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Title/Desc:

183KE POTABLE WATER SYSTEM QA PROJECT PLAN

Sta. 4 (3)

SEP 15 1995

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT 601252

2. To: (Receiving Organization) Distribution		3. From: (Originating Organization) K Basin Standards and Requirements		4. Related EDT No.: 601252	
5. Proj./Prog./Dept./Div.: Spent Nuclear fuel K Basin		6. Cog. Engr.: G.S. Hunacek		7. Purchase Order No.: N/A	
8. Originator Remarks: Attached document is being processed for release.				9. Equip./Component No.: N/A	
				10. System/Bldg./Facility: 100 K Area	
11. Receiver Remarks: Sign EDT to publish document.				12. Major Assm. Dwg. No.: N/A	
				13. Permit/Permit Application No.: N/A	
				14. Required Response Date: 09/18/95	

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Designator	Reason for Transmittal	Originator Disposition	Receiver Disposition
1	WHC-SD-SNF-QAPP-005		0	183 KE Potable Water System Quality Assurance Project Plan	E	2	1	1

16. KEY					
Approval Designator (F)		Reason for Transmittal (G)		Disposition (H) & (I)	
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information	4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)	1. Approved 2. Approved w/comment 3. Disapproved w/comment	4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)										(G)	(H)
Reason	Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	Reason	Disp.
1	1	Cog. Eng. G.S. Hunacek	<i>G.S. Hunacek</i>	9-14-95	13-8						
1	1	Cog. Mgr. C. DeFigh-Price	<i>C. DeFigh-Price</i>	9-14-95	13-8						
1	1	Env. D.J. Watson	<i>D.J. Watson</i>	9-14-95	13-8						
1	1	QA J.I. Diehl	<i>J.I. Diehl</i>	9-14-95	13-8						

18. <i>G.S. Hunacek</i> G.S. Hunacek Signature of EDT Originator		19. <i>C. DeFigh-Price</i> C. DeFigh-Price Authorized Representative Date for Receiving Organization		20. <i>C. DeFigh-Price</i> C. DeFigh-Price Cognizant Manager Date		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments	
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RELEASE AUTHORIZATION

Document Number: WHC-SD-SNF-QAPP-005, REV 0

Document Title: 183 K Potable Water System Quality Assurance Project Plan

Release Date: 9/15/95

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

Kara M. Broz

9/15/95

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SUPPORTING DOCUMENT		1. Total Pages <i>43</i>
2. Title 183 KE Potable Water System Quality Assurance Project Plan	3. Number WHC-SD-SNF-QAPP-005	4. Rev No. 0
5. Key Words 183 KE, Potable Water Plant, WAC 246-290, K Basins	6. Author Name: G.S. Hunacek <i>Gerald S. Hunacek</i> Signature Organization/Charge Code 2A100/L11GE	
7. Abstract This Quality Assurance Project Plan (QAPP) describes the quality assurance (QA) requirements for sampling, analysis, equipment, and data reporting for the 183 KE Potable Water Facility.		
8. RELEASE STAMP OFFICIAL RELEASE BY WHC DATE SEP 15 1995 <i>STCL 4</i>		

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183 KE POTABLE WATER SYSTEM
QUALITY ASSURANCE PROJECT PLAN

G. S. Hunacek

June 1995

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LIST OF TERMS

DOH	Washington State Department of Health
EPA	U.S. Environmental Protection Agency
HEHF	Hanford Environmental Health Foundation
OAWH	Operations Analysis/Waste Handlers
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
SAP	183 KE Potable Water System Sample Analysis Plan
WAC	Washington Administrative Code
Westinghouse Hanford	Westinghouse Hanford Company

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183 KE POTABLE WATER SYSTEM QUALITY ASSURANCE PROJECT PLAN

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) describes the quality assurance (QA) requirements for sampling, analysis, equipment, and data reporting for the 183 KE Potable Water Facility. This QAPP addresses the applicable guidelines identified in Quality Assurance Project Plan for 183 KE Potable Water System. Monitoring of the Potable Water System on the Hanford Site has been performed in accordance with the requirements of the Washington State Department of Health (DOH) Drinking Water Regulations as identified in the Washington Administrative Code (WAC) Chapter 246-290 (1994).

