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B. Document Number WMP-23262, Rev 0

C. Title
Description of Work for the Installation of Groundwater Wells at 200-UP-1 OU and the Integrated Disposal Facility FY 2005

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1. Title for Conference or Meeting _____
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5. Will Information be Published in Proceedings? ( ) No ( ) Yes
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H. Author/Requestor
C. S. Wright
(Print and Sign)

Responsible Manager
J. V. Borghese
(Print and Sign)

I. Reviewers

	Yes	Print	Signature	Public Y/N (If N, complete J)
General Counsel	[x]	S. B. Cherry	S B Cherry	(Y) / N
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cw
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K. If Additional Comments, Please Attach Separate Sheet

A-6001-401 (12/00)

ADMINISTRATIVE DOCUMENT PROCESSING AND APPROVAL

DOCUMENT TITLE:	OWNING ORGANIZATION/FACILITY:
Description of Work for the Installation of Groundwater Wells at 200-UP-1 OU and the Integrated Disposal Facility FY 2005	Groundwater Remedation Project
Document Number: WMP-23262	Revision/Change Number: 0

DOCUMENT TYPE *(Check Applicable)*

☐ Plan ☒ Report ☐ Study ☐ Description Document ☐ Other

DOCUMENT ACTION ☐ New ☐ Revision ☐ Cancellation

RESPONSIBLE CONTACTS

	Name	Phone Number
Author:	C. S. Wright	373-3994
Manager:	J. V. Borghese	373-3804

DOCUMENT CONTROL

Does document contain scientific or technical information intended for public use? ☐ Yes ☒ No

Does document contain controlled-use information? ☐ Yes ☒ No

("Yes" requires information clearance review in accordance with HNF-PRO-184)

DOCUMENT REVISION SUMMARY

NOTE: Provide a brief description or summary of the changes for the document listed.

REVIEWERS

Others

Name *(print)*	Organization
J. V. Borghese	Remedial Actions
J. D. Isaacs	Engineering
J. A. Winterhalder	Environmental Compliance
C. S. Wright	Remedial Actions

APPROVAL SIGNATURES

		RELEASE / ISSUE
Author:		NOV 22 2004
Name: (Print) C. S. Wright	Date	DATE:
Responsible Manager:	11/22/04	STA: 15
Name: (Print) J. V. Borghese	Date	HANFORD RELEASE
Other:		ID: 22
Name: (Print)	Date	

0063215

WMP-23262
Revision 0

Description of Work for the Installation of Groundwater Wells at 200-UP-1 OU and the Integrated Disposal Facility FY 2005

RECEIVED
DEC 07 2004
EDMC

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

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

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WMP-23262
Revision 0

Description of Work for the Installation of Groundwater Wells at 200-UP-1 OU and the Integrated Disposal Facility FY 2005

Document Type: TR Program/Project: WMP

M. J. Hocking
CH2M HILL Hanford Group, Inc.

C. S. Wright
Fluor Hanford, Inc.

Date Published
October 2004

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

Project Hanford Management Contractor for the
U.S. Department of Energy under Contract DE-AC06-96RL13200

Fluor Hanford
P.O. Box 1000
Richland, Washington

Chris Willingham 11-22-04
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APPROVAL PAGE

Title: Description of Work for the Installation of Groundwater Wells at 200-UP-1 OU and the Integrated Disposal Facility FY 2005

Approvals:

