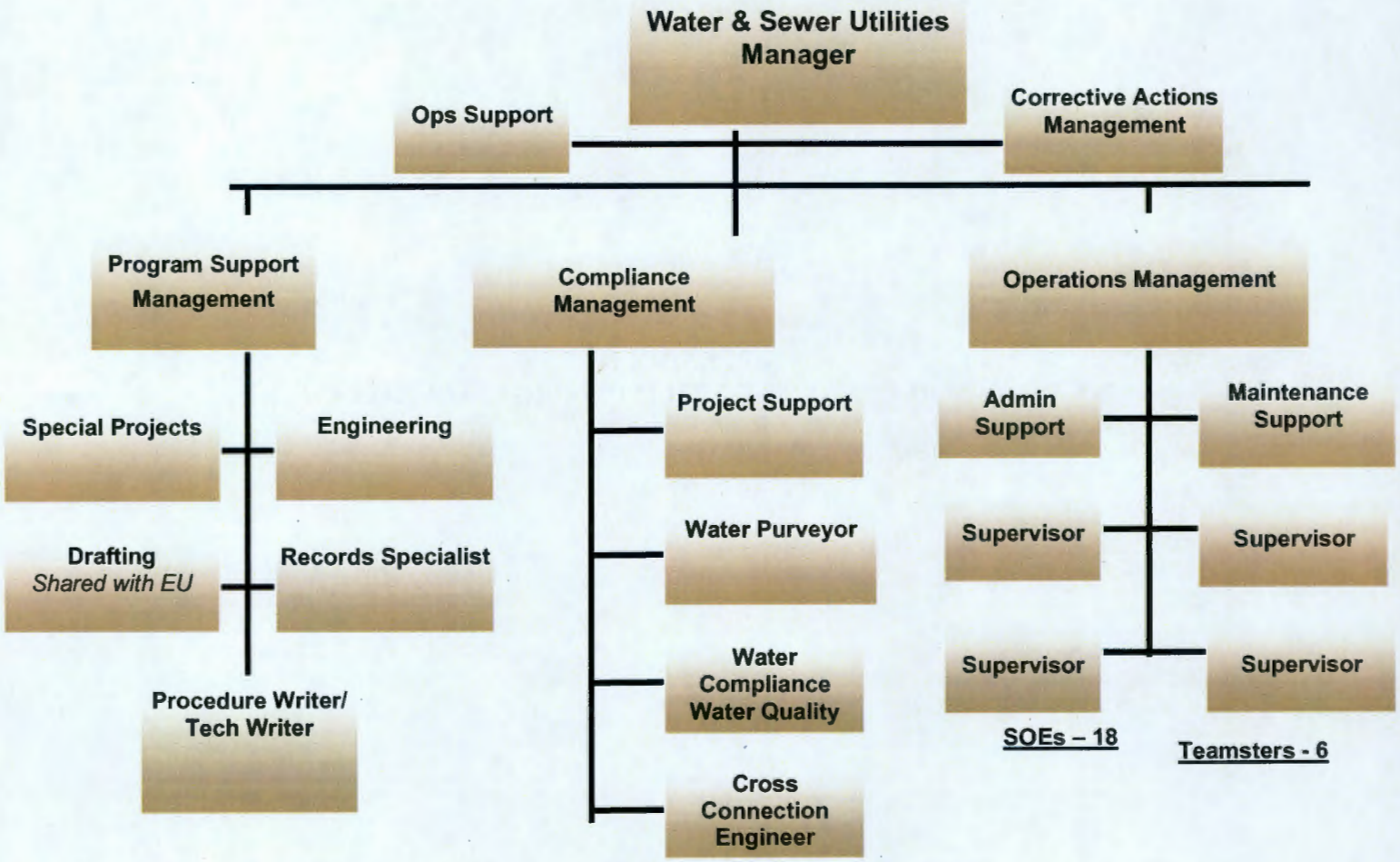
Please identify or describe additional hydrological or geographic conditions that you believe may affect the shape of the zone of contribution for this source. Where possible, reference them to locations on the map produced in Part IV

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? 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

The Department of Health is an equal opportunity agency. For persons with disabilities, this document is available on request in other formats. To submit a request, please call 1-800-525-0127 (TTY 1-800-833-6388).

APPENDIX B
SITE INFRASTRUCTURE AND UTILITIES ORGANIZATION CHART

Public Works Organization Water & Sewer Utilities



This page intentionally left blank.

APPENDIX C
COMPREHENSIVE MONITORING PROGRAM PLAN FOR CONTAMINANTS UNDER WAC 246-290-300 ELEMENTS

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

2.0 RESPONSIBILITIES

3.0 COMPREHENSIVE MONITORING PROGRAM PLAN FOR CONTAMINANTS UNDER WAC 246-290-300 ELEMENTS

- **3.1 Element 1 – Drinking Water Regulations Overview**
- **3.2 Element 2 – Coliform/Bacteriological**
- **3.3 Element 3 – Inorganic Chemical and Physical**
- **3.4 Element 4 – Asbestos**
- **3.5 Element 5 – Lead and Copper**
- **3.6 Element 6 – Organics**
- **3.7 Element 7 – Radionuclides**
- **3.8 Element 8 - Disinfection Byproducts / Disinfectant Residuals / Disinfection Byproduct Precursors**
- **3.9 Element 9 – Cryptosporidium and E. Coli**
- **3.10 Element 10 – MCLs and Follow-Up**

4.0 BIBLIOGRAPHY

5.0 GLOSSARY

• PURPOSE AND SCOPE

The Washington State Department of Health (DOH) has set forth regulations, Washington Administrative Code (WAC 246-290-415) requiring Group A Public Water Systems to prepare a Comprehensive Monitoring Plan for all contaminants under WAC 246-290-300. The Comprehensive Monitoring Plan is described as an element of an overall operations and maintenance program. As defined in WAC 246-290-010, a Comprehensive Monitoring Plan means a schedule that describes both the frequency and appropriate locations for sampling of drinking water contaminants as required by state and federal rules.

This Comprehensive Monitoring Program Plan applies to all WAC 246-290 Group A and WAC 246-291 Group B Public Water Systems and includes the following systems 200W, 100-K, 300 and 400 Area water systems, and the Group B systems serving the Wye Barricade, Yakima Barricade, 609, and Building 251W. These requirements apply to compliance collection/sampling, representative monitoring location and frequency, sample validity, monitoring waivers, maximum contaminant levels, maximum residual disinfectant levels, and follow-up actions.

• RESPONSIBILITIES

2.1. Administration and implementation of the Comprehensive Monitoring Plan and all required and referenced sub-plans will be performed by the Hanford Site Water Compliance Office/Water Purveyor.

2.2. Sampling/monitoring will be performed by appropriately certified individuals as designated by the Hanford Site Water Compliance Office/Water Purveyor.

2.3. The Hanford Site Water Compliance Office/Water Purveyor shall notify the Department of Health immediately upon learning of any chemical or physical exceedance, and shall maintain open communications and be the single point of contact with the DOH.

2.4. In the event of a violation, the affected water system manager shall determine if an Event/Occurrence Report is required and ensure a report is developed as applicable.

2.5. Water system managers will be responsible for ensuring their respective water system(s) is under normal operating conditions on selected sample collection dates. If unusual conditions exist, management will immediately notify the Hanford Site Water Compliance Office.

2.6. Oversight personnel will conduct effective quality/operational oversight to ensure proper and compliant implementation of the elements of the comprehensive monitoring program as developed by the Hanford Site Water Compliance Office/Water Purveyor.

- **COMPREHENSIVE MONITORING PROGRAM PLAN FOR CONTAMINANTS UNDER WAC 246-290-300 ELEMENTS**

The monitoring requirements specified in this Comprehensive Monitoring Plan are considered to be a minimum. The DOH may require additional monitoring when: contamination is present/suspected in a water system; the degree of source protection is not satisfactory; and/or additional monitoring is needed to evaluate continuing effectiveness of a treatment process where problems with the treatment may exist. Special purpose samples collected by the Water Purveyor shall not count toward fulfillment of the monitoring requirements of this Comprehensive Monitoring Plan unless approved by the Department of Health (DOH).

Compliance samples required by WAC 246-290-300(1)(d) Table 3 shall be taken at the following locations:

Asbestos	One sample from the distribution system or of required by DOH, from the source.
Bacteriological	From representative points throughout the distribution system.
Cryptosporidium and E. Coli (Source Water) – WAC 246-290-630(16)	40 CFR 141.703 - Must collect samples for each plant that treats surface water. Where multiple plants draw water from the same influent, such as the same pipe or intake, the DOH may approve one set of monitoring results to be used to satisfy the requirements for all plants. Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants.
Inorganic Chemical and Physical	From a representative point of the source, after treatment, and prior to entry into the distribution system.
Lead/Copper	From the distribution system at targeted sample tap locations.
Nitrate/Nitrite	From a point representative of the source, after treatment, and prior to entry into the distribution system.
Disinfection Byproducts (TTHMs/HAA5)	40 CFR 141.132(b)(1) – For systems serving from 500 to 9,999 persons - One water sample per quarter per treatment plant from locations representing maximum residence time. For systems serving

fewer than 500 persons –One water sample per year per treatment plant during month of warmest water temperature from locations representing maximum residence time. If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

Disinfectant Residuals Chlorine

40 CFR 141.132(c)(1) - Non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled.

Disinfection Precursors TOC

40 CFR 141.132(d) - Systems which use conventional filtration treatment must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph (d)(1) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month, or once per quarter if on a reduced monitoring schedule, per plant at a time representative of normal operating conditions and influent water quality.

Radionuclides	From a point representative of the source, after treatment, and prior to entry into the distribution system.
Organic Chemicals (VOC/SOC)	From a point representative of the source, after treatment, and prior to entry into the distribution system.
Other substances (Unregulated Chemicals)	From a point representative of the source, after treatment, and prior to entry into the distribution system, or as directed by the department.

.1 Drinking Water Regulations Overview

Safe Drinking Water Act

The principal law governing drinking water safety in the United States is the Safe Drinking Water Act (SDWA). The SDWA authorizes The US Environmental Protection Agency (EPA) to establish comprehensive national drinking water regulations to ensure drinking water safety.

The SDWA was enacted in 1974, as a result of public concern about water quality. The Act established a cooperative program among local, state, and federal agencies to institute drinking water regulations applicable to all public water systems in the United States. States were granted primary responsibility—known as primacy—for administering and enforcing the Safe Drinking Water Act of 1974. To obtain primacy, states were required to meet certain criteria, including adoption of regulations equal to or more stringent than EPA regulations.

In 1986, the SDWA was amended as a result of additional public concern and frequent contamination of groundwater from industrial solvents and pesticides. The 1986 Amendments require public water systems to monitor and treat for a continuously increasing number of contaminants. The EPA regulated approximately 20 contaminants between 1974 and 1986. The 1986 Amendments identified 83 contaminants that the EPA was required to regulate by 1989. Due to the slow implementation of the new regulations, the SDWA was amended again in 1996.

Congress amended the Act in 1988 by adding the Lead Contamination Control Act. The 1996 amendments focused on source water protection, funding for water system improvements, operator training, providing public information, and strengthening EPA's scientific work, including the use of risk and cost benefit analysis in establishing drinking water standards. Between 1975 and 2006, these amendments have resulted in the

development of 18 new drinking water regulations. Post-1996 regulations have included more complex compliance determinations and more advanced treatment technologies.

The EPA sets two limits for each contaminant that is regulated under the rules. The first limit is a health goal, or Maximum Contaminant Level Goal (MCLG). The MCLG is zero for many contaminants, especially known cancer-causing agents (carcinogens) because any amount of exposure may pose some risk of cancer. This goal is not a legal limit with which water systems must comply; it is based solely on human health. The second limit is a legal limit, referred to as the Maximum Contaminant Level (MCL). EPA sets the MCL as close to the health goal as possible, keeping in mind the technical and financial barriers that exist. EPA can either set an MCL requiring monitoring for the contaminant, or it can establish a treatment technique requirement when monitoring is not considered to be feasible.

Washington State Department of Health

EPA awarded primacy to Washington State in 1978. The State Board of Health and the Washington State Department of Health became partners in developing and enforcing state drinking water regulations. The Washington State Department of Health (DOH) has promulgated the federal drinking water requirements into the Washington Administrative Codes (WACs). Hanford Site water systems were designated as public water systems in 1986 and became formally registered as public systems under the jurisdiction of the Washington State Department of Health in 1987.

All public water systems in the state of Washington must monitor water quality according to written contaminant-specific plans that are in accordance with both state and federal drinking water laws and are acceptable to the WDOH. All Hanford Site contaminant-specific monitoring plans are prepared and implemented by the site water compliance office to ensure uniform interpretation and application of the codes across the site, to provide the most cost effective sampling program, and to insure that the appropriate monitoring is performed for the various water systems at Hanford. These contaminant-specific plans will be referenced throughout this document.

.2 Bacteriological

Overview: The 1986 Safe Drinking Water Act Amendments (SDWA) required the EPA to regulate total coliform bacteria to prevent waterborne microbial disease. The Total Coliform Rule was promulgated on June 29, 1989 and established a maximum contaminant level goal (MCLG) for total coliform bacteria of zero, and a maximum contaminant level based on the presence or absence of total coliforms. The Rule specifies requirements for routine and follow-up coliform sampling, and the performance of Sanitary Surveys for systems collecting fewer than five routine samples per month. A sanitary survey is an on-site review of the water source, facilities, equipment, operation and maintenance of a public water supply system for the purpose of evaluating the system's adequacy and ability to reliably produce and distribute safe drinking water. Sanitary Surveys are performed by the State, or State-approved personnel. Monitoring and sanitary surveys complement each other to assure long-term quality and safety in drinking water systems.