This QAPP is a facility-specific document that establishes the QA requirements that are included in the *183 KE Potable Water System Sample Analysis Plan* (Hunacek 1995), and the procedures used to obtain, analyze, verify, and validate 183 KE potable water sampling data.

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2.0 PROJECT DESCRIPTION

The objectives of sampling and analysis of the raw water source and potable water are provided in accordance with WAC 246-290 (1994) and all analytical results are maintained for the appropriate time period required by the State of Washington.

2.1 DATA QUALITY OBJECTIVES

The general objectives of the Sample Analysis Plan (SAP) (Hunacek 1995) and its referenced implementing procedures are:

- Provide operated control to meet the requirements of WAC 246-290. (See SAP Table 4-1 for sample and analysis)
- Provide data trending for sampling/analysis of sanitary water to support compliance with WAC 246-290.

2.2 SAMPLING ACTIVITIES DESCRIPTION

The general categories of activities specific to the SAP and its associated requirements are:

- Sample the raw water periodically for pH, temperature, turbidity, chlorine, alkalinity, hardness, lead, and copper to ensure conformance to established limits for water quality.
- Sampling of the sanitary water to ensure the effectiveness of the water quality control processes.
- Take potable samples and compare the laboratory results to determine whether radionuclides, inorganic chemicals, volatile organic chemicals, and bacteriological analyses are within the optimal limits for operation and whether the concentrations meet permit requirements.

2.3 APPLICABILITY TO WESTINGHOUSE HANFORD COMPANY QUALITY ASSURANCE PROGRAM

This QAPP is specific to those activities performed at 183 KE Water Treatment Plant for the sampling and analysis of the potable water. These activities primarily are conducted by the Potable Water System Operator and the Operations Analysis/Waste Handlers group.

This QAPP is prepared in compliance with the U.S. Environmental Protection Agency (EPA) guidance in *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans*, QAMS-005/80 (EPA 1983). This QAPP implements the applicable QA requirements defined by WHC-CM-4-2, *Quality Assurance Manual*, 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).

2.4 MINIMUM QA ELEMENTS FOR SAMPLING

Following are the minimum quality assurance elements addressed in the SAP (Hunacek 1995):

- Data quality objectives shall be established in the SAP.
- The SAP shall be implemented through the use of approved written procedures.
- Required plant operations shall be implemented to meet the requirements of the WAC 246-290 (1994).
- Data trending shall be reported for sampling/analysis of potable water to support compliance with WAC 246-290.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The organization and responsibilities for sampling, analysis, equipment, and data reporting in the 183 KE Water Treatment Plant are categorized into three functional areas: project management, supporting organizations, and analytical organizations. Each of these functional areas and their organizations are discussed below.

3.1 PROJECT MANAGEMENT

Project management encompasses the direct functions associated with the overall 183 KE Potable Water System. This includes taking samples, analysis, performing monitoring and activities, maintaining equipment, and data management activities. Project management organizations for the 183 KE Potable Water System, along with their responsibilities, are listed below.

3.1.1 183 KE Potable Water System Operator

183 KE Potable Water System Operator is responsible for operating and maintaining the potable water system within established safety and environmental requirements.

Responsibilities include:

- Ensuring that records of drinking water shall meet the requirements of Washington State Board of Drinking Water Regulations, WAC 246-290-300 (1994).
- 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.
- Initiating corrective action and notification in instances when water quality parameters exceed applicable, pre-established levels or limits.

3.1.2 Facility Compliance (K Basins)

Facility Compliance provides the regulatory coordination and requirements definition for the 183 KE Potable Water System. Responsibilities include:

- Preparing, maintaining, and updating the SAP and this QAPP for the 183 KE Potable Water System.

- Ensuring that the 183 KE Potable Water System objectives identified in the SAP and QAPP are met through periodic self assessments.
- Reviewing the analytical results on a periodic basis and performing self assessments to ensure that the requirements of the SAP are adhered to.