J. V. Borghese
Manager, Remedial Actions, Groundwater Remediation Project

[signature] for J. V. Borghese — 11/10/04
Signature — Date

J. D. Isaacs
Manager, Engineering, Groundwater Remediation Project

[signature] — 11-09-04
Signature — Date

J. A. Winterhalder
Environmental Compliance Officer, Groundwater Remediation Project

[signature] — 11-9-04
Signature — Date

C. S. Wright
Task Lead, Groundwater Remediation Project

[signature] — 11/09/04
Signature — Date

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ACRONYMS

AEA	*Atomic Energy Act of 1954*
ALARA	As Low As Reasonably Achievable
Bgs	Below ground surface
BTR	Buyer's Technical Representative
CCU	Cold Creek Unit
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
COCs	Contaminants of Concern
CP	Central Plateau
CY	Calendar Year
CFR	*Code of Federal Regulations*
DOE-RL	U.S. Department of Energy, Richland Operations Office
DOW	Description of Work
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
ERDF	Environmental Restoration Disposal Facility
ETF	Effluent Treatment Facility
ERC	Environmental Restoration Contractor
FH	Fluor Hanford, Inc.
FWS	Field Work Supervisor
FY	Fiscal Year
GAC	Granular Activated Carbon
Gpm	Gallons per minute
GPP	Groundwater Protection Project
HGET	Hanford General Employee Training
IDF	Integrated Disposal Facility
ILAW	Immobilized Low-Activity Waste
ISRM	In Situ Redox Manipulation
IRA	Interim Remedial Action
LLBG	Low Level Burial Grounds
LLW	Low-Level Waste
MCL	Maximum Concentration Level
MLLW	Mixed Low-Level Waste
MTCA	Model Toxic Control Act
NTU	Nephelometric Turbidity Unit
OU	Operable Unit
PCB	polychlorinated biphenyls
PHMC	Project Hanford Management Contract
PTSF	Purgewater Transport Storage Facility
POC	Point of Contact
QMP	quality management plan
RCRA	*Resource Conservation and Recovery Act of 1976*
RCT	Radiological Control Technician
ROD	Record of Decision
RUM	Ringold Upper Mud unit
SALDS	State approved land-disposal site
WAC	*Washington Administrative Code*
WMA	Waste Management Area
WP/LIS	Waste Packaging/Label Instruction Sheet

METRIC CONVERSION CHART

Into Metric Units			Out of Metric Units		
If You Know	*Multiply By*	*To Get*	*If You Know*	*Multiply By*	*To Get*
Length			**Length**		
Inches	25.4	millimeters	millimeters	0.039	inches
Inches	2.54	centimeters	centimeters	0.394	inches
Feet	0.305	meters	meters	3.281	feet
Yards	0.914	meters	meters	1.094	yards
Miles	1.609	kilometers	kilometers	0.621	miles
Area			**Area**		
sq. inches	6.452	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.093	sq. meters	sq. meters	10.76	sq. feet
sq. yards	0.0836	sq. meters	sq. meters	1.196	sq. yards
sq. miles	2.6	sq. kilometers	sq. kilometers	0.4	sq. miles
Acres	0.405	hectares	hectares	2.47	acres
Mass (weight)			**Mass (weight)**		
Ounces	28.35	grams	grams	0.035	ounces
Pounds	0.454	kilograms	kilograms	2.205	pounds
Ton	0.907	metric ton	metric ton	1.102	ton
Volume			**Volume**		
Teaspoons	5	milliliters	milliliters	0.033	fluid ounces
Tablespoons	15	milliliters	liters	2.1	pints
fluid ounces	30	milliliters	liters	1.057	quarts
Cups	0.24	liters	liters	0.264	gallons
Pints	0.47	liters	cubic meters	35.315	cubic feet
Quarts	0.95	liters	cubic meters	1.308	cubic yards
Gallons	3.8	liters			
cubic feet	0.028	cubic meters			
cubic yards	0.765	cubic meters			
Temperature			**Temperature**		
Fahrenheit	subtract 32, then multiply by 5/9	Celsius	Celsius	multiply by 9/5, then add 32	Fahrenheit
Radioactivity			**Radioactivity**		
Picocuries	37	millibecquerel	millibecquerel	0.027	picocuries

1.0 SCOPE OF WORK

This description of work (DOW) documents the requirements for three new wells to be drilled and constructed in fiscal year 2005. One well will be installed as part of the *Comprehensive Environmental Response Compensation, and Liability Act* (CERCLA) Program for the 200-UP-1 Operable Unit. Two wells will be installed for the Integrated Disposal Facility (IDF) Program; which encompasses the more commonly known Immobilized low-activity waste (ILAW) Program as part of the *Resource Conservation and Recovery Act* (RCRA).