Monitoring Requirements: Routine monitoring is required based on population served. For each routine sample that tests positive for total coliforms, a set of three or four repeat samples must be analyzed. At least one repeat sample must be collected from the same tap as the original sample. Two of the repeat samples must be collected from within 5 service connections of the original sample, one upstream and one downstream. The purpose of repeat sampling is to determine whether the positive routine sample is indicative of system contamination or of a non-distribution-system (local) problem. All repeat samples must be collected on the same day and submitted for analysis within 24 hours after notification by the laboratory of a coliform presence. If total coliforms are detected in any repeat sample, the system must collect an additional set of repeat samples.

For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms. If more than one sample is positive for total coliforms, this is considered a non-acute MCL violation. A non-acute MCL violation does not indicate that an imminent health hazard exists. It does indicate that there could be problem or change in the treatment process or distribution system. A thorough systematic investigation from the source to the consumer's tap is necessary to determine the cause of the total coliform results. An acute MCL violation occurs when there is fecal or E. Coli presence in a repeat sample; or if there is a coliform presence in any repeat samples collected as a follow-up to a sample with fecal or E. Coli presence.

Hanford-Specific: The "*Hanford Site Comprehensive Coliform Monitoring Plan*", assures adequate and representative sampling throughout each individual distribution system, and provides a means of evaluating microbial water quality.

Routine Sampling: The Chlorinator Serviceman, or designated alternate, is the individual

responsible for collecting the samples and transporting them to the Benton Franklin County Health Department. An operating procedure, S-WP-0014, *Bacteriological Sampling* is utilized to ensure that the collection and timely transport of the samples is performed using approved methods. When collecting a bacteriological sample, the disinfectant residual concentration is measured at the same time and same location and recorded on the Coliform sample report forms. Procedure S-WP-0012, "Chain of Custody Control", ensures that the requirements are met for documenting and maintaining custody of the samples from their point of origin to receipt at the laboratory. Additionally, a Bacteriological Analysis Form is prepared for each sample in accordance with procedure S-WP-0015, *Preparation of Water Bacteriological Analysis Form.*

Purveyors shall collect and submit for analysis no less than the number of samples required in Table 2, WAC 246-290-300, and no less than required under 40 CFR 141.21. The required minimum frequency for sampling is based upon the population to be served during that month by the water system. The general coliform monitoring frequency is addressed in WAC 246-290-300(3), *"The purveyor shall be responsible for collection and submittal of coliform samples from representative points throughout the distribution system. Samples shall be collected after the first service and at regular time intervals each month the system provides water to consumers. Samples shall be collected that represent normal operating conditions."*

If coliform bacteria are present in any sample, follow-up action is performed based upon WAC-246-290-320(2) and Table 3-1 below:

Table 22-3. Repeat Sample Requirements.

Number of Routine Samples Collected Each Month	**Number of Samples in a Set of Repeat Samples**	**Locations for Repeat Samples (collected at least one sample per site)**
1	4	• Site of previous sample with a coliform presence • Within 5 active services upstream of site of sample with a coliform presence • Within 5 active services downstream of site of sample with a coliform presence • At any other active service or from a location most susceptible to contamination (i.e., well or reservoir)
More than 1	3	• Site of previous sample with a coliform presence • Within 5 active services upstream of site of sample with a coliform presence • Within 5 active services downstream of site of sample with a coliform presence

When any samples with a Coliform presence were collected the previous month, 5 routine samples are collected the following month.

Source Monitoring: Source coliform monitoring for each surface water system is performed once per month and analyzed for fecal coliform density by the Benton Franklin County Health Department in accordance with WAC-246-290-664. Samples are collected before the first point of disinfectant application and before coagulant chemical addition.

The basic requirements of the Groundwater Rule include triggered and assessment source water monitoring. *Triggered Source Water Monitoring* is required when a routine distribution system sample collected under the TCR is total coliform positive. Within 24 hours of notification of the total coliform positive result, triggered source samples must be collected and tested for *E. coli* from each source (prior to treatment) that was in operation at the time the routine sample was collected. If one of the triggered source samples is *E. coli* positive, DOH will direct corrective actions or the collection of five additional source samples within 24 hours. If any of the five additional source samples is *E coli* positive, the following actions must be taken:

Assessment Source Water Monitoring may be required on a case-by-case basis to evaluate sources that may be at risk for fecal contamination. This usually requires the collection of one source sample per month for *E. coli* analysis, for a minimum of twelve months.

Other Source Monitoring Details: A triggered source water sample can be used as a repeat sample to meet the requirements of the Total Coliform Rule. In this case, an *E. coli* positive source water sample would result in an Acute Coliform MCL violation under the Total Coliform Rule. All *E. coli* samples must be at least 100 milliliters (mL) and analyzed by an accredited laboratory using EPA-approved methods.

Follow-Up Action: For surface systems, when coliform bacteria are present in a sample and the sample is not invalidated per WAC 246-290-320, Section 2, Subsection d, follow-up action is taken in accordance with WAC 246-290-320, Section 2 for the Group A systems, and WAC 246-291-320, for the Group B water systems. Hanford-specific procedures, S-WP-16 - S-WP-22, provide the actions necessary to comply with internal and external requirements. Additionally, an investigative assessment is performed to determine the cause of the coliform presence, specifically procedure S-WP-0027 *Positive Bacteriological Result Investigative Assessment.*

For groundwater systems and consecutive systems supplied from a groundwater source, when coliform bacteria are present in a routine sample under the Total Coliform Rule, follow-up action is taken in accordance with above-listed requirements, and also WAC 246-290-320, Section 2 (g) to include Groundwater Rule requirements. Hanford specific

procedures S-WP-0038 - S-WP-0040, provide the actions required to comply with the Groundwater Rule requirements.

Recordkeeping and Reporting: The Chlorinator serviceman submits all bacteriological analysis sample collection site logsheets and completed Chain of Custody sheets to the Site Water Sampling and Compliance office. The Benton Franklin County Health Department submits a "Water Bacteriological Analysis Report" form to the Washington State Department of Health and the Site Water Compliance office for each sample analyzed. Records are kept in accordance with WAC 246-290-480 and WAC 246-290-485 requirements.

In the event of a positive sample, the laboratory notifies the Site Water Compliance Department of the sample results. Site Water Compliance notifies the Department of Energy Richland Operations Office Site Infrastructure Division representative and the Washington State Department of Health. Reporting for Group A public water systems is accomplished in accordance with WAC-246-290-480 and WAC-246-290-485. Reporting for Group B public water systems is accomplished in accordance with WAC-246-291-260. Hanford Site specific reporting requirements are accomplished per applicable site directives and procedures.

Other Coliform Monitoring:

✓ To verify the proper disinfection of any component of the potable water systems such as line repair or new construction activities, samples are collected for Total Coliform and or HPC analysis in accordance with the American Water Works Association Standards (C-651, C-652, C-653 and C-654) and procedure S-WP-0005 *Basic Disinfection of Sanitary Water Systems and Components*.

✓ To verify proper disinfection of buildings, service connections and building piping, samples are collected for Total Coliform analysis in accordance with the Uniform Plumbing Code and site procedure S-WP-0036 *Basic Disinfection of Building Water Systems and Components*.

✓ Bacteriological samples are sometimes collected for water quality investigative purposes in response to consumer concerns.

✓ Water quality bacteriological samples are routinely collected from remote area facilities supplied with above or underground poly holding tanks. Above-ground tanks are typically housed in a controlled environment, equipped with system pump, pressure tank, level cutout switch, and fill station. Potable water is obtained from the 200 West Area water treatment plant and trucked to these remote areas via state-certified protocol.

.3 Inorganics

Overview: EPA first regulated chemicals in drinking water in l975 by establishing maximum contaminant levels and sampling requirements for about fifteen contaminants. The inorganic contaminants included arsenic, barium, cadmium, chromium, fluoride, lead, mercury, nitrate, selenium, silver, sodium and corrosion. Thereafter, EPA revised the standards for these chemicals and established new standards for other chemicals in a series of drinking water regulations in the late 1980's and early 1990's.

The VOC Rule (Phase I) became effective January 9, 1989. This rule established maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for eight VOCs. Monitoring requirements were specified for the eight VOCs and 51 additional unregulated (no established MCLs) contaminants. The Phase II Rule set drinking water standards for 38 inorganic and organic chemicals. The inorganic chemicals included asbestos, barium, cadmium, chromium, mercury, nitrate, nitrite and selenium. The Phase V Rule set standards for 23 contaminants that may be found in drinking water. The inorganics included antimony, beryllium, cyanide, nickel, and thallium. The Phase VIb Rule inorganic contaminants of concern were boron, manganese, molybdenum, and zinc.

Standard Monitoring Framework: To establish synchronized, standardized and simplified compliance monitoring across several existing and upcoming rules, EPA established the Standard Monitoring Framework (SMF). Under the SMF, most of the chemical monitoring requirements were phased into a 9 year standard monitoring cycle made up of initial sampling requirements (1 Year), periods (3 years), and cycles (3 periods or 9 years). The Washington State Department of Health implemented the Phase II and Phase V Rules beginning in the first compliance period (1993 - 1995).

Sampling Frequency: To ensure uniform interpretation and application of the codes across the Hanford site, to provide the most cost effective sampling program, and to ensure that the appropriate monitoring is performed for the diverse water systems at Hanford, all monitoring plans, procedures and schedules are prepared and implemented by the Site Water Compliance office. Sampling frequency requirements for all Hanford water systems have been determined through the use of the SMF and the Washington State Department of Health Water Quality Monitoring Reports which were instituted in 2000.

Sampling Protocol: All inorganic samples with the exception of lead, copper, and asbestos (distribution system samples) are collected at a site location after treatment and prior to distribution. Samples are collected by state-certified personnel and shipped to a State-accredited laboratory for analysis on the same day of sample collection. State-approved procedures and/or laboratory-specific procedures are followed for the collection

and timely transport of the samples. Chain of Custody control provides further insurance that the requirements are met for documenting and maintaining custody of the samples from their point of origin to receipt at the laboratory. Results of testing are reported to the Site Water Compliance office and DOH directly from the state-certified laboratories performing the analyses. Reference procedure, S-WP-0034, *Comprehensive Inorganic Monitoring Program Plan.*

Sampling Schedule: An inorganic sampling schedule for each water system is provided in the *Hanford Site Comprehensive Inorganic Monitoring Plan* and includes the second and third cycle of the Standard Monitoring Framework (2002 – 2019). Emergency sources are not on the schedule, but will be sampled when in use. Unregulated inorganic contaminants are not included on the schedule for the following reason:

The 1996 Amendments to the Safe Drinking Water Act required the EPA to establish criteria for a monitoring program for unregulated contaminants and to publish a list of the contaminants to be monitored. The Unregulated Contaminant Monitoring Rule generates monitoring data to evaluate and prioritize contaminants on the Contaminant Candidate List, a list of contaminants that EPA is considering for possible new drinking water standards.

Under the UCMR 1, the list of unregulated contaminants was monitored from 2001-2005. All large public water systems serving more than 10,000 people were required to monitor for these contaminants. Only a national representative sample of small public water systems (800 systems) serving < 10,000 people were required to monitor under the UCMR. The UCMR 2 established a new set of 25 chemicals using five associated analytical methods to be used during the 2008 – 2010 monitoring cycle, and built upon the established structure of UCMR 1. The UCMR 3 requires monitoring from 2013-2015 for 28 contaminants and two viruses. No Hanford water systems have been chosen to monitor these contaminants.

Hanford water systems shall not monitor for unregulated inorganic chemicals unless notification is received from DOH or EPA that Hanford water systems have been selected as part of the State Monitoring Plan for small systems.

Additionally, for many years, the drinking water standard for arsenic was 50 parts per billion (ppb). The Environmental Protection Agency (EPA) tightened the standard from 50 ppb to 10 ppb in January 2001. The reason EPA tightened the standard was to lessen people's long-term exposure to arsenic in drinking water. The lower federal standard became effective January 23, 2006 for existing Group A community water systems (serving more than 25 people), and non-transient non-community (NTNC) water systems. The lower standard is being considered for Group B public water systems as well. Monitoring for arsenic is performed as follows based on satisfactory initial monitoring results: Group A surface systems - one sample annually; Group A groundwater systems - one sample every three years; and, Group B systems as directed by the DOH.

Chemical or Physical or Action Level Exceedances: Upon learning of a chemical, physical or Action Level exceedence, the Site Water Compliance organization will notify the DOH per WAC 246-290 requirements. Action will be taken as directed by the DOH, and, as applicable, consumers served by the affected system will be notified in accordance with WAC 246-290, Part 7, Subpart A, *Public Notification and Consumer Information* and 40 CFR 141 Public Notification requirements.

Public Notification: Public notifications are categorized into three Tiers to take into account the seriousness of the violation or situation and of any potential health effects that may be involved, as shown in Table 3-2. Tier 1 public notice is required within 24 hours for any violation or situation with significant potential to have serious adverse effects on human health as a result of short-term exposure. Tier 2 notices are required within 30 days for all other violations and situations with the potential to have serious adverse effects on human health. Tier 3 notices are required within 1 year for all other violations and situations not included in Tier 1 and Tier 2.

Table 22-4 Inorganic Chemicals Tiers of Public Notice

Chemical Exceedance	Tier of Public Notice Required
Antimony	2
Arsenic	2
Asbestos (fibers > 10 million fibers per Liter)	2
Barium	2
Beryllium	2
Cadmium	2
Chromium (total)	2
Cyanide	2
Fluoride	2
Mercury	2
Nitrate	1
Nitrite	1
Selenium	2
Thallium	2
Lead and Copper	2
Fluoride secondary MCL exceedance	3

Reporting:

- Tier 1 Violation – The DOH shall be notified as soon as possible, but no later than 24 hours after the violation is known.
- All Other Violations – The DOH shall be notified within 48 hours of the failure to comply with any national primary drinking water regulation, including the failure to comply with any monitoring requirements of WAC 246-290.

