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7. Abstract

This document provides a plan for the remediation or decommissioning of existing wells on the Hanford Site. The plan implements the applicable federal and state requirements for protection of ground water resources summarized in DOE/RL 89-12, "Hanford Site Groundwater Management Program."

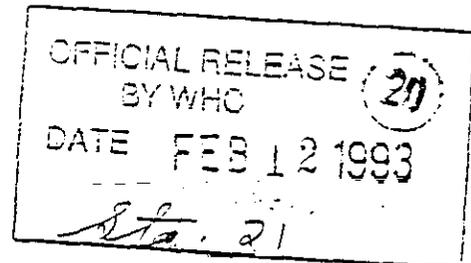
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1.0 INTRODUCTION

Protection of Hanford Site groundwater resources and assessment of the effects of their use or contamination upon public safety are required by federal and state regulations and U.S. Department of Energy (DOE) policy, (DOE, 1989).

Compliance with constraints applicable to the use of existing wells requires assessment as to the suitability for use and needs for rehabilitation, remediation or decommissioning of existing groundwater wells and other boreholes potentially affecting aquifers beneath the Hanford Site.

1.1 BACKGROUND

Approximately 3,500 groundwater wells and vadose zone boreholes had been drilled on the Hanford Site prior to 1989, over 2,900 still exist (McGhan, 1989). Most of these boreholes were drilled prior to 1987 and do not conform to presently accepted construction standards intended to protect groundwater resources (Ecology, 1990). Approximately 260 wells have been installed since 1987. These wells were constructed to current standards for well construction which mandate seals between the permanent casing and the formation to prevent potential migration of contaminated liquid.

The older wells were generally drilled by cable tool rigs using the drill and drive method. This method entails drilling while driving casing fitted with a drive shoe to prevent friction locking of the casing. Upon reaching total depth, the casing was usually perforated to allow inflow of groundwater. No surface or annular seal between the formation and casing was emplaced. Lack of seals can allow contaminants from surface water or lateral flow derived from cribs or waste tank leaks to migrate along the casing potentially reaching groundwater.

Such occurrences have been noted in the past. In response, a program of surface/annular seal installation was carried out from 1976 through 1985. The program involved perforation of existing casing and installation of grouted inner liners in several hundred wells in the 200 Areas. Wells were selected based upon proximity to potential contamination sources. Documentation of this process was limited to archived drilling logs.

Table 1 provides a current tabulation of existing wells based on best available data. Over 500 groundwater wells have gone dry through infiltration of sediments or lowering of the water table in their vicinity.

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Table 1. Hanford Site Well Use

HANFORD SITE WELL USE	NUMBER OF WELLS
Groundwater Contamination Surveillance	546
Groundwater Hydrological Data Collection	213
Dry Wells for Monitoring Waste Management Facilities	1,196
Basalt Stratigraphy Characterization	241
Water Supply Wells	13
Wells for Geologic and Seismic Studies	611
RCRA Wells	264
ER Program (CERCLA)	118
TOTAL	3,200

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2.0 HANFORD SITE WELL USE

Several programs presently construct and/or utilize existing and newly drilled wells to provide characterization and groundwater monitoring data (DOE, 1989 and Table 1). The programs are summarized in the following paragraphs.

2.1 GROUNDWATER SURVEILLANCE AND MONITORING PROGRAMS

2.1.1 Site-Wide Surveillance

The independent site-wide surveillance program for the Hanford Site is conducted by Pacific Northwest Laboratory. This program monitors the effects, if any, of DOE activities at Hanford to onsite and offsite environmental and natural resources. At the present time, over 795 monitoring wells on the Hanford Site are used to assess the impact of specific facilities and to track the movement of contaminant plumes from past disposal practices. Many of the wells used in this assessment are selected from the operational monitoring networks to define site-wide contaminant distribution patterns. Both chemical and radiological constituents are measured.