Two monitoring wells will be installed for the IDF Program in the 200 East Area, and one new monitoring well will be installed at 200-UP-1 (200 West Area). A summary of the monitoring wells is located in Table 1-1. The site plan view map of the 200 East Area with two new well locations is presented in Figure 1-1, and the location for the new well "Q" is located in the 200-UP-1 OU is shown in Figure 1-2.

Table 1-1 Well Summary

Summary of New Wells to be Drilled			
Well Name/ Well ID	**WMA or OU**	**Well Type**	**Comments**
C4639	200-UP-1	Monitoring	UP-1 Well "Q"
299-E24-24 / C4647	IDF	Monitoring	
299-E17-26 / C4648	IDF	Monitoring	

Note: IDF - Integrated Disposal Facility

Figure 1-1 200 East Area IDF Well Locations

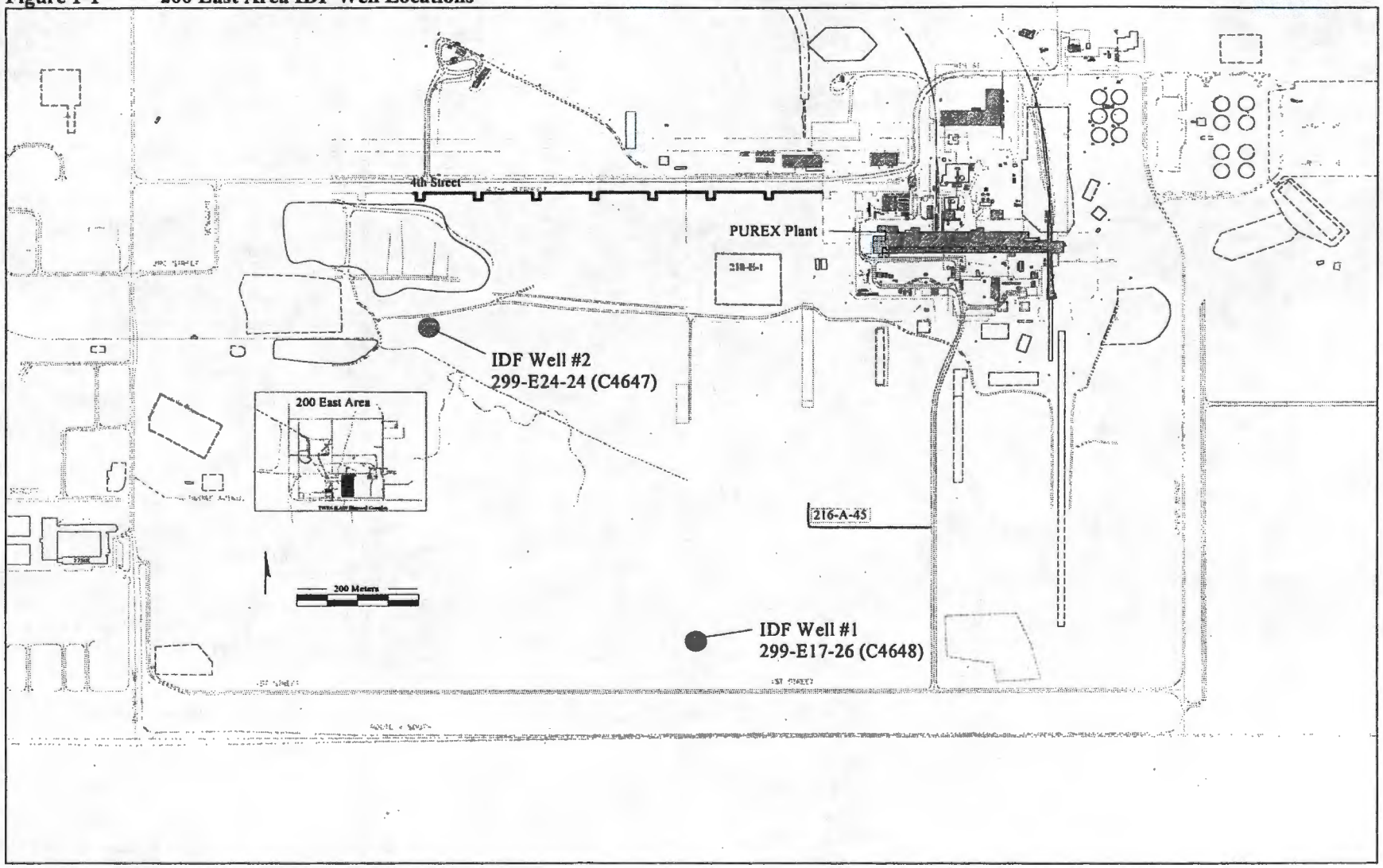
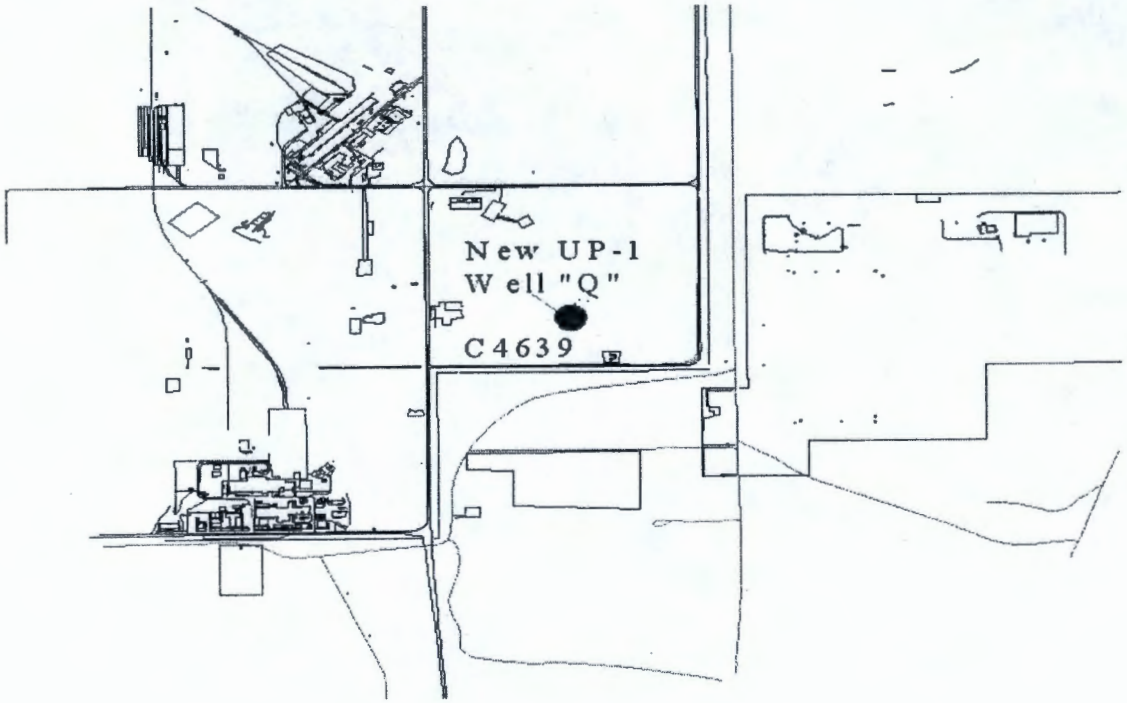