- Notify DOE-RL and the affected water system manager.

MCLs and Follow-up Monitoring Actions:

The MCLs are listed in Tables 3-3 and 3-4 below for inorganic chemical and physical characteristics, respectively.

Table 22-5 Inorganic Chemical Characteristics MCLs

Substance	Primary MCLs (mg/L)	Substance	Secondary MCLs (mg/L)
Antimony (Sb)	0.006	Chloride (Cl)	250.0
Arsenic (As)	0.010 *	Fluoride (F)	2.0
Asbestos	7 million fibers/liter (longer than 10 microns)	Iron (Fe)	0.3
Barium (Ba)	2.0	Manganese (Mn)	0.05
Beryllium (Be)	0.004	Silver (Ag)	0.1
Cadmium (Cd)	0.005	Sulfate (SO4)	250.0
Chromium (Cr)	0.1	Zinc (Zn)	5.0
Copper (Cu)	* *		
Cyanide (HCN)	0.2		
Fluoride (F)	4.0		
Lead (Pb)	* *		
Mercury (Hg)	0.002		
Nickel (Ni)	0.1		
Nitrate (as N)	10.0		
Nitrite (as N)	1.0		
Selenium (Se)	0.05		
Sodium (Na)	* *		
Thallium (Tl)	0.002		

Note * Does not apply to TNC systems.

Note * * Although the state board of health has not established MCLs for copper, lead, and sodium, there is sufficient public health significance connected with copper, lead, and sodium levels to require inclusion in inorganic chemical and physical source monitoring. For lead and copper, the EPA has established distribution system related levels at which a system is required to consider corrosion control. These levels, called "action levels," are 0.015 mg/L for lead and 1.3 mg/L for copper and are applied to the highest concentration in ten percent of all samples collected from the distribution system. The EPA has also established a recommended level of twenty mg/L for sodium as a level of concern for those consumers that may be restricted for daily sodium intake in their diets.

Table 22-6 Physical Characteristics MCLs

Substance	Secondary MCLs
Color	15 Color Units
Specific Conductivity	700 umhos/cm
Total Dissolved Solids (TDS)	500 mg/L

Compliance with the MCLs, except for nitrate and nitrite, is determined by a running annual average at each sampling point. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling and at least one sampling point is in violation of the MCL. If one sampling point is in violation of the MCL, the system is in violation of the MCL.

If any sample will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected. If a sample result is less than the detection limit, zero will be used to calculate the running annual average.

Compliance with the MCLs for nitrate and nitrite is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate or nitrite exceed the MCLs in the initial sample, a confirmation sample is required under 40 CFR 141.23 (f)(2), and compliance shall be determined based on the average of the initial and confirmation samples.

Lead and copper follow-up monitoring shall be conducted in accordance with 40 CFR 141.86 (a) – (f), 141.87 and 141.88.

Recordkeeping: The following summaries shall be kept on file in the Site Water Compliance repositories in accordance with WAC 246-290-480 requirements:

- All monitoring forms to include Chain of Custody, Water Sampling Information (WSIs), laboratory reports, and tabular summaries.
- Records of action taken to correct violations of primary drinking water standards and copies of Public Notifications.
- Certification forms along with a representative copy of each type of notice when a Public Notification is required.
- All waiver forms and supporting documentation.
- All correspondence with DOH.

.4 **Asbestos**

The major sources of asbestos in drinking water are decay of asbestos cement water mains; and erosion of natural deposits. The MCLG for asbestos is 7 MFL (million fibers per Liter). EPA has set this level of protection based on the best available science to prevent potential health problems. EPA has set an enforceable regulation for asbestos, called a maximum contaminant level (MCL), at 7 MFL.

The Phase II Rule, the regulation for asbestos, became effective in 1992. The Safe Drinking Water Act requires EPA to periodically review the national primary drinking water regulation for each contaminant and revise the regulation, if appropriate. EPA reviewed asbestos as part of the Six Year Review and determined that the 7 MFL MCLG and 7 MFL MCL for asbestos are still protective of human health.

.4.1 Applicability/Frequency

- Group A surface water systems once every nine years
- Group A groundwater systems once every nine years

.4.2 Sampling Locations and Sampling Frequency

- All Group A systems with surface water sources shall be monitored for asbestos at the source with the exception of purchased and inter-tie systems.
- All Group A systems shall be monitored for asbestos from a tap supplied by asbestos cement pipe within the distribution system unless waivers have been obtained from DOH.
- Sampling shall be performed the first three year compliance period of every nine year compliance cycle unless directed otherwise by DOH.

.4.3 Sampling Protocol: Reference procedure S-WP-0034, *Comprehensive Inorganic Monitoring Program Plan.*

.4.4 Reporting, Recordkeeping & Notification Requirements: Reference procedure S-WP-0034, *Comprehensive Inorganic Monitoring Program Plan.*

In April 1999, DOH provided information to assist water systems in determining asbestos monitoring requirements and waiver eligibility. Direction was given to complete asbestos waiver forms for the water systems at Hanford. Three of the water systems were eligible for waivers. The remaining systems were sampled in September 1999. DOH provided new asbestos waiver forms and guidance in 2004. The asbestos waiver forms were submitted and systems ineligible for the waiver were sampled in August 2004. All testing results were well below the established Maximum Contaminant level limit of

7 MFL. Currently, there is a DOH State-wide waiver eliminating the requirement to monitor for asbestos through 2019.

.5 Lead and Copper

In 1991, EPA published the Lead and Copper Rule to minimize lead and copper in drinking water. The rule replaced the previous standard of 50 ppb, measured at the entry point to the distribution system. The rule established a maximum contaminant level goal (MCLG) of zero for lead in drinking water, and a treatment technique to reduce corrosion within the distribution system.

Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 0.015 mg/L or copper concentrations exceed an action level of 1.3 mg/L in more than 10% of customer taps sampled, systems must undertake a number of additional actions to control corrosion. If the action level for lead and/or copper is exceeded, systems must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control.

The Rule requires systems to evaluate not only the pipes in their distribution systems but also the age and type of housing that they serve. Based on this information, systems must collect water samples at points throughout the distribution system that are vulnerable to lead contamination, including regularly used residential bathroom and kitchen taps. The initial material evaluations of the Hanford distribution systems and facilities were performed in 1993 and submitted to DOH. The evaluations identified a pool of targeted sampling sites large enough to ensure that each water system was able to collect the number of lead and copper tap samples required per the regulations. The evaluations also revealed that no lead service lines existed in the distribution systems at Hanford.

Sampling for lead and copper at Hanford began in late 1993. Based on initial testing results, some of the water systems were required to perform additional monitoring and/or replace copper tubing and change out facility faucets with lead-free faucets to reduce lead and copper levels at facility taps. Based on meeting the lead and copper action levels for a period of time, the monitoring schedule was eventually reduced from an annual frequency to once every three years for all affected Hanford systems. Per requirements, samples collected once every three years are collected no later than every third calendar year of the monitoring period during the month of June, July, August, or September.

Currently, based on monitoring results, all systems remain on a reduced monitoring schedule and samples are collected during the month of June.

All tap samples collected for lead and copper are first-draw samples. Each first-draw tap sample is one liter in volume and has stood motionless in the plumbing system of each sampling site for at least six hours. The samples are collected at an interior tap from which water is typically drawn for consumption. The number of samples collected is based on the population of the water system.

System Size (# people served)	# Sites (std. mon.)	# Sites (red. mon.)
3301 – 10000	40	20
501 – 3300	20	10
101 – 500	10	5
< or = to 100	5	5

Procedure S-WP-0001, *Lead and Copper Monitoring Program Sample Collection* provides the steps necessary to ensure all requirements are met for sample collection, chain of custody control and transport of the samples to the designated DOH-approved laboratory for analysis. Public water systems in Washington State must provide notification of lead and copper sample results to water users where lead and copper samples are collected. Systems must also certify they have completed these notices and provide a copy to the Washington State Department of Health. Procedure S-WP-0041, *Lead and Copper Public Information Requirements* provides the steps necessary for meeting these requirements.

If copper and/or lead exceed the regulatory MCL, the Water Purveyor will notify the DOH and take follow-up action/monitoring consistent with Procedure S-WP-0034 *Comprehensive Inorganic Monitoring Program Plan.* A water system that fails to meet the lead action level on the basis of tap samples collected will offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or if the DOH has established an alternate monitoring period, the last day of that period.

.6 Organics

Overview: EPA first regulated chemicals in drinking water in l975 by establishing maximum contaminant levels and sampling requirements for about fifteen contaminants. Thereafter, EPA revised the standards for these chemicals and established new standards for other chemicals in a series of drinking water regulations in the late 1980's and early 1990's.

The VOC Rule (Phase I) became effective January 9, 1989. This rule established maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for eight VOCs (benzene, carbon tetrachloride, para-dichlorobenzene,1, 2-dichloroethane,1,1-dichloroethylene, 1,1,1-trichloroethane, trichloroethylene, and vinyl chloride). Monitoring requirements were specified for the eight VOCs and 51 additional unregulated (no established MCLs) contaminants. The Phase II Rule set drinking water standards for 38 inorganic and organic chemicals. The Phase V Rule set standards for 23 contaminants that may be found in drinking water. The Phase VIb Rule included a list of more organic and inorganic contaminants of concern.

Standard Monitoring Framework: See Element 3.3.

Sampling Frequency: See Element 3.3.

Sampling Protocol: All organic samples are collected from a point representative of the source, after treatment, and prior to entry into the distribution system. Samples are collected by certified personnel and shipped to a State-accredited laboratory for analysis on the same day of sample collection. State-approved procedures and/or laboratory-specific procedures are followed for the collection and timely transport of the samples. Chain of Custody control provides further insurance that the requirements are met for documenting and maintaining custody of the samples from their point of origin to receipt at the laboratory. Results of testing are reported to the Site Water Compliance office and DOH directly from the state-certified laboratories performing the analyses. Reference procedure: S-WP-0035 *Comprehensive Organic Monitoring Program Plan.*

Sampling Schedule: An organic sampling schedule for each water system is provided in the *Hanford Site Comprehensive Organic Monitoring Plan* and includes the second and third cycle of the Standard Monitoring Framework (2002 – 2019). Unregulated organic contaminants under the Unregulated Contaminant Monitoring Rule are not included on the schedule for the following reason:

The 1996 Amendments to the Safe Drinking Water Act required the EPA to establish criteria for a monitoring program for unregulated contaminants and to publish a list of the contaminants to be monitored. The Unregulated Contaminant Monitoring Rule generates monitoring data to evaluate and prioritize contaminants on the Contaminant Candidate

List, a list of contaminants that EPA is considering for possible new drinking water standards.

Under the UCMR 1, the list of unregulated contaminants was monitored from 2001-2005. All large public water systems serving more than 10,000 people were required to monitor for these contaminants. Only a national representative sample of small public water systems (800 systems) serving < 10,000 people were required to monitor under the UCMR. The UCMR 2 established a new set of 25 chemicals using five associated analytical methods to be used during the 2008 – 2010 monitoring cycle, and built upon the established structure of UCMR 1. The UCMR 3 requires monitoring from 2013-2015 for 28 contaminants and two viruses. No Hanford water systems have been chosen to monitor these contaminants.

Hanford water systems shall not monitor for unregulated organic chemicals unless notification is received from DOH or EPA that Hanford water systems have been selected as part of the State Monitoring Plan for small systems.

Contaminant Exceedances: Upon learning of a chemical exceedance, the Site Water Compliance organization will notify the DOH per WAC 246-290 requirements. Action will be taken as directed by the DOH, and, as applicable, consumers served by the affected system will be notified in accordance with WAC 246-290, Subpart A, *Public Notification and Consumer Information* and 40 CFR 141 Public Notification requirements.

Public Notification: Public notifications are categorized into three Tiers to take into account the seriousness of the violation or situation and of any potential health effects that may be involved. Tier 1 public notice is required within 24 hours for any violation or situation with significant potential to have serious adverse effects on human health as a result of short-term exposure. Tier 2 notices are required within 30 days for all other violations and situations with the potential to have serious adverse effects on human health. Tier 3 notices are required within 1 year for all other violations and situations not included in Tier 1 and Tier 2. Tables 3-5 and 3-6 provide tiers of public notice required for synthetic organic chemicals and volatile organic chemicals, respectively.

Table 22-7 Synthetic Organic Chemical Tiers of Public Notice

Chemical Exceedance (MCL Violation)	Tier of Public Notice Required
2,4-D	2
2,4,5-TP (Silvex)	2
Alachlor	2
Atrazine	2
Benzo(a)pyrene (PAHs)	2
Carbofuran	2
Chlordane	2
Dalapon	2
Di (2-ethylhexyl) adipate	2
Di (20ethylhexyl) phthalate	2
Dibromochloropropane	2
Dinoseb	2
Dioxin (2,3,7,8-TCDD	2
Diquat	2
Endothall	2
Endrin	2
Ethylene Dibromide	2
Glyphosate	2
Heptachlor	2
Heptachlorepoxide	2
Hexachlorobenzene	2
Hexachlorocyclo-pentadiene	2
Lindane	2
Methoxychlor	2
Oxamyl (Vydate)	2
Pentachlorophenol	2
Pichloram	2
Polychlorinated biphenyls (PCBs)	2
Simazine	2
Toxaphene	2

Table 22-8 Volatile Organic Chemical Tiers of Public Notice

Chemical Exceedance (MCL Violation)	Tier of Public Notice Required
Benzene	2
Carbon Tetrachloride	2
Chlorobenzene (monochlorobenzene)	2
o-Dichlorobenzene	2
p-Dichlorobenzene	2
1,2-Dichloroethane	2
1,1-Dichloroethylene	2
Cis-1,2-Dichloroethylene	2
Trans-1,2-Dichloroethylene	2
Dichloromethane	2
1,2-Dichloropropane	2
Ethylbenzene	2
Styrene	2
Tetrachloroethylene	2
Toluene	2
1,2,4-Trichlorobenzene	2
1,1,1-Trichloroethane	2
Trichloroethylene	2
Vinyl Chloride	2
Xylenes (total)	2

Reporting:

- Tier 1 Violation – The DOH shall be notified as soon as possible, but no later than 24 hours after the violation is known.
- All Other Violations – The DOH shall be notified within 48 hours of the failure to comply with any national primary drinking water regulation, including the failure to comply with any monitoring requirements of WAC 246-290.
- Notify DOE-RL and the affected water system manager.

