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183KE POTABLE WATER SYSTEM ANALYSIS PLAN

SEP 27 1995

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Page 1 of 1

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1	1	Env. D.J. Watson	<i>D.J. Watson</i>	9-27-95							
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7. Abstract

Sampling analysis plans are a recognized manner of providing applicable requirements for conducting media sampling and analysis in a manner consistent with prescribed objectives. This SAP has been prepared to satisfy the data quality objectives listed in this SAP with respect to the operation of the 183 KE potable water for K Area.

8.

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183 KE Potable Water System Sample Analysis Plan

G. S. Hunacek

Date Published
September 1995

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

**Westinghouse
Hanford Company**

P.O. Box 1970
Richland, Washington

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LIST OF TERMS

DOE	U.S. Department of Energy
DOH	Department of Health
DQO	Data Quality Objective
EPA	U.S. Environmental Protection Agency
OA&WH	Operations Analysis and Waste Handlers
QA	Quality Assurance
SAP	Sample Analysis Plan
Westinghouse Hanford	Westinghouse Hanford Company

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**183 KE POTABLE WATER SYSTEM
SAMPLE ANALYSIS PLAN**

1.0 INTRODUCTION AND OBJECTIVES

Sampling analysis plans are a recognized manner of providing applicable requirements for conducting media sampling and analysis in a manner consistent with prescribed objectives. This Sample Analysis Plan (SAP) has been prepared to be consistent with U.S. Environmental Protection Agency (EPA) guidelines contained in EPA Quality Assurance Management Staff 005/80, Interim Guidance and Specification for Preparing Quality Assurance Project Plans (EPA 1983) to assure quality in the sampling activity.

This SAP has been prepared to satisfy the data quality objectives (DQOs) listed below with respect to the operation of the 183 KE potable water for K Area.

1.1 DATA QUALITY OBJECTIVES

Provide operated control to meet the requirements of "Public Water Supplies," *Washington Administration Code* (WAC) 246-290 for sample and analysis.

Provide data trending for sampling/analysis of sanitary water to support compliance with WAC 246-290.

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2.0 FACILITY BACKGROUND

2.1 183 KE FACILITY DESCRIPTION

The 183 KE water treatment plant in the 100 K Area consists of a headhouse, sedimentation basins with mixing chambers and flocculators, filter beds, two underground clearwell reservoirs, a raw water tunnel, storage for chemicals, and a chlorine storage area in 183 KE facility.

2.2 POTABLE WATER SYSTEM DESCRIPTION

The Columbia River is the source of all water used at K Area. A river pumphouse (181 KE) directs river water to the 183 KE filter plant by means of two 60-inch steel pipes. At 183 KE water plant, chemicals are added to coagulate suspended solids in the water before filtration. The water passes through gravity filters consisting of sand, gravel, and anthracite coal that is stored in two underground (9-Mgal each) clearwells. A pipe tunnel separates the two clearwells, the 190 KE pumphouse contains the pumpwells which connect the two clearwells from these pumpwells, the filter backwash pumps and the service water pumps take suction. The service water pumps supply the area fire system. The area potable water system is supplied by the 8 inch 183 KE service water loop.

The potable water system at 100 K Area consists of chlorination equipment including two booster pump and distribution piping with instrumentation. The original potable water was supplied from the 100 KW Area; however, 100 KE was reconfigured when the reactors were shutdown to the present system. Service water pumps feed the potable water contact time tank with filtered water from the clearwell, and the chlorine is introduced to the system by a corporation cock (in-line nozzle) in the basement of the 183 KE Building. Chlorination equipment is also located in 183 KE on the ground floor. Three-inch poly vinyl chloride piping delivers the chlorinated water to the distribution system in the basement of the 165 KE. From the 165 KE Building, water is distributed to the cross-tie tunnel for 1717 K, various mobile offices, 1706 K, 105 KE, and 105 KW.

2.3 MEASURING/SAMPLING METHODS DESCRIPTIONS

2.3.1 Physical Parameters for Operations

The potable water distribution system is a separate water system and is not connected with production facilities other than to supply the need for personnel safety for drinking water standards. The 183 KE water treatment operator checks equipment conditions in the facility and records readings as specified in the Water Treatment Plant monthly report sheet.

2.3.2 Washington Department of Health Criteria

The 100 K Area Water Treatment Facility and its associated systems for providing sanitary water to the 100 K Area are classified as Group A, nontransient, and noncommunity (WAC 246-290).