2.1.2 Operational Monitoring

The operational groundwater monitoring program conducted by Westinghouse Hanford Company (WHC), which may be considered "near-field monitoring," addresses groundwater conditions in and adjacent to reactor and chemical processing operations in the 100, 200, 300, 400 and 1100 areas. Operational groundwater monitoring has been carried out at the Hanford Site since the early days of the project.

2.1.3 Resource Conservation and Recovery Act (RCRA) Permit Characterization and Monitoring

The RCRA groundwater monitoring program conducted by WHC currently involves site-specific monitoring and/or well installation at 20 facilities under EPA interim status regulations. Over 250 new RCRA-compliant monitoring wells have been installed for this purpose.

2.1.4 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Monitoring and Site Characterization

Several CERCLA "groundwater operable units" have been identified at Hanford. Monitoring wells within these units are located so as to define the nature and extent of the contaminant plume.

Use of data from existing wells is generally included as a part of a specific groundwater operable unit work plan. Wells selected often must be remediated to allow use. Other existing wells within the operable unit may be

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identified for remediation or decommissioning. WHC has responsibility for the 100, 200, 300, and 400 areas and for 600 area wells associated with those monitoring programs. The U.S. Army Corps of Engineers (COE) has responsibility for the 1100 Area and the Hanford Site North Slope.

2.1.5 Washington 216-Permitted Facilities

Permits administered by Washington Administrative Code (WAC) 173-216 (Ecology, 1990b) are required for liquid waste streams. These permits require sampling and analysis plans and groundwater impact assessments. Existing vadose and groundwater wells are used for active and inactive crib monitoring.

2.1.6 Washington Underground Storage Tank Monitoring

Groundwater monitoring is required for underground storage tanks containing petroleum products and "other regulated substances."

2.2 VADOSE ZONE CHARACTERIZATION AND MONITORING

Several hundred vadose zone wells are used by WHC to monitor subsurface waste storage and disposal sites to provide early warning of potential waste movement that could signal potential or future groundwater contamination problems. Many of these wells may require remediation or decommissioning to preclude groundwater resource contamination caused by well construction inadequacies (Parker, 1988).

2.3 WATER SUPPLY WELLS

A limited number of water supply wells are present on the Hanford Site. The wells are used for water supply at isolated facilities or as emergency facility backup water supplies. These wells may require rehabilitation or remediation as determined by the users.

2.4 RESEARCH OR SPECIAL PURPOSE WELLS

Several series of research or special purpose wells have been drilled on the Hanford Site. The wells include stratigraphic and hydrologic investigation boreholes, reactor siting study boreholes and destroyed seismic test holes. Selected wells may require rehabilitation, reconfiguration or remediation.

2.5 NON-DOE CONTRACTOR WELLS

Several non-DOE contractors such as the Washington Public Power Supply System, Skagit Power, Siemens Nuclear and US Ecology have constructed characterization and facility monitoring wells. Certain of these wells may be selected for remediation or decommissioning.

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3.0 REGULATORY REQUIREMENTS

3.1 FEDERAL AND DOE REQUIREMENTS

Applicable DOE, other federal, and Washington state statutory requirements governing use and construction of groundwater wells are summarized in *Hanford Site Groundwater Protection Management Program* (DOE, 1989).

This document also illustrates the groundwater protection strategy required by DOE Order 5400.1 (DOE, 1988). One of the elements of this strategy is a management program for groundwater protection and remediation. This management program requires that well remediation, decommissioning and maintenance plans be developed to support operational, RCRA and CERCLA groundwater monitoring requirements.

3.2 STATE STANDARDS FOR WELL CONSTRUCTION, MAINTENANCE AND ABANDONMENT

The State of Washington Department of Ecology (Ecology) has issued standards governing groundwater well design, maintenance, construction, and abandonment in WAC 173-160 (Ecology, 1990a). These standards may be applied to the remediation and decommissioning of existing wells.

The term *decommissioning* is used in this plan as equivalent to the properly completed and documented abandonment of a groundwater or resource protection well.