Follow-up Monitoring Actions: Organic follow-up monitoring shall be conducted in accordance with the following:

- For VOCs, 40 CFR 141.24 (f)(11) through 141.24(f)(15), and 141.24(f)(22)
- For SOCs, 40 CFR 141.24(b), 141.24(c) and 141.24 (h)(7) through 141.24 (h)(11), and 141.24(h)(20).
- When an unregulated chemical is verified at a concentration above the detection limit, follow up or corrective action shall be taken as directed by DOH.

Recordkeeping: The following summaries shall be kept on file in the Site Water Compliance repositories in accordance with WAC 246-290-480 requirements:

- All monitoring forms to include Chain of Custody, Water Sampling Information (WSIs), laboratory reports, and tabular summaries.
- Records of action taken to correct violations of primary drinking water standards and copies of Public Notifications.
- Certification forms along with a representative copy of each type of notice when a Public Notification is required.
- Any waiver forms and supporting documentation.
- All correspondence with DOH.

.7 Radionuclides

The *Atomic Energy Act of 1954* was promulgated to ensure the proper management of radioactive materials. The Act and its amendments include provisions to delegate the roles and responsibilities for the control of radioactive materials and nuclear energy primarily to DOE, the U.S. Nuclear Regulatory Commission, and EPA. Through the Act, DOE regulates the control of radioactive materials under its authority, including the treatment, storage, and disposal of low-level radioactive waste from its operations. Sections of the Act authorize DOE to establish radiation protection standards for itself and its contractors. Accordingly, DOE promulgated a series of regulations to protect public health and the environment from potential risks associated with radioactive materials. Hanford Site operations are subject to the requirements in these regulations and directives.

DOE order 458.1, *Radiation Protection of the Public and the Environment*, establishes standards and requirements for conduct of DOE and DOE contractor operations with respect to radiological protection of the public and the environment. Relative to the radiological health and safety of the public, the objectives of DOE O 458.1, are to ensure that DOE operations achieve the following:

- Radiation exposures to the public are maintained within established limits
- Radioactive contamination is controlled through the management of real and personal property
- Potential exposures to the public are as far below established limits as is reasonably achievable
- DOE facilities have the capabilities, consistent with the types of operations conducted, to monitor routine and non-routine releases and to assess doses to the public.

In addition to providing radiological protection to the public, the objective of DOE O 458.1 is to provide radiological protection of the environment to the extent practical.

DOE O 458.1 also provides derived concentration guide values as reference values for conducting radiological environmental protection programs at operational DOE facilities and sites. These DOE-derived concentration guide values are based on a committed dose standard of 100 millirem (1 millisievert) due to **ingestion**, inhalation, or direct exposure during a given year, and are provided for three exposure pathways; ingestion of water, inhalation of air, and immersion in a gaseous cloud. The DOE radiation standards (dose limits) for protection of the public from all routine concentrations are provided in Table 3-7.

Table 22-9 Radiation Standards (Dose Limits[a]) for Protection of the Public from all Routine DOE Concentration

All Pathways (DOE O 458.1)		
Effective dose equivalent for any member of the public from all routine DOE operations[b] shall not exceed the values below.		
	Effective Dose Equivalent[c]	
	mrem/yr	**mSv/yr**
Routine public dose	100	1
Potential authorized temporary public dose(d)	500	5
Dose to Native Aquatic Animal Organisms from Liquid Discharges (DOE O 458.1)		
Radioactive material in liquid waste discharged to natural waterways shall not cause an absorbed dose[e] to native aquatic animal organisms that exceed 1 rad (10 mGy) per day.		
Drinking Water Pathway Only (40 CFR Parts 9, 141, and 142 (65 FR 76707); WAC 246-290; and DOE O 458.1)		
Radionuclide concentrations in DOE-operated public drinking water supplies shall not cause persons consuming the water to receive an effective dose equivalent greater than 4 mrem (0.04 mSv) per year. DOE operations shall not cause private or public drinking water systems downstream of the facility discharge to exceed the radiological drinking water limits in 40 CFR Parts 9, 141, and 142.		
Air Pathways Only (40 CFR 61)		
	Effective Dose Equivalent[c]	
	mrem/yr	**mSv/yr**
Public dose limit at location of maximum annual air concentration as a consequence of routine DOE operations[b]	10	0.1

(a) Radiation doses received from natural background, residual weapons testing and nuclear accident fallout, medical exposure, and consumer products are excluded from the implementation of these dose limits.

(b) Routine DOE operations imply normal, planned activities and do not include actual or potential accidental or unplanned releases.

(c) Effective dose equivalent is expressed in rem (or millirem) and sievert (or millisievert).

(d) Authorized temporary annual dose limits may be greater than 100 mrem (1 mSv) per year (but cannot exceed 500 mrem [5 mSv]) per year if unusual circumstances exist that make avoidance of doses greater than 100 mrem (1 mSv) per year to the public impracticable. The DOE Richland Operations Office is required to request and receive specific authorization from DOE HQ for an increase from the routine public dose limit to a temporary annual dose limit.

(e) Absorbed dose is expressed in rad (or millirad) with the corresponding value in gray (or milligray) in parentheses.

The maximum amount of beta-gamma radiation from manmade radionuclides allowed in drinking water by Washington State and EPA is an annual average concentration that will not produce an annual dose equivalent to the whole body or any internal organ greater than 4 millirem (0.04 millisievert). Maximum contaminant levels for gross alpha

(excluding radon and uranium) are 15 pCi/L (0.56 Bq/L). The maximum allowable annual average limit for tritium is 20,000 pCi/L (740 Bq/L) (40 CFR 141; WAC 246-290). These concentrations are assumed to produce a total body or organ dose of 4 millirem (0.04 millisievert) per year. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any internal organ must not exceed 4 millirem (0.04 millisievert).

Hanford Site drinking water systems have been classified by the state of Washington as non-transient, non-community systems. State and federal laws requiring the monitoring of radiological contaminants in drinking water apply to community systems and are, therefore, not directly applicable to the Hanford Site. However, radionuclides in DOE systems at Hanford are monitored to community system requirements to comply with the requirements of DOE Order 458.1. Group A Public Water Supplies (WAC 246-290) requires that all drinking water analytical results be reported routinely to the DOH. Radiological monitoring for Hanford Site drinking water systems is conducted by PNNL and subsequently reported to the DOH through the Hanford Site Annual Environmental Report.

The current drinking water radionuclide monitoring scheme at Hanford is based on historical grandfathered data and current monitoring results. This determines the type and frequency of the radionuclides monitored. Drinking water samples collected by PNNL are currently analyzed for gross alpha, gross beta, tritium, and strontium-90.

.8 Disinfection Byproducts / Disinfectant Residuals / Disinfection Byproduct Precursors

Disinfection Byproducts: Many water systems treat their drinking water with chemical disinfectants to inactivate pathogens that may cause disease. While disinfectants are effective in controlling many harmful microorganisms, they react with organic and inorganic matter in the water and form disinfectant byproducts (DBPs), some of which pose health risks at certain levels.

To address this concern, the United States Environmental Protection Agency (EPA) issued the Stage I Disinfection/Disinfectant Byproduct (D/DBP) Rule in 1998. One of the purposes of the Rule is to reduce exposure to DBPs by limiting DBP concentrations in drinking water. To this end, the EPA has established Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) for some of the known DBPs.

To provide for increased protection against DBPs, EPA promulgated the Stage II D/DBP Rule in 2006. The Rule supports its Stage I predecessor by requiring water systems to

meet existing MCLs at each monitoring site in the distribution system instead of averaging results from several sites. Sites are selected using a risk-targeted approach to identify locations where customers are exposed to the highest levels of DBPs. The goal is to reduce DBP exposure among all consumers.

Procedure S-WP-0044 replaced the Stage I D/DBP Rule Byproduct Monitoring Program Plan, procedure S-WP-0029, effective October 1, 2013, and describes the Stage II D/DBP Rule Byproduct Monitoring Plan for Hanford Group A Water Systems. The procedure describes how byproduct monitoring, recording and recordkeeping are achieved to meet the requirements set forth in the Stage II D/DBP Rule. The disinfectant and disinfectant byproduct precursor monitoring requirements remain unchanged and are regulated under the D/DBP Stage I Rule and are contained within procedures S-WP-0028, S-WP-0031 and S-WP-0032.

Overview: All Hanford water systems use a form of chlorine, either gaseous or sodium hypochlorite, for disinfection. The disinfection by-products of concern include Total Trihalomethanes (TTHMs) and Haloacetic Acids (five) (HAA5). The MCLs in mg/L are the following:

- Total Trihalomethanes - 0.080
- HAA5s - 0.060

Monitoring Locations and Sampling Frequency: Based on historical monitoring data obtained during Stage I of the D/DBP Rule, the designated Stage II sample sites represent locations with the highest TTHM and HAA5 levels. All systems are sampled during August, the month of the warmest water temperature, based on historical monitoring sampling data.

For systems serving less than 500 persons, individual samples (instead of a dual sample set) are collected quarterly or annually (if on a reduced monitoring schedule), at the locations representing the highest TTHM and HAA5 concentrations during the month of August.

For systems serving 500 – 3,300 persons, individual samples are collected quarterly (instead of a dual sample set) during the months of February, May, August and November. For systems serving 3,301 – 9,999 persons, dual sample sets are collected quarterly at the locations representing the highest TTHM and HAA5 levels during the months of February, May, August and November.

All DBP sampling is performed in accordance with procedure S-WP-0030, "Disinfectant Byproduct Monitoring". Samples are collected on the second Tuesday of the month unless unusual circumstances dictate otherwise; i.e.; holidays. Samples are collected during normal system operating conditions only. If unusual system conditions exist, the Washington State Department of Health will be contacted for further guidance.

Compliance Calculations/Determinations:

Systems Serving < 500 People:

A. One individual sample set per quarter or per year (if on a reduced monitoring schedule) is collected and analyzed during the month of August (and at 90 day intervals if on a quarterly schedule) at a location representing the highest TTHM levels and at another location representing the highest HAA5 concentrations for a total of 2 samples. Only one location with a dual sample set per monitoring period is necessary if the highest TTHM and HAA5 concentrations occur at the same location and in the same month.

B. If the TTHM sample results are less than or equal to 0.080 mg/L (Sum of chloroform, bromodichloromethane, dibromochloromethane and bromoform) and HAA5 results are less than or equal to 0.060 mg/L (Sum of monochloroacetic, dichloroacetic, trichloroacetic, monobromoacetic, and dibromoacetic acids), and the system is on a reduced monitoring schedule, the system is in compliance and may remain on an annual monitoring scheme.

C. If the Maximum Contaminant Level (MCL) is exceeded in the yearly sample for either TTHMs or HAA5s, monitoring will be increased to dual sample sets once per quarter at each location. If the locational running annual average (LRAA) exceeds the MCL for either TTHM or HAA5, an MCL violation will have occurred. The LRAA is calculated based on the four most recent consecutive quarters of monitoring (Q1 + Q2 + Q3 + Q4 /4 = LRAA).

D. In addition to the LRAA MCL requirement, the Stage II D/DBP Rule also requires an Operational Evaluation if an individual TTHM or HAA5 level exceeds the Operational Evaluation Level (OEL), since high levels can occur even while the system is in compliance with the LRAA requirements. The OEL is greater than 0.80 mg/L for TTHMs and 0.60 mg/L for HAA5s. The formula to determine OEL compliance is: Q1 + Q2 + Q3 + Q3 /4. See procedure S-WP-0045, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Operational Evaluation Requirements.*

E. If an Operational Evaluation Level is exceeded or an MCL violation occurs, then the Washington State Department of Health will be notified, and further action will be taken based upon the type of exceedance, and as directed by DOH. See procedure S-WP-0046, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Violations Response Plan.*

Systems Serving 500 – 3,300 People:

A. One individual sample set per quarter is collected and analyzed during the month of August and at 90 day intervals at a location representing the highest TTHM levels and at another location representing the highest HAA5 concentrations for a total of 2 samples. Only one location with a dual sample set per monitoring period is necessary if the highest TTHM and HAA5 concentrations occur at the same location and in the same month.

F. Each quarter, a LRAA will be calculated for TTHM and HAA5 at each monitoring location. Compliance will be achieved if the TTHM and HAA5 LRAA at each monitoring location for the four most recent quarters is less than or equal to 0.80 mg/L for TTHM and 0.60 mg/L for HAA5.

G. In addition to the LRAA calculation, an OEL calculation will be performed quarterly at each monitoring location. Compliance will be achieved if the OEL is less than 0.80 mg/L for TTHMs and 0.60 mg/L for HAA5. See S-WP-0045, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Operational Evaluation Requirements.*

H. If an Operational Evaluation Level is exceeded or an MCL violation occurs, then the Washington State Department of Health will be notified, and further action will be taken based on the type of exceedance and as directed by DOH. See procedure S-WP-0046, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Violations Response Plan.*

Systems Serving 3,301 – 9,999 People:

A. Two dual sample sets per quarter are collected and analyzed during the month of August and at 90 day intervals at a location representing the highest TTHM levels and at another location representing the highest HAA5 concentrations for a total of 4 samples.

I. Each quarter, a LRAA will be calculated for TTHM and HAA5 at each monitoring location. Compliance will be achieved if the TTHM and HAA5 LRAA at each monitoring location for the four most recent quarters is less than or equal to 0.80 mg/L for TTHM and 0.60 mg/L for HAA5.