2.3.3 Water Treatment Plant Compliance

The WAC 246-290 requires that the source of raw water for the sanitary water plant meet the standards for turbidity, calcium hardness, and alkalinity. The Columbia River source is considered to be a surface water-based source. The requirements for treatment of surface water-based supply will include coagulation, flocculation, filtration, and disinfection. To meet drinking water standards, the plant has included the addition of alum, polymer, and chlorine (see Table 2-1).

Table 2-1. Standard Limits for Contaminant.

Contaminant	Maximum Limit
Lead	0.015 milligrams per liter
Copper	1.3 milligrams per liter
pH	6.5 to 8.5
Temperature	18.0 ° C
Hardness	none
Chlorine residual	0.2 milligrams per liter
Turbidity	>2.5 NTU ≤.5. 95% of samples <2.5 NTU 80% Reduction
Coliform	Any contamination requires follow up sampling.

Note:

NTU = nephelometric turbidity unit

3.0 RESPONSIBILITIES

The responsibility descriptions below are related to sampling, analysis, equipment, and data reporting for the 183 KE facility as described in this SAP.

3.1 K BASIN OPERATIONS

The K Basin operations potable water operator has the following responsibilities:

- Ensuring that records of drinking water meet the requirements of WAC 246-290 (see Table 3-1 for records and records retention)
- Completing the Water Treatment Plant Monthly Report sheet and the State Water Treatment Report sheet
- Taking sampling, analysis, and data reporting at various building locations
- Taking corrective actions to not exceed operating parameters by following approved operational procedures.

3.2 STANDARDS AND REQUIREMENTS

Standards and requirements has the following responsibilities:

- Preparing, maintaining, and updating the SAP for the 183 KE potable water system operations
- Determining whether the data quality objectives in Section 1.0 of this SAP are being met
- Reviewing the analytical trending from Operations.

Table 3-1. Potable Water Records

Type of records	Reference	Records retention
Bacteriological analyses	WAC-246-290-300	5 years
"Coliform Monitoring Plan" System map/diagram showing location of: <ul style="list-style-type: none"> -water sources -storage, treatment, pressure regulation facilities -distribution systems -pressure zones -interconnections -coliform collection zones Narrative which includes <ul style="list-style-type: none"> -public water systems ID numbers -population served and services -water services -system facilities; processes for storage, treatment, and pressure regulation -coliform sample collection sites -sampling schedules 	WAC 246-290-300	current plan always in file
Inorganic chemical and physical analyses	WAC 246-290-300	life of system
Turbidity analyses	WAC 246-290-300	5 years
Trihalomethane analyses	WAC 246-290-300	3 years
Pesticide analyses	WAC 246-290-300	3 years
Radionuclide analyses <ul style="list-style-type: none"> -gross alpha particle -radium-226 -radium-228 -gross beta -iodine-131 -strontium 90 -tritium 	WAC 246-290-300	3 years
Volatile organic chemicals	WAC 246-290-300	3 years
Other analyses as directed by DOH	WAC 246-290-300	3 years
Daily source meter readings	WAC 246-290-300	10 years

Table 3-1. Potable Water Records

Type of records	Reference	Records retention
Official correspondence -from DOE -from regulatory agencies -notices of violation and corrective actions/compliance schedules -notices to the public -department orders -rule/guideline clarification -variances, waivers, exemptions	WAC 246-290-480 WAC 246-290-300	3 years after the last corrective action was completed
Copies of any written reports, summaries, communications relating to -internal -consultants -DOE -regulatory agents	WAC 246-290-480	10 years
Miscellaneous -water facility inventory forms -total annual water production -projects	WAC 246-290-480	life of facility
Water System Plan -basic water system planning data -existing system analysis -planned improvements -conservation program -financial program -relationship/compatibility w/other plans (local growth, management plans, development policies) -supporting maps -operations program -ownership and management -SEPA -watershed control program ***project for 20 years into the future***	WAC 246-290-100	current plan on file

Table 3-1. Potable Water Records

Type of records	Reference	Records retention
Project reports (for construction, extensions, improvements) <ul style="list-style-type: none"> -engineering concepts -design criteria -planning -source protection -water quality and quantity -results of filtration facility pilot study -local requirements such as fire flow -facility operations -short term/long term financing -other DOH determined consideration -reason for carrying out project -project description -planning (background, population, demand, interrelationship schedule, management program, impacts) -alternatives -legal considerations -calculations -management implementation -SEPA considerations -treatment 	WAC 246-290-110	life of facility
Construction documents <ul style="list-style-type: none"> -drawing -material specifications -construction specifications -testing -disinfection -inspection -changes orders 	WAC 246-290-120	life of facility
Source approval for new or previously unapproved source	WAC 246-290-130	