WAC 173-160 may be used to evaluate the fitness for intended use and impact upon groundwater resources of existing boreholes. Provisions exist within the standards for variances allowing alternative construction specifications upon prior application on a case-by-case basis to Ecology.

3.3 HANFORD FEDERAL FACILITY AGREEMENT AND CONSENT ORDER

The Hanford Federal Facility Agreement and Consent Order (Ecology, EPA, and DOE, 1990, commonly known as the Tri Party Agreement) establishes requirements for the conduct of environmental investigations on the Hanford Site. Functional design requirements for use of existing wells are developed based upon approved decisions reached under this agreement.

3.4 HANFORD SITE DRAFT PERMIT FOR THE TREATMENT, STORAGE AND DISPOSAL OF HAZARDOUS WASTE

Several sections of the draft sitewide permit may be directly applicable to this plan when the permit is in place. Requirements will be incorporated into this plan when identified.

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3.5 OTHER STATE OR RCRA PERMITS

Permits for other RCRA or WAC 173-216 facilities may apply to this plan or the use of existing wells. Applicable requirements will be incorporated into this plan when identified.

3.6 ENVIRONMENTAL COMPLIANCE

The Environmental Compliance Manual (WHC, 1988b) establishes overall environmental compliance requirements for WHC. Applicable requirements are incorporated into operating procedures and specifications.

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4.0 REMEDIATION AND DECOMMISSIONING ACTIVITY MANAGEMENT AND CONTROL

4.1 IDENTIFICATION OF WELL REQUIREMENTS

Representatives of concerned users may identify existing wells within or associated with areas of their responsibility for potential use or decommissioning. Additionally, federal or state regulators may identify areas to be evaluated or well structures of concern and request remediation or decommissioning of boreholes or groups of boreholes.

Each well proposed for use or decommissioning is evaluated and placed into action categories based upon applicable present and future use, degree of environmental impact, location and construction characteristics. Such criteria include:

Potential or present use:

- Groundwater quality analysis
- Water level measurements
- Geophysical logging or monitoring
- Water supply
- Groundwater or soil remediation
- Soil characteristics
- No known use.

Environmental affect:

- Potential affect on groundwater resources, particularly the Columbia River, confined aquifers and groundwater not presently contaminated
- Demonstrated contamination migration or aquifer interconnection
- Category list.

Location and construction:

- Spatial location with respect to permitted facilities or RCRA site requirements
- Well configuration
- Well construction materials
- Available construction and maintenance records.

The action categories include:

- No action required, well is acceptable for defined data quality objective
- Rehabilitation to original condition required to attain data quality objective and fulfill criteria for intended use
- Remediation required to protect groundwater resources or to attain required data quality objective
- Decommissioning required, the well cannot be remediated or has no documented present or future use.

Wells within each action category are assigned priorities and scheduled for completion of remediation or abandonment.

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4.2 DESIGN REVIEW AND APPROVAL

The mechanism for approval under the Tri Party Agreement (Ecology, EPA, and DOE, 1990) of proposed use or decommissioning groundwater wells requires identification of data quality objectives by user groups, selection of existing well data points, tabulation of well construction and sampling data and preparation of a schematic proposal for remediation or abandonment of specific wells.

This schematic proposal addresses present condition, recommended actions and suggested well completion geometry on a case-by-case basis. It is then transmitted to representatives of all other concerned Hanford Site user entities for review and approval. Comments are incorporated.

When strict compliance with the requirements of WAC 173-160 is not possible for the proposal, application may be made to Ecology for approval of a variance prior to the work being done.

The proposal can be presented to DOE, EPA and Ecology during regularly scheduled overview meetings for comment and concurrence. This review and concurrence is considered equivalent to the well construction variance process allowed in WAC 173-160-020. Approved meeting minutes can act as the implementing approval document.

In some cases concurrence cannot be provided during meetings. Approval and additional guidance if required is provided by specific correspondence between Ecology, EPA and DOE. This correspondence may be identified as an action item during overview meetings.