3.1.3 Operations Analysis/Waste Handlers

Operations Analysis/Waste Handlers (OAWH) coordinates the sampling and analysis activities for the 183 KE Potable Water System. OAWH responsibilities include:

- Reviewing the analytical results for trending against limits.
- Ensuring that there is a certified operator to conduct water plant operations required by WAC 246-290 (1994).

3.2 SUPPORTING ORGANIZATIONS

The following organizations provide support to the 183 KE Potable Water System.

3.2.1 Quality Assurance

QA is responsible for conducting QA programs in accordance with DOE Order 5700.6C (DOE 1991) and WHC-CM-4-2. Quality Assurance has the following responsibilities:

- Reviewing and approving changes and modifications to the QAPP and SAP.
- 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 and approving outside laboratories performing analysis.

3.2.2 Analytical Laboratories

Samples shall be analyzed by Westinghouse Hanford-operated laboratories or by a Westinghouse Hanford-approved participant contractor or subcontractor laboratory.

3.2.2.1 Hanford Environmental Health Foundation. Hanford Environmental Health Foundation (HEHF) is responsible for sampling the chemical water quality, and for the analysis of the chemical and bacteriological characteristics of the water. HEHF reports all water quality results to Westinghouse Hanford and the DOH. HEHF also analyzes for lead and copper, but from samples taken by the 183 KE Potable Water System Operator.

3.2.2.2 Westinghouse Hanford Company. Westinghouse Hanford is responsible for the treatment, distribution, and in part, the recording/reporting, and maintenance of the system. Westinghouse Hanford will also perform samples for radionuclides, lead, and copper.

3.2.2.3 International Technology. International Technology is responsible for analyzing radionuclides.

3.2.2.4 ICF Kaiser Hanford Company. ICF Kaiser Hanford Company collects the bacteriological samples, and in conjunction with Westinghouse Hanford, is responsible for recordkeeping/reporting and system maintenance.

3.2.2.5 Pacific Northwest Laboratory. HEHF reports the results from the radiological sampling to Pacific Northwest Laboratory for inclusion in their annual water quality surveillance report.

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4.0 QUALITY ASSURANCE OBJECTIVES

Following are the QA objectives for 183 KE Potable Water System sampling and analysis activities.

- Define appropriate methods for sampling chemical and radiological analysis for required analytes of interest.
- Define quantitative limits and values for chemical analyses.
- Defining data representatives and comparability in terms applicable to the SAP (Hunacek 1995).

The 183 KE Potable Water System Sample Analysis Plan establishes the sample location, type of sampling, frequency of sampling, type of analysis and the procedure use for sampling. Other measurement considerations, accuracy requirements, units, and data reporting are specified in the procedures developed to support this QAPP.

4.1 ANALYTES OF INTEREST AND ANALYTICAL METHOD SELECTION

The SAP identifies the analytes of interest and corresponding analytical reference methods for 183 KE Potable Water System. The list of analytes and analysis methods was developed from WAC 246-290 (1994).

4.2 QUANTITATIVE LIMITS FOR ANALYTICAL RESULTS

The quantitative limits for analytical results shall be commensurate with EPA standards and methods, and the requirements described in the SAP.

4.3 REPRESENTATIVENESS, COMPLETENESS AND COMPARABILITY

Data representativeness is addressed qualitatively by the specifications of sampling locations and sampling intervals. Contractual and procedural requirements for precision and accuracy must be met for at least 90% of the requested determinations on an annual basis for each laboratory performing analyses. These criteria shall be considered in the validation process and documented. Corrective action measures shall be initiated as required. Approved analytical procedures shall require the use of reporting techniques and units consistent with Section 10.1 of this QAPP to facilitate comparability data sets in terms of precision and accuracy.