J. In addition to the LRAA calculation, an OEL calculation will be performed quarterly at each monitoring location. Compliance will be achieved if the OEL is less than 0.80 mg/L for TTHMs and 0.60 mg/L for HAA5. See S-WP-0045, *Stage 2 Disinfectants and Disinfectant*

Byproducts Rule Operational Evaluation Requirements.

K. If an Operational Evaluation Level is exceeded or an MCL violation occurs, then the Washington State Department of Health will be notified, and further action will be taken based on the type of exceedance and as directed by DOH. See procedure S-WP-0046, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Violations Response Plan.*

Reporting/Logkeeping/Recordkeeping:

Reporting: Results are reported to the DOH directly from the laboratory performing the analysis. The following information must be reported to the DOH within 10 days of the end of any quarter in which monitoring is required unless DOH notifies the water systems that DOH personnel will perform the calculations:

- Number of samples taken during the last quarter.
- Date and result of each sample taken during the last quarter.
- LRAA for each monitoring location.
- Whether the MCL was violated at any monitoring location.
- Any Operational Evaluation Levels that were exceeded during the quarter and, if so, the locations and date, and the calculated TTHM and HAA5 levels.

Recordkeeping: All monitoring forms to include Chain of Custody, Water Sampling Information (WSIs), log sheets, and laboratory reports are kept on file in the Site Water Sampling & Compliance repositories in accordance with WAC 246-290-480 requirements.

Disinfectant Residuals: Since all Hanford water systems use free chlorine for residual distribution maintenance, chlorine will be the only disinfectant addressed in this procedure. The MRDL for chlorine is 4.0 mg/L. This level may only be exceeded to protect public health from specific microbiological contamination events. These exceedances would be to mitigate problems as a result of unusual conditions such as line breaks, cross-connection contamination events, or raw water contamination.

Sample Collection/Analysis: Certified personnel as determined by Site Water Compliance conduct free chlorine residual measurements. Samples are analyzed with portable instruments approved by the Site Water Compliance Department, and acceptable to the Washington State Department of Health (DOH). Samples are collected during normal operating conditions. If chlorine levels must be elevated above standard operating levels to provide greater public health protection, the DOH will be notified immediately by Site Water Compliance.

Measurements Used for Compliance: Free chlorine residual measurements are taken at the point and at the same time as Coliform samples, to include routine/follow-up and

repeat samples, as identified in the Hanford Site Comprehensive Coliform Plan, procedure S-WP-0014, *Bacteriological Sampling*, and collected in accordance with procedure U0-O-14.01, *Chlorine Residual Monitoring*.

At the Hanford water treatment plants, continuous monitoring equipment is used to record residual disinfectant concentrations of the water entering the distribution system per WAC 246-290-600 monitoring requirements. All water systems monitor distribution system residual concentrations daily at representative sites with the exception of a few smaller systems that were given DOH approval to monitor less frequently.

Compliance Determinations: Compliance determinations are made 4 times per year, based upon the running annual arithmetic average (RAA) of 12 consecutive months. The RAA is calculated by the average of all included residual measurements for each month, then adding 12 consecutive monthly averages together, and dividing the sum by 12.

The RAA report contains the following information:

- The monthly chlorine residual average of all samples taken.
- The Running Annual Arithmetic Average.
- The RAA quarterly arithmetic averages.
- Whether the system is in compliance with the RAA.

If the average covering any consecutive four-quarter period exceeds the MRDL, the DOH will be notified immediately by Site Water Compliance, and water system users will be notified per WAC 246-290-71001 Public Notification requirements.

Reporting/Logkeeping/Recordkeeping: Monthly report forms for Group A systems with an active surface water treatment plant, or a purchased system, are maintained in Site Water Compliance repositories (200W, 100K and 300 Areas).

Monthly Report forms for Group A systems without an active surface water treatment plant (400 Area) are sent to DOH by the 4th working day of the following month.

Monthly reports contain the following information:

- - Number of samples taken during the month.
- - The location, date, and result of each sample taken during the month.
- - The daily arithmetic average of all samples taken.
- - The monthly average of all daily averages.

All chlorine monitoring monthly report forms and RAA compliance calculation forms are kept on file in the Site Water Compliance repositories in accordance with WAC 246-290-480 requirements. Copies of all report forms are maintained in the Hanford Site Comprehensive Disinfection/Disinfectant Byproducts Rule Monitoring Plan. Reference procedure: S-WP-0032, *Comprehensive Disinfectant Byproduct Rule Chlorine Monitoring Program Plan.*

Disinfection Byproduct Precursors: The EPA included a Treatment Technique in the Disinfection/Disinfectant Byproduct Rule to reduce the formation of Disinfectant Byproducts (DBPs) and to minimize the formation of unknown DBPs. This treatment technique is termed Enhanced Coagulation or Enhanced Precipitative Softening. It requires that a specific percentage of influent total organic carbon (TOC) be removed during treatment. The treatment technique uses TOC as a surrogate for natural organic matter (NOM), the precursor material for DBPs. Procedure S-WP-0031 *Comprehensive Disinfectant Byproduct Precursor Monitoring Program* describes the plan for the 200W Hanford Group A surface water system that practices conventional coagulation. Monitoring is performed in accordance with Procedure S-WP-0028 *Disinfectant Byproduct Precursor Monitoring.*

Since there are no softening systems for any Hanford surface water systems, Enhanced Precipitative Softening will not be addressed in this program plan. Enhanced coagulation does apply to the 200W Hanford surface system, however.

Individual treatment plants are required to achieve a specified percent removal (Step 1) of influent TOC between the raw water sampling point and the treated water TOC monitoring location (no later than the combined filter effluent turbidity monitoring location), as shown in Table 3-8. If a plant does not meet any alternative compliance criteria, it is required to perform jar or pilot-scale testing (Step 2 testing) to set an alternative TOC removal requirement.

Table 22-10 Required Removal of TOC by Enhanced Coagulation for Plants Using Conventional Treatment: Step 1 Removal Percentages[a]

Source Water TOC (mg/L)	**Source Water Alkalinity (mg/L as $CaCO_3$)**		
	0 to 60	**> 60 to 120**	**> 120**
> 2.0 – 4.0	35.0 %	25.0 %	15.0 %
> 4.0 – 8.0	45.0 %	35.0 %	25.0 %
> 8.0	50.0 %	40.0 %	30.0 %

Notes:

a. Enhanced coagulation plants meeting at least one of the six alternative compliance criteria listed below are not required to meet the removal percentages in this table.

Certain waters are less amenable to effective removal of TOC by coagulation. For this reason, six alternative compliance criteria have been developed to allow plants flexibility for establishing compliance with the treatment technique requirements. Applicable alternative compliance criteria for Hanford plants include the following:

1. Source water TOC < 2.O mg/L: If the source water contains less than 2.0 mg/L of TOC, calculated quarterly as a running annual average.

2. Treated Water TOC < 2.0 mg/L: If a treated water contains less than 2.0 mg/L TOC, calculated quarterly as a running annual average.

3. Raw Water TOC < 4.0 mg/L; Raw Water Alkalinity > 60 mg/L (as $CaCO_3$); TTHM < 40 µg/L; HAA5 < 30 µg/L: It is more difficult to remove appreciable amounts of TOC from waters with higher alkalinity and lower TOC levels. Therefore, utilities that meet the above criteria can establish compliance with the treatment technique requirements. All of the parameters (e.g., TOC, alkalinity, TTHM, HAA5) are based on running annual averages, computed quarterly. TTHM and HAA5 compliance samples are used to qualify for this alternative performance criterion.

4. TTHM <µg/L and HAA5 < 30 µg/L with only chlorine for disinfection: Plants that use only free chlorine as their primary disinfection and for maintenance of a residual in the distribution system, and achieve the stated TTHM and HAA5 levels, are in compliance with the treatment technique. The TTHM and HAA5 levels are based on running annual averages, computed quarterly. TTHM and HAA5 compliance samples are used to qualify for this alternative performance criterion

Monitoring Locations and Sampling Frequency: Untreated source water TOC and raw water alkalinity samples are collected from the source prior to any treatment. Treated water TOC samples are collected no later than the point of combined filter effluent and prior to continuous disinfection. One untreated source water TOC sample, one untreated source water alkalinity sample, and one, treated water TOC sample are collected at the same time, referred to as paired samples. The paired samples are collected in accordance with sampling collection procedure S-WP-0028 *Disinfectant Byproduct Precursor Monitoring*, for each treatment plant, at a time representing normal operating conditions and influent water quality. Samples are collected the second Tuesday of the month unless unusual circumstances dictate otherwise; i.e.; holidays. Samples are collected during normal system operating conditions only. If unusual system conditions exist, the Washington State Department of Health will be contacted for further guidance.

Compliance Calculations/Determinations: One paired sample per quarter is collected from each applicable treatment plant. Based on historical sampling data, alternative compliance criteria #2, "Treated TOC < 2.0 mg/L" is used to demonstrate compliance with the enhanced coagulation treatment technique requirements. Four compliance determinations are made per year, based on a running annual arithmetic average (RAA) of quarterly treated water TOC values.

Reporting/Logkeeping/Recordkeeping: Report forms are submitted to the DOH within 10 days of the end of each quarter in which the samples were collected. Reports contain the following information:

- The alternative compliance criterion that the systems are using to demonstrate compliance.
- Number of paired samples taken during the last quarter.
- The location, date, and result of each paired sample and associated alkalinity taken during the last quarter.
- The running arithmetic average based on quarterly averages of treated water TOC.
- Whether the system is in compliance with alternative compliance criterion #2.

All monitoring forms to include Chain of Custody, Water Sampling Information (WSIs), and laboratory reports are kept on file in the Site Water Compliance repositories in accordance with WAC 246-290-480 requirements. Copies of the report form are maintained in the Hanford Site Comprehensive Disinfection/Disinfectant Byproducts Rule Monitoring Plan. Copies of laboratory reports are forwarded to Area Operations management as applicable.

.9 Cryptosporidium and E. Coli

The Long Term 2 Enhanced Surface Water Treatment Rule (LT2) was published in the Federal Register on January 5, 2006. The purpose of the rule is to reduce disease incidence associated with *Cryptosporidium* and other disease-causing microorganisms in drinking water.

Cryptosporidium is a significant concern in drinking water because it contaminates most drinking water sources, it is resistant to chlorine and other disinfectants, and it has caused waterborne disease outbreaks. Consuming water with *Cryptosporidium* can cause gastrointestinal illness, which may be severe and sometimes fatal for people with weakened immune systems (which may include infants, the elderly, and people who have AIDS).

Current regulations require filtered water systems to reduce source water *Cryptosporidium* levels by 99 percent (2-log). Recent data on *Cryptosporidium* indicate that this treatment is sufficient for most systems, but additional treatment is necessary for certain higher risk systems. These higher risk systems include filtered water systems with high levels of *Cryptosporidium* in their water sources and all unfiltered water systems, which do not treat for *Cryptosporidium.*

The rule will supplement existing regulations by targeting additional *Cryptosporidium* treatment requirements for higher risk systems. The rule also contains provisions to reduce risks from uncovered finished water storage facilities and to ensure that systems maintain microbial protection as they take steps to reduce the formation of disinfection byproducts. The rule applies to all systems that use surface water or ground water under the direct influence of surface water.

The LT2 Rule requires water systems to monitor their source water to determine if the source is vulnerable to contamination and may require additional treatment. On February 8, 2008, DOH provided guidance and options for meeting the source water requirements of the LT2 Rule. The forms were completed and returned to DOH. Based on historical source fecal coliform monitoring from August 2005 – September 2007, results averaged 2-3 organisms/100mL for affected Hanford systems. DOH approved these results as "grandfathered" data, thus eliminating the requirement to monitor for *Cryptosporidium*. The affected Hanford systems were placed into Bin Classification 1, eliminating the requirement to provide additional treatment for *Cryptosporidium*. Also, the requirements imposed upon public water systems that store water in open reservoirs are not applicable to Hanford water systems. All finished water storage reservoirs on Site are covered and not open to atmosphere.

.10 MCLS & Follow-up

Maximum Contaminant Levels (MCLs) and Maximum Residual Disinfectant Levels (MRDLs) are stated in WAC 246-290-310. If an MCL or MRDL is exceeded, Water Compliance will take follow-up action in accordance with WAC-246-290-320.

In general, when a primary standard violation occurs, Water Compliance will: 1) provide notification to management, DOE-RL and DOH in accordance with WAC 246-290-480; 2) provide notification to affected Hanford employees in accordance with 40 CFR 141.201 through 208 and Part 7, Subpart A of WAC-246-290; 3) determine the cause of the contamination; and 4) take actions as directed by DOH. When a secondary standard violation occurs, Water Compliance will notify management, DOE-RL and DOH, and take action as directed by DOH.

Contaminant-specific follow-up actions are provided in the previous contaminant-specific sections of this procedure.