Past correspondence concerning design requirements for use of specific sets of existing wells forms a part of the existing functional design requirements and is used to generate schematic designs for additional wells to be considered.

4.3 CONTRACTOR INTERFACE/RESPONSIBILITIES

Integration and coordination of Hanford Site well remediation and decommissioning activities is necessary to fulfill the requirements of the Hanford Site Groundwater Management Program (DOE, 1989).

WHC is functionally responsible for management, field direction and documentation of groundwater well remediation and decommissioning activities on the Hanford Site. The responsible function also coordinates required design review and approval for use of existing groundwater wells.

Figure 1 provides a flow chart for completion of identified requirements for groundwater well remediation or decommissioning.

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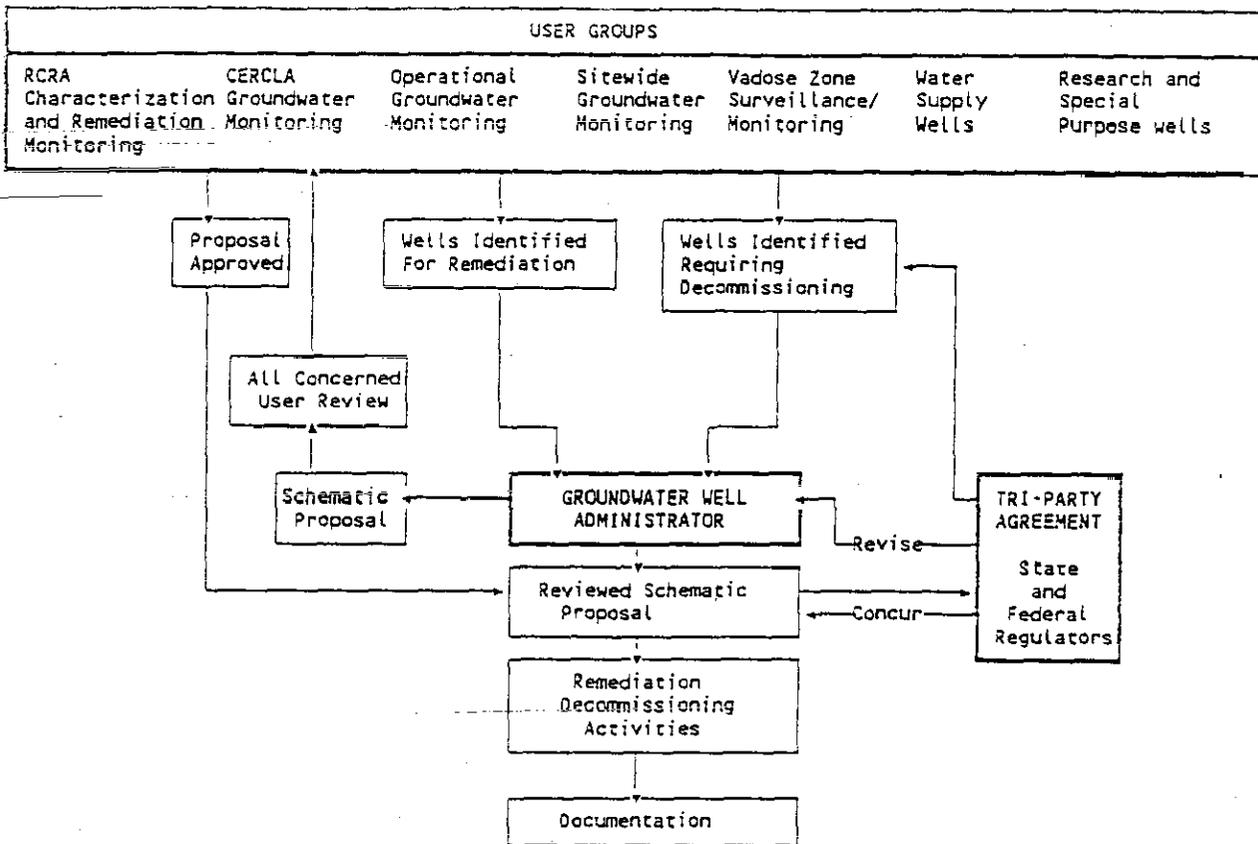