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5.0 SAMPLING PROCEDURES

5.1 SAMPLING PROCEDURES

All 183 KE Potable Water System sampling shall be performed in a manner that provides representative measurements of the 183 KE Potable Water System. Sample frequency and location are pre-established and included in the SAP (Hunacek 1994). Water sampling in the 183 KE Potable Water System is performed by facility operations personnel, who also are responsible for maintaining water quality.

5.2 SAMPLING SCHEDULE

Sampling schedules for each sampling event are contained in the SAP. Permanent changes to the 183 KE Potable Water System sampling schedule shall be documented and included in the next revision of the SAP.

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6.0 SAMPLE CUSTODY

All samples obtained relating to potable water quality and the water treatment systems shall be controlled as required by WHC-CM-4-2, QI 13.4, "Chain of Custody," WHC-CM-7-7, EII 5.1, "Chain of Custody," or an equivalent approved facility chain of custody. The EII 5.1 requirements or equivalent facility procedures shall apply as soon the sample material is introduced to the sample container.

- 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/Sample Analysis Request form (BD-6000-828, Jetform) or Chain of Custody (A-6000-407, Macro WEFO61).
- Retain the original until project documentation is dispositioned.
- Implement laboratory custody procedures upon transfer of custody.

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. Analysis results shall be traceable to original samples through unique sample numbers or identification codes. All analysis results shall be controlled as permanent project quality records, as required by WHC-CM-4-2, QR 17.0, "Quality Assurance Records," WHC-CM-7-5, EII 1.6 "Records Management," WHC-CM-3-5, *Document Control and Records Management*, or equivalent Westinghouse Hanford-approved procedures.

Sampling of the K Area Potable Water System is under the direct supervision of the K Area Water System Operator, who must be DOH-certified. The K Area Potable Water System Operator is responsible for taking the sample and for shipping it to the contract laboratory using an approved chain-of-custody form.

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7.0 CALIBRATION PROCEDURES

Calibration of test equipment used in sampling the 183 KE Potable Water System should be performed in a manner consistent with manufacturer's specifications and instructions. Calibration of laboratory analytical equipment shall be defined by applicable reference methods. Standards for calibrating instruments shall require the range, precision, and accuracy needed to maintain the instruments within their required tolerances.

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8.0 ANALYTICAL PROCEDURES

All samples shall be sent to laboratories that possess an internal QA/quality control program. For each analysis requested the contract will have in place approved procedures for conducting each type of analysis.

Analytical methods or procedures based on the reference methods identified in WAC 246-290 (1994), shall be selected and approved before use, in compliance with appropriate OAWH procedure.

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9.0 MONITORING AND REPORTING CRITERIA

The SAP encompasses all sampling and analyses performed on the 183 KE Potable Water System. Interim monitoring shall be conducted in accordance with WAC 246-290-300 and WAC 246-290-320 (1994). The K Area Water System purveyor shall report results of monitoring to the DOH. Sampling of the K Area Potable Water System is under the direct supervision of a DOH-certified operator, the analysis of the samples is conducted by HEHF, and the results are evaluated and documented on a DOH form.

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10.0 DATA REDUCTION, VALIDATION, AND REPORTING

10.1 DATA REDUCTION

Laboratories conducting analyses of 183 KE Potable Water System samples shall be responsible for performing chemical analyses, reducing raw analytical results to their final units, and for reporting the results to the K Area Water System purveyor.

10.2 DATA VALIDATION

Data validation is the process by which raw sample analyses are reviewed and checked for validity, completeness, and quality.

10.3 DATA REPORTING

The implementation of the QAPP will generate monitoring and sampling data. The data generated is to be collected, analyzed, stored, and readily retrievable. OAWH is responsible for the records management for this QAPP in accordance with WHC-CM-7-5 and WAC 246-290 (1994).

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11.0 QUALITY CONTROL

Samples taken during 183 KE Potable Water System daily activities will be subject to quality control measures in both the KE Water Treatment Facility and the analytical laboratory. The 183 KE Potable Water System Operator is responsible for quality control at the sampling sites, while quality control is overseen by the laboratory manager at the analytical laboratory. Quality control is designed to ensure adequate design, sampling, management, maintenance and operation practices, and to protect the health of consumers using public drinking water supplies.