• BIBLIOGRAPHY

4.1. WAC 246-290, *Group A Public Water Systems*

WAC 246-291, *Group B Public Water Systems*

40 CFR Part 141, *National Primary Drinking Water Regulations: and Part 143, National Secondary Drinking Water Regulations*

40 CFR Parts 9, 141, 142, 143, *Public Notification Rule*

EPA 816-F-09-004, *List of Contaminants & Their MCLs*, May 2009

EPA 816-F-04-010, *The Standard Monitoring Framework*

EPA 815-R-99-012, *USEPA Enhanced Coagulation and Enhanced Precipitative Softening Guidance Manual*, May 1999

EPA 815-R-99-015, *M/DBP Simultaneous Compliance Manual,* August 1999

EPA 815-R-08-018, *Stage 2 Disinfectants and Disinfection Byproducts Rule Operational Evaluation Guidance Manual*

EPA 815-R-07-014, *Complying with the Stage 2 Disinfectant and Disinfection Byproducts Rule*: Small Entity Compliance Guide

DOH, *Conventional WTPs – Stage 1 DBP Precursor Removal* report form

DOH PUB #331-221, *Inorganic Chemical (IOC) Sampling Procedure*

DOH PUB #331-222, *Nitrate Sampling Procedure*

DOH PUB #331-220, *Volatile Organic Chemical (VOC) Sampling Procedure*

DOH PUB #331-224, *Synthetic Organic (SOC) Sampling Procedure*

DOH PUB #331-225, *Coliform Sampling Procedure*

DOH PUB #331-464, *Stage II DBP Monitoring Plan – Surface Water (Routine Monitoring)*

DOH *Total Trihalomethane (TTHM) and Haloacetic Acid (HAA5) Sampling Procedure*

Publications

EPA Microbial and Disinfection Byproduct Rules Simultaneous Compliance Guidance Manual

S-WP-0014, *Bacteriological Sampling*

Hanford Site Comprehensive Coliform Monitoring Plan

Hanford Site Comprehensive Disinfection/Disinfectant Byproduct Precursor Monitoring Plan

Hanford Site Comprehensive Disinfection/Disinfectant Byproducts Rule Monitoring Plan

Hanford Site Comprehensive Stage II Disinfection/Disinfectant Byproducts Rule Monitoring Plan

S-WP-0034, *Comprehensive Inorganic Monitoring Program Plan*

Hanford Site Comprehensive Inorganic Monitoring Plan

S-WP-0038, *Groundwater Rule Monitoring Program Plan*

S-WP-0039, *Groundwater Rule Compliance Requirements for a Positive Total Coliform Sample in the 400 Area, System ID#419470*

S-WP-0040, *Groundwater Rule Compliance Requirements for a Positive Total Coliform Sample in the 300 Area, System ID#418408*

S-WP-0001, *Lead and Copper Monitoring Program Sample Collection*

S-WP-0041, *Lead and Copper Public Information Requirements*

S-WP-0035, *Comprehensive Organic Monitoring Program Plan*

Hanford Site Comprehensive Organic Monitoring Plan

S-WP-0012, *Chain of Custody Control*

S-WP-0015, *Preparation of Water Bacteriological Analysis Form*

S-WP-0019, *Response to a "Routine" "Total Coliform Presence/E. Coli Absence" Group A Surface Water System Sample*

S-WP-0020, *Response to a "Repeat" "Total Coliform Presence/E. Coli Absence" Group A Surface Water System Sample*

S-WP-0021, *Response to a "Routine" "Total Coliform Presence/E. Coli Presence" Group A Surface Water System Sample*

S-WP-0022, *Response to "Repeat" "Total Coliform Presence/E. Coli Presence" Group A Surface Water System Sample*

S-WP-0027, *Positive Bacteriological Result Investigative Assessment*

S-WP-0028, *Disinfectant Byproduct Precursor Monitoring*

S-WP-0030, *Disinfectant Byproduct Monitoring*

S-WP-0031, *Comprehensive Disinfectant Byproduct Precursor Monitoring Program Plan*

S-WP-0032, *Comprehensive Disinfectant Byproduct Rule Chlorine Monitoring Program Plan*

S-WP-0002, *Free Chlorine Residual Determination Test*

S-WP-0004, *Determination of Chlorine (Disinfectant) Required for Disinfecting New and Repaired Water Mains*

S-WP-0016, *Response to a "Routine" and/or "Repeat" "Total Coliform Presence/E. Coli*

Absence" Group B Water System Sample
S-WP-0005, *Basic Disinfection of Sanitary Water Systems and Components*
S-WP-0044, *Comprehensive DBP Rule Stage II Disinfectant Byproduct Monitoring Plan*
S-WP-045, *Stage 2 Disinfectant and Disinfectant Byproduct Rule Operational Evaluation Requirements*
S-WP-0046, *Stage 2 Disinfectants and Disinfectant Byproducts Rule Violations Response Plan*
MSC-PRO-052, *Corrective Action Management*
MSC-5173, *MSC Radiological Control Manual*
MSC-PRO-060, *Reporting Occurrences and Processing Operations Information*
MSC-PRO-696, *Conduct of Operations*
MSC-PRO-079, *Job Hazards Analysis*
DOE/RL-2011-119, Rev. 0, *Hanford Site Environmental Report*
DOE O 458.1, *Radiation Protection of the Public and the Environment*

- **GLOSSARY**

Booster disinfection: the practice of adding disinfectant in the distribution system to maintain disinfectant residual concentration throughout the distribution system.

Community water system: a public water system that serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents.

Compliance cycle: the nine-year calendar year cycle during which public water systems must monitor. Each compliance cycle consists of three three-year compliance periods. The first calendar year cycle begins January 1, 1993 and ends December 31, 2001; the second begins January 1, 2002 and ends December 31, 2010; the third begins January 1, 2011 and ends December 31, 2019.

Compliance period: means a three-year calendar year period within a compliance cycle. Each compliance cycle has three three-year compliance periods. Within the first compliance cycle, the first compliance period runs from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

Composite Sample: sample in which more than one source is sampled individually by the water system and then composited by a certified laboratory by mixing equal parts of water from each source (up to five different sources) and then analyzed as a single sample.

Comprehensive Monitoring Plan: a schedule that describes both the frequency and appropriate locations for sampling of drinking water contaminants as required by state and federal rules.

Confirmation: to demonstrate the accuracy of results of a sample by analyzing another sample from the same location within a reasonable period of time, generally not to exceed two weeks. Confirmation is when analysis results fall within plus or minus thirty percent of the original sample results.

Consecutive system: a public water system that buys or otherwise receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Contaminant: a substance present in drinking water that may adversely affect the health of the consumer of the aesthetic qualities of the water.

Continuous Monitoring: determining water quality with automatic recording analyzers that operate without interruption twenty-four hours per day.

Disinfectant: any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

Disinfectant residual concentration: the concentration of disinfectant that is maintained in a distribution system. Disinfectant could be free chlorine (the sum of the concentrations of hypochlorous acid (HOCl) and hypochlorite acid (OCl) or combined chlorine (chloramines). It is used in the Surface Water Treatment Rule as a measure for determining CT.

Disinfection byproduct (DBP): compound formed from the reaction of a disinfectant with organic and inorganic compounds in the source or finished water during the disinfection process. **Distribution Coliform Sample:** a sample of water collected from a representative location in the distribution system at or after the first service and analyzed for coliform presence.

Distribution System: all piping components of a public water system that serve to convey water from transmission mains linked to source, storage, and treatment facilities to the consumer excluding individual services.

Dual sample set: a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an Initial Distribution System Evaluation and determining compliance with the TTHM and HAA5 Maximum Contaminant Levels. **Duplicate (verification) Sample:** a second sample collected at the same time and location as the first sample and used for verification.

Filtration: a process for removing particulate matter from water by passage through porous media.

Finished water: water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except that treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

Grab Sample: a water quality sample collected at a specific instant in time and analyzed as an individual sample.

Gross Alpha Particle Activity: the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

Gross Beta Particle Activity: the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

Haloacetic Acids (five) (HAA5): the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Locational running annual average (LRAA): the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

Maximum Contaminant Level (MCL): the maximum permissible level of a contaminant in water the purveyor delivers to any public water system user, measured at the locations under WAC 246-290-300, Table 3.

Monitoring site: the location where samples are collected.

Maximum Residual Disinfectant Level (MRDL): a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects.

Monitoring Waiver: an action taken by the DOH to allow a water system to reduce specific monitoring requirements based on a determination of low source vulnerability to contamination.

Non-community water system: a public water system that is not a community water system. A non-community water system is either a "transient non-community water system (TWS)" or a "non-transient non-community water system (NTNCWS)."

Non-transient non-community water system or NTNCWS: a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.

Primary Standards: standards based on chronic, non-acute, or acute human health effects.

Primary Turbidity Standard: an accurately prepared formazin solution or commercially prepared polymer solution of known turbidity that is used to calibrate bench model and continuous turbidimeters.

Public water system (PWS): a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days of the year. Such term includes (1) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system, and (2) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system.

Residence time: the time period lasting from when the water is treated to a particular point in the distribution system. Also referred to as water age.

Residual disinfection: also referred to as "secondary disinfection". The process whereby a disinfectant (typically chlorine or chloramine) is added to finished water in order to maintain a disinfection residual in the distribution system.

Secondary disinfection: see definition for "residual disinfection".

Secondary Standards: standards based on factors other than health effects.

Standard Methods: means the book, titled Standard Methods for the Examination of Water and

Waste Water, jointly published by the American Public Health Association, American Water Works Association (AWWA), and Water Pollution Control Federation.

Synthetic Organic Chemical (SOC): a manufactured carbon-based chemical.

Total Organic Carbon (TOC): total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

Total Trihalomethanes (TTHM): the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

Trihalomethane (THM): one of the family of organic compounds named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

Volatile Organic Chemical (VOC): a manufactured carbon-based chemical that vaporizes quickly at standard temperature and pressure.

APPENDIX D
COMPREHENSIVE CROSS-CONNECTION CONTROL PROGRAM

TABLE OF CONTENTS

1.0 PURPOSE AND SCOPE

2.0 REQUIREMENT FOR PROGRAM

3.0 PROGRAM OBJECTIVES

4.0 ROLES AND RESPONSIBILITIES

5.0 SUMMARY OF PROGRAM DECISIONS

6.0 REQUIRED ELEMENTS OF PROGRAM

7.0 OTHER PROVISIONS

8.0 RELATIONSHIP TO OTHER PLANNING AND PROGRAM OPERATIONS

9.0 GLOSSARY

10.0 ABBREVIATIONS AND ACRONYMS

11.0 BIBLIOGRAPHY

1.0 PURPOSE AND SCOPE

The Cross-Connection Control (CCC) Program is the overlying document and summary that protects the Hanford Water System's water supply from the dangers of cross connections and water backflow.

2.0 REQUIREMENT FOR PROGRAM

The Hanford Site CCC Program has the responsibility to protect the public water systems/areas from contamination due to cross connections. A cross connection may be defined as "Any actual or potential physical connection between a potable water line and any pipe, vessel, or machine that contains or has a probability of containing a non-potable gas or liquid, such that it is possible for a non-potable gas or liquid to enter the potable water system by backflow."

2.2 The Hanford Site Cross-Connection Control Program includes the following water systems/areas:

- Energy, Dept. of/200W #001004
- Energy, Dept. of/300 #418408
- Energy, Dept. of/609 #001806
- Energy, Dept. of/Wye Barricade #AB046 E
- Energy, Dept. of/Yakima Barricade #001848
- Energy, Dept. of/251 #001782
- Energy, Dept. of/Volpentest Hammer Training and Education Center

2.3 All public water systems are required to develop and implement CCC programs. The CCC requirements are contained in WAC 246-290-490 of the Group A Drinking Water Regulations. The minimum required elements of a CCC program are as follows:

- Establishment of legal authority and program policies;
- Evaluation of premises for cross-connection hazards;
- Elimination and/or control of cross connections;
- Provision of qualified personnel;
- Inspection and testing of backflow preventers;
- Quality control of testing process;
- Response to backflow incidents;
- Public education for consumers;

- Record keeping for CCC program; and
- Special requirements for reclaimed water use.

2.4 Other requirements of a CCC program include:

- Coordination with facility managers/administrators/contractors, and DOE/RL regarding CCC activities;
- Inclusion of a written CCC program in a WSP or SWSMP; and
- Prohibition of the intentional return of used water.

3.0 PROGRAM OBJECTIVES

The objectives of the CCC program are as follows:

3.1 Reasonably assess and reduce the risk of contamination of the source of supply and water distribution system; and

3.2 Comply with the applicable plumbing code, state codes, and other regulations pertaining to the construction and operation of the water system.

4.0 ROLES AND RESPONSIBILITIES

For detailed descriptions for the following Roles and Responsibilities refer to MSC RD 10361 Controlling Cross Connections 'Roles and Responsibilities'.

4.1 Water Purveyor:

4.1.1 Water Purveyor has ultimate responsibility to protect the public water systems, and has final enforcement authority in cross-connection control.

4.1.2 Develop a cross-connection control program in accordance with Washington State Department of Health (WSDOH) regulations and ensure that designees involved in all aspects of the program (facility inspections, design reviews, hazard assessments, or backflow prevention assembly application) possesses a current Cross-Connection Control Specialist (CCS) certification.

4.1.3 Ensure the customer/consumer has taken proper steps to protect the main water supply system from actual and potential contamination.

4.1.4 Ensure periodic inspections of premises served by raw and/or potable water to check for the presence of actual or potential cross-connection.

4.1.5 Ensure inspectors observe procedures approved by the Water Purveyor.

4.1.6 Ensure inspection results are documented and transmitted to the respective facility manager.

4.1.7 Establish a schedule for corrective action based on Water Purveyor's determination of degree of hazard and priority.

4.1.8 Administer installation, testing, and maintenance of approved back-flow prevention assemblies to ensure compliance with regulations.

4.1.9 Order any cross-connection(s) found during inspections to be removed by the customer/consumer.

4.1.10 Recommend the termination of water service to any facility that has cross connections known to present an imminent health risk that have not been either immediately removed or otherwise mitigated.

4.1.11 Administer the enforcement authority as required to ensure compliance with federal, state, and local laws governing protection of the water systems.

4.1.12 Review and approve all designs or modification to potable and raw water piping systems.

4.1.13 Ensure the cross-connection control program meets the training and educational requirements prescribed by the applicable regulations/standards of the State of Washington.

4.1.14 Maintain on-site copies of all WSDOH BAT certifications.

4.1.15 Monitor implementation of the cross-connection control program requirements.

4.1.16 Ensure that back-flow prevention assemblies are periodically inspected and tested.

4.1.17 Establish and maintain historical files (records) of site inspection, cross-connection correction, back-flow prevention assembly locations, and back-flow prevention assembly repair/test reports required by WAC and Water Purveyor requirements.