Table 3-1. Potable Water Records

Type of records	Reference	Records retention
Source protection Declaration of covenant restricting land-use Watershed control program plan -watershed description -inventory -location -hydrology -land ownership -activities which may adverse affect source water quality -watershed control measures -documentation of ownership -relevant written agreements -monitoring of activities and water quality -system operation -emergency provisions -documentation of water quality trends Annual reports on watershed program effectiveness	WAC 246-290-135	life of facility
Plan of operation -designation of authority, responsibility -supervision of water system	WAC 246-290-030	life of facility
Construction report for public water system projects updated water facility inventory form	WAC 246-290-040	

3.3 K BASIN OPERATIONS (ANALYSIS)

K Basin operations has the following responsibilities:

- Reviewing analytical results for trending against limits
- Ensuring that a certified operator conducts water plant operations (WAC 246-290)
- Coordinating the 183 KE potable water system SAP activities.

3.4 QUALITY ASSURANCE (K BASINS)

Quality Assurance (QA) has the following responsibilities:

- Assuring that the QA requirements in the SAP are consistent with DOE/RL Order 4330.2, *Water Treatment Plants and Distribution System* (DOE/RL 1984), and DOE RLIP 5480.10, *Industrial Hygiene Program, Part D, "Cross Connection Control Standard, Hanford Water Systems"* (DOE/RL 1990)
- Reviewing changes and modifications to this SAP.

3.5 ANALYTICAL LABORATORIES

Samples shall be analyzed by the Westinghouse Hanford Company (Westinghouse Hanford) operated laboratories or by a Westinghouse Hanford approved, participant contractor or subcontractor laboratory.

3.5.1 Westinghouse Hanford Company

Westinghouse Hanford is responsible for the treatment, distribution, and in part, the recordkeeping, reporting, and maintaining of the system. Westinghouse Hanford will also perform samples for radionuclides, lead, and copper.

3.5.2 ICF Kaiser Hanford Company

The ICF Kaiser Hanford Company (as the site purveyor) collects bacteriological samples, and in conjunction with Westinghouse Hanford, has responsibilities for recordkeeping, reporting, and maintaining of the system.

4.0 SAMPLING STRATEGY

4.1 LOCATION/PARAMETER/FREQUENCY/PROCEDURE/ANALYSIS

Sampling location, parameter, and frequency have been selected to obtain representative samples at different locations in the 100 K Area and the 183 KE potable water system to determine the effectiveness of the operation which are described in Table 4-1. Water sampling and analysis are necessary to obtain water quality data for use in meeting DQOs.

4.2 EQUIPMENT/PROCEDURES/CALIBRATION

Sampling and analysis equipment will have specific procedures on manufacturer's specifications and instructions for the 183 KE potable water system. The sampling and analysis procedure will identify the potable water specific requirements, which include the following:

- A description of the sampling equipment containers
- Safety precautions
- Steps for collecting each sample
- Instructions for completing log book entries, sample labels, and chain-of-custody forms
- Procedure in checklist format to be completed at the time the sampling and analysis is performed.

4.3 LABELING/HANDLING/ANALYSIS

Sampling of the K Area potable water system is under the direct supervision of a DOH certified operator. The operator is responsible for taking samples to the contract laboratory using an approved chain-of-custody form. The requirements for the samples to be transported to the laboratory will require the following information.

- Inspect transferred samples to ensure that:
 - Seals are intact
 - Labels are affixed and legible
 - Sample analysis is specified for each sample or discrete set of samples
 - The physical condition of samples is acceptable
 - Samples being transferred are those identified on the form.

- Sign, date, and record time of sample custody transfer on chain-of-custody form.
- Retain the original until project documentation is dispositioned.
- Implement laboratory custody procedures upon transfer custody.

Table 4-1. 183 KE Potable Water System Sampling Activity (4 sheets).