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12.0 PERFORMANCE AND SYSTEM AUDITS

Audits shall be performed to verify the quality of operation of one or more elements of the total program. From QAMS-005/80 (EPA 1983), audits may be of the following two types:

- Performance audits, in which sample analysis data are obtained independently for comparison with data required by the SAP
- System audits, involving a qualitative onsite laboratory, operations, or recordkeeping, in which established QA program and procedure requirements are met.

At a minimum, performance audit requirements shall be met for each laboratory conducting sample analyses for each analytical method used in the SAP. More frequent performance audits may be performed because of Westinghouse Hanford internal QA procedures.

System audits shall be performed annually by QA. System audit requirements shall be implemented through the use of WHC-CM-4-2, QI 10.4, "Surveillance." Additional audits shall be performed as a consequence of corrective action requirements.

Any discrepancies observed during the evaluation performance audit results or during system audit surveillance that cannot be immediately corrected to the satisfaction of the investigator shall be documented on a surveillance report and resolved in compliance with WHC-CM-4-2, QI 10.4.

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13.0 PREVENTATIVE MAINTENANCE

Measurement and testing equipment used in the field sampling and laboratory that directly affect the quality of the analytical data collected from the 183 KE Water Treatment Facility will be subject to preventative maintenance. Field equipment maintenance instructions will be as defined by the approved procedures governing equipment use. Laboratories will be responsible for performing or managing the maintenance of their analytical equipment.

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14.0 DATA ASSESSMENT PROCEDURES

Data from sampling and monitoring will be assessed as required by the SAP (Hunacek 1995), and appropriate statistical evaluation techniques that may be referenced therein. Analytical data will first be compiled by the laboratory and validated by OAWH-approved procedures.

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15.0 CORRECTIVE ACTION

Corrective action requests required as a result of surveillance or audit activity shall be documented and dispositioned as required by WHC-CM-4-2, QI 10.4, "Surveillance," QR 16.0, "Corrective Action," QI 16.1, "Trend Analysis," and QI 16.2, "Corrective Action Request." Primary responsibilities for corrective action are assigned to Facility Compliance (K Basins). Other measurement system, procedures, or plan corrections that may be required as a result of routine review processes shall be resolved as required by governing procedures or shall be referred to the 183 KE Potable Water System Operator for resolution. Copies of all surveillance, audit, and corrective action documentation shall be maintained on completion or closure.

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16.0 QUALITY ASSURANCE REPORTS

Sampling activities shall be assessed regularly by surveillance and auditing processes. Surveillance, audit, and corrective action documentation shall be considered Quality Assurance records and shall be documented and dispositioned as stated in Section 15.0. Records management requirements applicable to this QAPP are noted in Section 10.0.

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17.0 REFERENCES

- 40 CFR 60, 1990, "Quality Assurance Methods Interim Guidelines and Specifications for Preparation of Quality Assurance Project Plans," *Code of Federal Regulations*, as amended.
- DOE, 1991, *Quality Assurance*, DOE Order 5700.6C, U.S. Department of Energy, Washington, D.C.
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- EPA, 1983, *Interim Guidelines and Specifications for Preparation of Quality Assurance Project Plans*, QAMS-005/80, U.S. Environmental Protection Agency/Office of Exploratory Research, Washington, D.C.
- Hunacek, G. S., 1995, *183 KE Potable Water System Sample Analysis Plan (SAP)*, WHC-SD-SNF-SM-004, Rev. 0, Westinghouse Hanford Company, Richland, Washington.
- WAC 246-290, 1994, "Public Water Supplies," *Washington Administrative Code*, as amended.
- WHC-CM-3-5, *Document Control and Records Management*, Section 9.0, "Quality Assurance Records," Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-4-2, *Quality Assurance Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-7-5, *Environmental Compliance Manual*, Westinghouse Hanford Company, Richland, Washington.
- WHC-CM-7-7, *Environmental Investigation and Site Characterization Manual*, Westinghouse Hanford Company, Richland, Washington.

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