4.1.18 Identify and/or maintain a tracking system for facility inspections and back-flow assembly testing and monitor compliance with testing requirements.

4.1.19 Maintain records of back-flow prevention assembly locations, inspections, repairs, test, facility inspections, and corrected cross-connections.

4.1.20 Analyze for adverse trends and identify appropriate corrective actions.

4.2 Engineering and Design

4.2.1 Design new water piping systems or modifications of existing systems per WAC 246-290, AWWA Standards and DOH guidelines.

4.2.2 Submit design disclosure documentation, including temporary changes, to MSA Site Water Compliance for review and approval.

4.2.3 Incorporate comments from MSA Site Water Compliance and the Water Purveyor before release of designs for construction or modification.

4.3 Back-Flow Assembly Tester (BAT)

4.3.1 Obtain and maintain certification per WAC regulation.

4.3.2 Submit a copy of the current BAT certification validation card to the MSA Site Water Compliance office per WAC 246-290-490 (3)(g).

4.3.3 Submit written current MSA BAT certification validation card to Training Records.

4.3.4 Test back-flow prevention assemblies in accordance with MSA Site Water Compliance approved maintenance instructions.

4.3.5 Remove from service, any back-flow prevention assembly that fails an operability test.

4.3.6 Ensure the completeness and accuracy of all back-flow prevention assembly test reports.

4.3.7 Transmit test reports to MSA Site Water Compliance.

4.4 Construction Projects, Construction Management, and Construction Forces Organizations

4.4.1 Administer installation and testing of approved back-flow prevention assemblies as identified by the requirements of this document.

4.4.2 On completion of each test/project, transfer a copy of all design media, vendor data, test reports, and installation records related to back-flow prevention assemblies to MSA Site Water Compliance

4.4.3 Ensure that new designs or modifications, including temporary modifications, of the water systems are approved by MSA Site Water Compliance and the Water Purveyor prior to start of construction or modification.

4.5 Facility Management and Site Contractors

4.5.1 Prevent actual and potential contamination of the water systems within the facilities under their jurisdiction.

NOTE
This does not preempt oversight and approval of systems by MSA Site Water Compliance or the Water Purveyor.

4.5.2 Protect against cross-connections and ensure the removal of any known cross connections.

4.5.3 Ensure installation, operation, testing and maintenance of approved back-flow prevention assemblies are completed as directed by this requirements document.

4.5.4 Immediately test, repair, or replace any back-flow prevention assembly that fails an operability test or is overdue for annual operability test.

4.5.5 Remove within the time frame established by MSA Site Water Compliance, any cross-connections found during facility inspections.

4.5.6 Post or otherwise mark, outlets for non-potable water to indicate clearly that the water is unsafe for human consumption.

4.5.7 Ensure procurement and installation of back-flow prevention assemblies meets the requirements of this procedure.

4.5.8 Procure required back-flow prevention assemblies, spare parts, repair kits, and test equipment.

4.5.9 Ensure procured assemblies, repair parts, and test equipment are controlled per standard industry practices and are delivered to the job site in satisfactory condition.

NOTE

Failure of the consumer to cooperate in the installation, maintenance, repair, testing, or inspection of back-flow prevention assemblies required by this procedure is grounds for the

4.5.10 Ensure backflow assembly test datasheets are submitted to MSA Site Water Compliance, MSIN R3-15, upon completion of testing, or when an assembly is removed from service. See MSC-RD-10361, Section 3.5, Step 3.

4.5.11 Readily identify by visual observation (e.g., sign, out of service tag, etc.) a back flow assembly (BFA) that is Out-of-Service.

4.6 Oversight Personnel Assigned to Plan or Perform Surveillances or Audits

4.6.1 Ensure proper implementation of the cross-connection program as developed by MSA Site Water Compliance.

4.7 Engineering and Design - Back-Flow Prevention Assemblies Selection

4.7.1 Select only assemblies approved by the WSDOH.

NOTE

A current list of approved assemblies may be obtained from MSA Site Water Compliance.

4.7.2 IF cross-connections cannot be eliminated,

THEN install back-flow prevention assemblies appropriate for the degree of hazard or air gaps and in some cases both.

NOTE

The degree of hazard of the actual or potential cross-connection is determined by MSA Site Water Compliance. Supplies protected by an air gap are not considered a cross-connection for the purpose of this procedure.

4.7.3 Make connections of potable water systems to boilers through an air gap or an approved Reduced Pressure Back-flow Prevention Assembly (RPBA).

WARNING

DO NOT connect the potable water supply to pumps that are used for non-potable water, chemicals, or other substances unless an approved back-flow prevention assembly is used to protect against back-flow.

4.7.4 Where water is drawn from a fire hydrant connected to a potable water system, e.g., for flushing drains, filling tankers, use a portable RPBA or air gap to protect the system from back-flow.

WARNING

DO NOT install back-flow prevention assemblies in zones or areas that could or have fixed, smearable, or airborne contamination or other hazards or potential hazards

4.7.5 Where water is drawn from a fire hydrant for purposes other than fire suppression, obtain a non-emergency hydrant use permit. Comply with all cross-connection control requirements established by the Water Purveyor.

4.7.6 Where water is drawn from a raw water hydrant for use in a Radiological Area, an underground radioactive material area (URMA), or soil contamination area (SCA) as defined by MSC-5173, an RPBA is required.

5.0 SUMMARY OF PROGRAM DECISIONS

The following table summarizes the major policy and program decisions adopted for the Hanford Water System.

Summary of Program Decisions for the Hanford Water Systems

Decision Item	Decision (Check one option per item)
1. Assessment and Re-Assessment of Cross-Connection Hazards (Element 2)	
a. By purveyor's certified Cross-Connection Control Specialist (CCS)	X
b. By consultant CCS on contract to water system	
c. By another agency's CCS (via an inter-agency agreement)	
2. CCS Option - purveyor's CCC Program Management (Element 4)	
a. By purveyor's certified CCS	X
b. By another agency's CCS (via an inter-agency agreement)	
c. By consultant CCS on contract to water system	
3. Testing of Assemblies (Element 5)	
a. By purveyor's staff or purveyor employed certified BAT	
b. By customer employed (contractor) BAT	X
4. Extent of Coordination with DOE/RL (Other Provisions) [WAC 246-290-490 (2)(d)	
a. Information exchange	X
b. Interaction	
c. Joint program	
d. Not applicable at this time (no new facilities construction or remodeling)	

6.0 REQUIRED ELEMENTS OF PROGRAM

The following program element descriptions are excerpts from the CCC regulations found in WAC 246-290-490.

Element 1: *Adoption of a written legal instrument authorizing the establishment and implementation of a CCC program.*

Authority - The Purveyor is the operator of the water systems from the source to the points of demarcation, service connection, or facility premise isolation. Sources include the Columbia River and the Richland Water System (7225OW). By stated policy, the Purveyor is authorized and mandated to protect the water system from contamination via cross connections. Documentation and details pertaining to the stated authority can be found in the 'Hanford Site Services (HSS) Matrix (Mod 240)' Section J.3 of the 'MSC Prime Contract' DE-AC06-09RL14728.

Element 2: *Development and implementation of procedures and schedules for evaluating new and existing service connections to assess the degree of hazard.*

Cross-Connection Hazard Assessments

1. Initial Hazard Assessment

   Utilize 'Appendix 2' of the S-WP-0006 'Facility Cross-Connection Control Inspection' procedure for all hazard assessments.

   a. ***Existing*** Facilities/Systems - The Purveyor will ensure that a DOH CCS conducts an initial cross-connection hazard evaluation of the Hanford Water System within six months after adoption of this CCC program.

      Program Adoption Date: 3/7/1995 Initial Hazard Survey Date: 3/7/1995

   b. ***New*** Facilities/Systems – The Purveyor will ensure that a DOH-certified CCS conducts an initial cross-connection hazard evaluation, *before* water service is provided to any new facilities, irrigation systems etc. served by the water system.

2. Periodic Resurveys – The Purveyor will ensure that a DOH-certified CCS periodically resurveys for cross-connection hazards in the Hanford Water System per the S-WP-0006 'Facility Cross-Connection Control Inspection' procedure. Resurveys will be conducted:

   a. Periodically after the initial hazard survey in accordance with the criteria:

	Hazard (High/Low)	Occupancy (Yes/No)	Water (Yes/No)
1	H	Y	Y
2	H	N	Y
3/5	L	Y	Y
5	L	N	Y

b. Upon any changes in use of the premises, plumbing or distribution facilities.

c. At the request of the Purveyor.

NOTE

Per the procedure (S-WP-006), adequate notifications will be given to facility owners /administrators.

Element 3: *Development and implementation of procedures and schedules for elimination and/or control of cross connections.*

Policy – Utilize the S-WP-0049 'Cross-Connection Control and Water Systems Design Document Review' procedure for guidance through the aspects of *Element 3*. The following apply to all new and existing buildings or areas of water use in the Hanford Water System:

1. Mandatory Premises Isolation for High-hazard Buildings, Facilities or Systems – The Purveyor will ensure that water services to all buildings, facilities or systems of the type described in Table 9 of WAC 246-290-490 (i.e., high hazard) are isolated by a DOH-approved reduced pressure backflow assembly (RPBA), unless an exception is made by the water purveyor and recorded in the annual summary report.
2. Compliance with Uniform Plumbing Code/Additional Premises Isolation Requirements – The Purveyor will work with the relevant contractor to ensure that all buildings or areas of water use beyond (downstream) the point of demarcation:
   a. Comply with the current plumbing code (amended for Washington) adopted by the State Building Code Council; and
   b. Be isolated with an approved backflow assembly and / or air gap where the CCS believes the plumbing code does not provide protection commensurate with the assessed degree of hazard to the water system.
3. Plumbing/Water System Design – The Purveyor will ensure that the design of the plumbing and/or water system incorporates DOH-approved backflow prevention assemblies commensurate to the degree of hazard assessed by the Purveyor's CCS. Initial

plumbing/water system design and subsequent design modifications will be subject to review by a DOH-certified CCS for cross-connection hazards.

4. Approved Backflow Assemblies - The Purveyor will ensure that DOH-approved backflow prevention assemblies protect the public water system from contamination. DOH-approved assemblies are assemblies that appear on DOH's published list of *Backflow Prevention Assemblies Approved for Installation in Washington State.*
   a. The Purveyor will assure that any new and replaced assemblies conform to Washington State's lead-free content guidelines.
   b. The Hanford Water System utilizes approved backflow prevention program software to document and track approval status of its backflow prevention assemblies as well as generates hard-copy records.
5. Installation Standards – In adherence to MSC-RD-10361 'Controlling Cross Connections' 3.4.1, the Purveyor will ensure that all approved backflow preventers are installed in:
   - The orientation for which they are approved;
   - A manner and location that facilitates their proper operation, maintenance, and testing or inspection, and in compliance with safety regulations;
   - A manner and location that protects them from flooding and freezing; and
   - Accordance with the installation standards outlined in the most recently published editions of the PNWS-AWWA Cross-Connection Control Manual, or the USC-FCCCHR Manual of Cross-Connection Control, unless the manufacturer's requirements are more stringent.

Element 4: *Provision of qualified personnel, including at least one person certified as a* Cross-Connection Control Specialist *(CCS), to develop and implement the cross-connection control program.*

1. Program Administration - The Purveyor or his authorized agent is responsible for administration of the CCC program.
2. DOH-Certified CCS – The Purveyor will employ, or have available on staff, at least one person certified by Washington State Department of Health (DOH) as a CCS to develop and implement the CCC program. When no staff or employees are qualified, the Purveyor will retain a DOH-certified CCS on contract to provide the necessary expertise and services.
3. CCS Duties – The Purveyor will ensure that a DOH-certified CCS does the following:
   - Performs CCC and water system design document reviews;
   - Performs CCC hazard evaluations;
   - Determines the type of backflow preventer to be installed;

- Inspects backflow preventers (to ensure protection is provided commensurate for the degree of hazard, for correct installation and for approval status);
- Reviews and maintains necessary records for assembly tests;
- Reports and investigates backflow incidents; and
- Completes reports (Annual Activities, Program Summary and Exception Reports) as required by WAC 246-290-490 and submits them upon request to DOH.

4. Current CCS Information The following table(s) shows information related to the CCS(s) currently responsible for development, implementation and oversight of the Purveyor's CCC program:

Name of CCS	Siemion, Kael M.
Address	Mission Support Alliance, LLC. P.O. Box 650 Attn: Kael Siemion MSIN: S0-20
City, State, Zip	Richland, WA, 99352
Telephone Number	(509) 373-2479
CCS Certification Number	013234

Element 5: *Development and implementation of procedures to ensure that approved backflow preventers are inspected and/or tested (as applicable).*

1. Backflow Preventer Inspection and Testing The Purveyor will ensure that all backflow preventers in the Hanford Water System are inspected and tested in accordance with WAC 246-290-490. The Purveyor will arrange to have all backflow preventers inspected and tested (if applicable):
   - At the time of installation;
   - Annually after installation (minimum frequency) or more frequently;
   - After a backflow incident;
   - After an assembly is repaired, replaced, reinstalled, or relocated (or air gap re-plumbed); and
   - After upstream mechanical isolation, causing loss of pressure to the assembly.

2. DOH-Approved Test Procedures - Per WAC 246-290-490 (7)(d), the Purveyor will ensure that all assemblies protecting the public water system from contamination are tested in accordance with DOH-approved field test procedures.

   a. Hanford Water System backflow assembly test procedures include:

   - S-CC-0063: 'Pressure Vacuum Breaker Assembly Test Using a Differential Pressure Gauge Type Test Kit'
   - S-CC-0064: 'Reduced Pressure Backflow Assembly Test Using a Differential Pressure Gauge Type Test Kit'
   - S-CC-0065: 'Double Check Valve Assembly Test Using Differential Gauge Type Test Kit'.