Building/ sample location	Type of sampling	Frequency of sampling	Procedure use for sampling	Type of analysis	Record
183 KE raw	pH	When making water	pH analyzer	direct reading	daily log
183 KE filter	pH temperature turbidity chlorine alkalinity	When making water	pH meter model	direct reading	daily log
183 KE raw	temperature	When making water	Temperature analyzer	direct reading	daily log
183 KE filter	temperature	When making water	Temperature Meter	direct reading	daily log
183 KE raw water	turbidity	When making water	Process Turbidimeter	direct reading	daily log
183 KE (before) filtering	turbidity	When making water	Process Turbidimeter	direct reading	daily log
183 KE (after) filtering	turbidity	When making water	Process Turbidimeter	direct reading	daily log
183 KE potable	turbidity	daily	Process Turbidimeter	direct reading	daily log
183 KE filter water	chlorine	daily	Chlorine Analyzer	direct reading	daily log/ residual has to be >0.2
183 KE raw water	alkalinity	daily	Total Alkalinity Analyzer	direct reading	daily log
183 KE filter water	alkalinity	daily	Total Alkalinity Analyzer	direct reading	daily log

Table 4-1. 183 KE Potable Water System Sampling Activity (4 sheets).

Building/ sample location	Type of sampling	Frequency of sampling	Procedure use for sampling	Type of analysis	Record
183 KE filter water	hardness	daily	Hardness Analyzer	direct reading	daily log
1720 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
190 KE any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
165 KE any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
105 KE any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
1706 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
1718 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
1717 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
1722 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
1709 K any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2
190 KW any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be >0.2

Table 4-1. 183 KE Potable Water System Sampling Activity (4 sheets).

Building/ sample location	Type of sampling	Frequency of sampling	Procedure use for sampling	Type of analysis	Record
165 KW any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be > 0.2
105 KW any available spot	chlorine	daily	Free and total chlorine test kit	direct reading	daily log/ residual has to be > 0.2
183 KE potable water	homogeneous liquids	daily	Ultrasonic Flowmeter	direct reading	daily log/ measures the flow of clean homogeneous liquids
183 KE potable water	VOC's and SOC's	every 3 months	WAC 246-290	conducted by lab	every 3 months
183 KE	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
1721/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
1709/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
1718/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
1717/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
165-KE/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
105-KE/100 K (Restroom/ Kitchen)	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
105-KW/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months
1706/100 K	lead and copper	every 6 months	WAC 246-290	conducted by lab	every 6 months

Table 4-1. 183 KE Potable Water System Sampling Activity (4 sheets).

Building/ sample location	Type of sampling	Frequency of sampling	Procedure use for sampling	Type of analysis	Record
183 KE potable water	inorganic chemical and physical	every 12 months	WAC 246-290	conducted by lab	every 12 months
183 KE potable water	bacteriological analyses	every month	WAC 246-290	conducted by lab	every 3 months
183 KE potable water	radionuclides	every 48 months	WAC 246- 290	conducted by lab	every 48 months

Notes:

VOC = volatile organic chemicals

SOC = synthetic organic chemicals

Contract laboratories shall have in place approved chain-of-custody procedures to ensure the maintenance of sample integrity and identification from receipt through completion of the analytical process.

4.4 ANALYTICAL REQUIREMENTS

Analytical requirements or methods shall be Westinghouse Hanford or Westinghouse Hanford approved participant contractor or subcontractor procedures based on referenced methods. All procedure reviews and approvals shall be in compliance with applicable Westinghouse Hanford procedure control.

4.5 DATA

4.5.1 Data Verification

The data collected from the 183 KE potable water system are to be checked by OA&WH to ensure that the quality meets the requirements. The OA&WH desk instruction for completing the verification is to check the data for any possible errors resulting from misidentification or abnormal data results. If an error is encountered, the data for that specific analytical method should be checked until it can clearly be shown that the error encountered was a random error and not a systemic error.

4.5.2 Data Reduction

Data resulting from sampling should be reduced according to applicable procedures. Data reduction includes activities that convert instrument and computer responses into reportable results. Computer programs used for data should verify that all reading or outputs are accurate.

4.5.3 Data Validation

Data validation which uses data from sample blanks, splits, spikes, etc., for purposes of confirming analytical data, is not conducted because of the high frequency of analysis and the data verification which is conducted as described in Section 4.5.1.

5.0 QUALITY ASSURANCE AND QUALITY CONTROL

5.1 QUALITY ASSURANCE

Data will be considered representative as long the sample results are within the limits for operations and the concentrations meet the established requirements in the Quality Assurance Program Plan. Data that do not meet this objective will be reviewed to determine whether they can be used, or whether corrective action should be taken. Corrective actions are described in the Quality Assurance Program Plan (Hunacek 1995).

5.2 QUALITY CONTROL

Samples, in addition to those listed in Table 4-1, may be taken for quality control purposes. Careful adherence to established procedures for sample collection, preservation, and storage will minimize errors due to sampling and sample instability.

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6.0 REFERENCES

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