Figure 1 Flow Chart for Remediation or Decommissioning of Hanford Site Wells

4.4 CONDUCT OF OPERATIONS

All fitness-for-use assessments and field operations are planned and conducted according to approved procedures and specifications. Governing procedures are Environmental Investigations Instructions (EIIs) contained in WHC-CM-7-7 (WHC, 1988c). Specific EIIs are cited within this plan as applicable.

4.4.1 Fitness-For-Use

Assessment of fitness-for-intended use of identified wells is done according to EII 6.6. This EII also provides the mechanism for obtaining review and approval of proposed schematic remediation or decommissioning methods. This review and approval process involves all potential users and involved programs.

4.4.2 Remediation Specifications

A generic remediation specification has been prepared for groundwater wells requiring remediation (WHC, 1992). Remediation field activities are controlled by EII 8.3.

4.4.4 Decommissioning Requirements

Decommissioning requirements are contained in WAC 173-160, EII 6.10 and borehole specific instructions implemented by the field operations crews.

4.5 EFFLUENT MONITORING AND WASTE MANAGEMENT

Specifications and applicable EIIs address the effluent monitoring and waste management requirements of WHC-CM-7-5 (WHC, 1988b) and provide for control and disposition of fluids and waste produced during maintenance, remediation or decommissioning of wells.

4.6 HEALTH AND SAFETY

Health and safety requirements are addressed in specifications and instructions for all maintenance, remediation and decommissioning activities. These requirements may include special training, field safety, radiological safety and hazardous waste safety. Excavation and/or hazardous work permits are obtained for work as needed. Existing procedures and forms are used.

4.7 PLANNING AND BUDGETING

Work within this activity is controlled under the WHC Management Control System as defined in WHC-CM-2-5 (WHC, 1988a).

4.7.1 Work Breakdown Structure

Work within this activity is a part of the WHC product oriented Work Breakdown Structure. An element of the applicable work breakdown structure is a specific Cost Account Authorization annually developed for well rehabilitation, remediation and decommissioning. The cost account authorization contains scope of work, budget, identified milestones and a Level III schedule for attainment of the milestones.

4.7.3 Cost Account Management

The Cost Account Manager prepares a Cost Account Plan containing the detailed time-phased planning, monitoring, and controlling of the cost account work. The cost account plan is then input into the Financial Data System for tracking to assure that planned work is completed on schedule and within budget.

4.7.4 Change Control

Changes to schedule, budget or baseline are as specified in WHC-CM-2-5.

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4.8 REPORTING

4.8.1 WAC 173-160 Reporting

WAC 173-160-050 requires that every well contractor, within thirty days after completion (or alteration) of a well, submit a complete record on the construction or alteration of the well to Ecology.

Well contractors must notify Ecology of their intent to construct, reconstruct, or abandon a well at least seventy-two hours before starting work by completion of a well construction notification (Start card).

Abandonment procedures for resource protection wells must be recorded on a form provided by Ecology. Well abandonment must be recorded and reported to Ecology within thirty days of abandonment.

4.8.2 Activity Documentation and Hanford Site Well Database

Well remediation and decommissioning field activities are documented as required by EII 1.6 and other applicable EIIs. Summaries of reviewed field activity reports are entered into a Hanford Site Well Database system maintained by WHC's Environmental Field Services.

4.8.2 Bi-Weekly Summary Reports

Summary activity reports to management are prepared bi-weekly by the responsible function. Status of remediation and decommissioning activities completed within the reporting period will be included in the reports.

4.8.3 Annual Report

An annual report summarizing remediation and decommissioning activities will be prepared and issued for clearance within 90 days after the end of each fiscal year.

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EII-6.10, "Abandoning/Decommissioning Groundwater Wells"
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Washington.

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