Element 6: *Development and implementation of a backflow prevention assembly testing quality control assurance program.*

1. DOH-Certified Backflow Assembly Tester (BAT) Required – Under MSC-RD-10361 'Controlling Cross-Connections' section 3.5, the Purveyor will ensure that a DOH-certified BAT tests all backflow assemblies that protect the water system from contamination.
2. BAT Documentation Requirements - Prior to engaging a BAT to test assemblies within the water system, the Purveyor will require the tester to document that he/she:
   a. Is currently certified by DOH as a BAT
   - BAT certification documentation is required per MSC-RD-10361 'Controlling Cross Connections'.
3. Quality Assurance – The Purveyor's CCS will review within 30 days receipt of inspection/test report forms submitted by the BAT and follow-up on any reports that are found to be deficient in any way. The information/documentation to be verified:

a. Test report has been completely and adequately filed out.
b. The appropriate assembly testing equipment (make, model and serial number) was used;
c. The testing equipment is verified for accuracy and/or calibrated within the past 12 months; and
d. Test results/conclusions satisfy appropriate pass/fail criteria.

Element 7: *Development and implementation (when appropriate) of procedures for responding to backflow incidents.*

1. Backflow Incident Response Plan - The Purveyor will develop a Backflow Incident Response Plan in consultation with the Purveyor's CCS. It will be included:

   a. The Purveyor has developed a Backflow Incident Response Plan (S-WP-0047).

Element 8: *Development and implementation of a cross-connection education program.*

1. Education Program - The Purveyor's education program will consist of distribution of CCC-related educational material (handouts) to (and/or holding special cross-connection classes for) staff and other water users as appropriate. The education program will emphasize the responsibility of the water users in preventing contamination of the water supply. Information distributed will include, the following subjects (as applicable):
   a. Cross-connection hazards in general;
   b. Cross-connection hazards typical to the Purveyor's premises;
   c. Irrigation system hazards and corrective actions;
   d. Fire sprinkler cross-connection hazards;
   e. Importance of annual inspection or testing of backflow preventers; and
   f. Thermal expansion in hot water systems when backflow assemblies are used.
2. Educational Materials - The Purveyor will adapt existing educational materials from organizations such as PNWS-AWWA, ABPA, SRC4 and The Western Washington Cross-Connection Prevention Professionals, or will develop new educational materials, so that the contents are applicable/relevant to the Purveyor's water system. Samples of the Purveyor's educational materials can be found through DOH's drinking water website, specifically: http://www.doh.wa.gov/CommunityandEnvironment/DrinkingWater/WaterSystemDesignandPlanning/CrossConnectionControlBackflowPrevention/CCCBrochures.aspx.
3. Frequency - The Purveyor will distribute educational information at a minimum once per calendar year.
4. Education Implementation – The Purveyor will document who has received education information in the following table *(describe who the Purveyor has educated, by what means and when)*. The implementation information will be included in the Annual Summary Report.

Target Audience	Method		Date Provided
	Brochure	Class	

Element 9: *Development and maintenance of cross-connection control records.*

1. Required CCC Records - The Purveyor will maintain records of the following types of

information:

a. CCC hazard evaluation results;

b. Backflow preventers required by the CCS to protect the water system (may include both premises isolation and in-premises protection);

c. Air gap location installation and inspection dates, inspection results, and name of CCS conducting inspections;

d. Backflow assembly location, description (type, manufacturer, make, model, size and serial number), installation, inspection and test dates, test results, and CCS performing tests; and

- The Hanford Water System utilizes approved backflow prevention program software to document and track CCC and backflow prevention records, as well as generating paper copy records.

2. CCC Reports Generator Required to be Prepared and Submitted - The Purveyor will prepare the following required reports and submit them to DOH as indicated:

a. **CCC Program Activities Annual Summary Report:** complete for each calendar year and send to DOH when requested.

b. **CCC Program Summary Information Report:** complete and submit when requested by DOH or when there are significant policy changes to the CCC program.

c. **Backflow Incident Reports** (if applicable): complete and submit to DOH with the CCC Program Activities Annual Summary Report unless otherwise requested by DOH. As a courtesy, the Purveyor will submit a copy to the PNWS-AWWA CCC Committee; and

d. **Exceptions to Mandatory Premises Isolation Report** (if applicable): complete one report for each exception granted in a calendar (reporting) year and submit to DOH with the CCC Program Activities Annual Summary Report.

3. CCS Review - The Purveyor's CCS will complete and/or review the CCC reports for accuracy.

Element 10: *Additional cross-connection control requirements for reclaimed water.*

At this time, the Hanford Water System does not receive or distribute reclaimed water. In the event that reclaimed water use is proposed within the System service area, the Purveyor will incorporate into the CCC program and comply with all cross-connection control requirements mandated by the Permitting Authority in accordance with Chapter 90.46 RCW.

7.0 OTHER PROVISIONS

7.1 Coordination with Authority Having Jurisdiction (AHJ): Both WAC 246-290-490 and the

Uniform Plumbing Code (as amended for Washington) require coordination between purveyors and the AHJ in all matters concerning cross-connection control. Depending on the circumstance, the AHJ can be the contractor or DOE/RL

a. Identification of AHJ – The relevant contractor that enforces the plumbing code for the premises served by the Purveyor.

b. Coordination with AHJ – A copy of this cross-connection control program is available to the AHJ upon request.

c. Description of Coordination with AHJ – The Purveyor coordinates with the AHJ on an information sharing basis. An annual report is available upon request.

d. Delineation of Responsibilities – The Purveyor and the AHJ are responsible for the following CCC activities in the Hanford Water System. The respective responsibilities of the two parties are delineated as summarized in the following table:

CCC Responsibility	Purveyor	AHJ	
		Contractor	DOE/RL
New Construction Plan Reviews	X		
New Construction Hazard Evaluations/Inspections	X		
Existing Facilities Hazard Evaluations/ Inspections	X		
a. Initial	X		
b. Periodic Resurveys	X		
c. Periodic Resurveys inside isolated premises		X	
Assembly Testing		X	
Record-Keeping/Data Management (hazard evaluations, test reports, etc.)	X		
Backflow Incident Response	X		

a. Notification of AHJ – The Purveyor will inform the AHJ when there is a:

- Backflow incident.

7.2 Prohibition of Return of Used Water: The water system must prohibit the intentional and prevent the unintentional return of used water to the Purveyor's distribution system per WAC 246-290-490 (2)(d).

a. Definition - Used water is defined as water that has left the control of the Purveyor.

b. Used Water Policies - For protection of the drinking water quality and the health of the employees/building occupants, the Purveyor will institute the following policies:

- Plumbing design or changes will not allow water, without appropriate protection, that has been used for such purposes as heating or cooling to be returned to the drinking water system; and
- Buildings and facilities with two or more water service connections that are internally connected such as to provide a flow–through condition will have each service isolated by either an RPBA or DCVA, depending upon the level of hazard assessed by the Purveyor's CCS.

8.0 RELATIONSHIP TO OTHER PLANNING AND PROGRAM OPERATIONS

The Purveyor will consider the impacts of the CCC program upon the planning and operation requirements of the Hanford Water Systems. Such considerations include, but are not limited to, ensuring that:

8.1 The design of the water distribution system (and plumbing system) provides for expected head losses resulting from installation of backflow assemblies;

8.2 CCC program personnel are consulted in the design of water and wastewater treatment facilities and when proposals are made to receive or distribute reclaimed water;

8.3 Operations under normal and abnormal conditions do not result in excessive pressure losses;

8.4 Cross-connection issues are considered in water quality investigations; and

8.5 Adequate financial and administrative resources are provided to carry out the CCC program.

9.0 GLOSSARY

Approved air gap: a physical separation between the free-flowing end of a potable water supply pipeline and the overflow rim of an open or non-pressurized receiving vessel. To be an air gap approved by the department, the separation must be at least:

- Twice the diameter of the supply piping measured vertically from the overflow rim of the receiving vessel, and in no case be less than one inch, when unaffected by vertical surfaces (sidewalls); and
- Three times the diameter of the supply piping, if the horizontal distance between the supply pipe and a vertical surface (sidewall) is less than or equal to three times the diameter of the supply pipe, or if the horizontal distance between the supply pipe and intersecting vertical surfaces (sidewalls) is less than or equal to four times the diameter of the supply pipe and in no case less than one and one-half inches.

Approved backflow preventer: an approved air gap, an approved backflow prevention assembly, or an approved AVB. The terms "approved backflow preventer," "approved air gap," or "approved backflow prevention assembly" refer only to those approved backflow preventers relied upon by the purveyor for the protection of the public water system. The requirements of WAC 246-290-490 do not apply to backflow preventers installed for other purposes.

Approved backflow prevention assembly: an RPBA, RPDA, DCVA, DCDA, PVBA, or SVBA of make, model, and size that is approved by the department. Assemblies that appear on the current approved backflow prevention assemblies list developed by the University of Southern California Foundation for Cross-Connection Control and Hydraulic Research or other entity acceptable to the department are considered approved by the department.

Authority Having Jurisdiction: the local official, board, department, or agency authorized to administer and enforce the provisions of the Uniform Plumbing Code as adopted under chapter 19.27 RCW.

Backflow: the undesirable reversal of flow of water or other substances through a cross connection into the public water system or consumer's potable water system.

Backflow assembly tester: a person holding a valid BAT certificate issued in accordance with chapter 246-292 WAC.

Backpressure: a pressure (caused by a pump, elevated tank or piping, boiler, or other means) on the consumer's side of the service connection that is greater than the pressure provided by the public water system and which may cause backflow.

Backsiphonage: backflow due to a reduction in system pressure in the purveyor's distribution system and/or consumer's water system.

Combination fire protection system: a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection; and
- Is constructed of approved potable water piping and materials that serve both the fire sprinkler system and the consumer's potable water system.

Consumer: any person receiving water from a public water system from either the meter, or the point where the service line connects with the distribution system if no meter is present. For purposes of cross-connection control, "consumer" means the owner or operator of a water system connected to a public water system through a service connection.

Consumer's water system (as used in WAC 246-290-490): any potable and/or industrial water system that begins at the point of delivery from the public water system and is located on the consumer's premises. The consumer's water system includes all auxiliary sources of supply, storage, treatment, and distribution facilities, piping, plumbing, and fixtures under the control of the consumer.

Cross connection: any actual or potential physical connection between a public water system or the consumer's water system and any source of nonpotable liquid, solid, or gas that could contaminate the potable water supply by backflow.

Cross-connection control program: the administrative and technical procedures the purveyor implements to protect the public water system from contamination via cross connections as required in WAC 246-290-490.

Cross-connection control specialist: a person holding a valid CCS certificate issued in accordance with chapter 246-292 WAC.

Cross-connection control summary report: the annual report that describes the status of the purveyor's cross-connection control program.

Flow-through fire protection system: a fire sprinkler system that:

- Is supplied only by the purveyor's water;
- Does not have a fire department pumper connection;
- Is constructed of approved potable water piping and materials to which sprinkler heads are attached; and
- Terminates at a connection to a toilet or other plumbing fixture to prevent the water from becoming stagnant.

High health cross-connection hazard: a cross connection which could impair the quality of potable water and create an actual public health hazard through poisoning or spread of disease by sewage, industrial liquids or waste.

In-premises protection: a method of protecting the health of consumers served by the consumer's potable water system, located within the property lines of the consumer's premises by the installation of an approved air gap or backflow prevention assembly at the point of hazard, which is generally a plumbing fixture.

Low health cross-connection hazard: a cross connection that could cause an impairment of the quality of potable water to a degree that does not create a hazard to the public health, but does adversely and unreasonably affect the aesthetic qualities of such potable waters for domestic use.

Premises Isolation: a method of protecting a public water system by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the consumer's water system from the purveyor's distribution system.

Reclaimed water: effluent derived in any part from sewage from a wastewater treatment system that has been adequately and reliably treated, so that as a result of that treatment, it is suitable for beneficial use or a controlled use that would not otherwise occur, and it is no longer considered wastewater.

Unapproved auxiliary water supply: a water supply (other than the purveyor's water supply) on or available to the consumer's premises that is either not approved for human consumption by the health agency having jurisdiction or is not otherwise acceptable to the purveyor.

Uniform Plumbing Code: the code adopted under RCW 19.27.031(4) and amended under chapter 51-46 WAC. This code establishes statewide minimum plumbing standards applicable within the property lines of the consumer's premises.

Used water: water which has left the control of the purveyor.

10.0 ABBREVIATIONS AND ACRONYMS

AG	air gap
AHJ	Authority Having Jurisdiction
AVB	atmospheric vacuum breaker
BAT	backflow assembly tester (for WAC 246-290-490)
CCS	cross-connection control specialist
DCDA	double check detector assembly
DCVA	double check valve assembly
IAPMO	International Association of Plumbing and Mechanical Officials
PVBA	pressure vacuum breaker assembly

RPBA	reduced pressure backflow assembly
RPDA	reduced pressure detector assembly
SVBA	spill resistant vacuum breaker assembly
UBC	Uniform Building Code
UL	Underwriters Laboratories Inc.
UPC	Uniform Plumbing Code

11.0 BIBLIOGRAPHY

- Chapter 246-290 WAC, *Group A Public Water Supplies*
- *Cross-Connection Control Manual Accepted Procedures and Practice, Seventh Edition, November 2012*
- MSC-RD-10361, *Controlling Cross Connections*
- S-WP-0047, *Backflow Incidence Response Plan*
- S-CC-0063, *Pressure Vacuum Breaker Assembly Test Using a Differential Pressure Gauge Type Test Kit*
- S-CC-0064, *Reduced Pressure Backflow Assembly Test Using a Differential Pressure Gauge Type Test Kit*
- S-CC-0065, *Double Check Valve Assembly Test Using Differential Gauge Type Test Kit*