Figure 1-2 200 West Area 200-UP-1 OU Well "Q"



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2.0 BACKGROUND

This section discusses previous work activities and regulatory decisions associated with the 200-UP-1 OU, and IDF Program. General summaries of hydrogeology, contaminants of interest, and conceptual models of relevant factors associated with the planned work activities are presented for each area.

2.1 REMEDIAL ACTION GOALS AND PREVIOUS WORK ACTIVITIES

2.1.1 200-UP-1 OU (200 West)

The 200-UP-1 OU pump and treat system currently consists of two extraction wells removing technetium-99 and uranium from the groundwater. Contaminated groundwater is conveyed via pipeline from the wellhead at the 200 West Area remediation site to the Effluent Treatment Facility (ETF) in the 200 East Area for treatment. A number of new wells (C4235, C4236, C4256, C4298, C4299 and C4300) were recently installed to better understand the distribution of contamination in the 200-UP-1 groundwater operable unit. This well installation (C4639) is part of this continued effort.

2.1.2 IDF (200 East)

The IDF is an area where no previous investigations have occurred; therefore no major geologic studies have been carried out at this location. Studies related to the IDF site are summarized in PNNL-12257, *Geologic Data Package for the 2001 Immobilized Low-Activity Waste Performance Assessment*. The first key activity was the drilling of borehole 299-E17-21 at the southwest end of the site and obtaining the first high-quality data from the locale (PNNL-14586, *Geological Data Package for 2005 Integrated Disposal Facility Waste Performance Assessment*). This was followed by the drilling of 299-E24-21 at the northwest corner of the site and then 299-E17-22, 299-E17-23, and 299-E17-25

2.2 SITE GEOLOGY/HYDROGEOLOGY

200-West Area

The unconsolidated sediments overlying the Miocene Columbia River Basalt Group constitute the Ringold Formation, the Cold Creek unit, and the Hanford formation, in ascending order. Eolian or alluvial deposits of geologically recent origin may overlie the Hanford formation.

The Ringold Lower Mud is persistent throughout the 200 West Area and is the base of the unconfined or semi-confined aquifer (consistent with WHC-SD-EN-TI-008, *Geologic Setting of the 200 West Area: An Update*). The fluvial character of the Ringold Unit E sand and gravel, as probable braided stream deposits (WHC-SD-EN-TI-008) permits lateral migration through incised channels. Some channels will be relatively continuous, but many channels will be segmented due to the nature of braiding streams. This may be the reason for variable discharge rates in proximal wells where screens are installed at the same horizon. Sand and gravel within the Ringold Unit E display variability in vertical and lateral extent of post-depositional cementation (as iron-oxides, carbonates, and/or silica). In the central 200 West Area fluvial sands of the Upper Ringold can be up to 10 m (32.8 ft) in thickness.

The Cold Creek unit overlies the Upper Ringold and is present throughout the 200 West Area as the combined silt and carbonate units. The combined units attain a thickness of greater than 20 m (66 ft) locally in the central part of the 200 West Area. Carbonate cement is discontinuous through the unit and variable in the degree of cementation.

Sediments of the Hanford formation fine-grained unit are of variable thickness but are dominantly sand with discontinuous silt/sandy horizons. The Hanford upper coarse unit consists of gravel dominated sediment of high energy flood deposits.

The uppermost aquifer beneath the 200 West Area is unconfined and lies within an unconsolidated to semi-indurated gravel and sand sequence of the Ringold Formation. The water table does fluctuate in response to barometric pressure changes, which is typical of confined aquifers, because of the thick overlying vadose zone. Beneath the carbon tetrachloride disposal sites, the unconfined aquifer is approximately 66 m (215 ft) thick (WMP-18046, *Description of Work for the Installation of Groundwater Wells at 100-HR-3, 200-ZP-1, and 200-UP-1 Operable Units*). Lateral and vertical variability in transmissivity is illustrated by the production rates of the six 200-ZP-1 extraction wells, which range from 63 L/min to 310 L/min for similarly completed and configured wells.

200 East Area

The geology of the 200 East Area consists of the Elephant Mountain Member of the Saddle Mountains Basalt, Columbia River Basalt Group, which forms the base of the suprabasalt aquifer system (PNNL-12261, *Revised Hydrogeology for the Suprabasalt*

Aquifer System, 200 East Area and Vicinity) and the Ringold Formation and Hanford formation sedimentary sequences, which overlie the basalt. The Elephant Mountain Member of the Saddle Mountains Basalt, is a medium- to fine-grained tholeiitic continental flood basalt. Beneath the 200 Areas of the Hanford Site, the Elephant Mountain unit consists of two flows and ranges in thickness from 20 to 30 m (PNNL-12261). The uppermost surface of the Elephant Mountain Member (basalt) is considered the base of the suprabasalt aquifer system because of its low permeability relative to the overlying sediments. This surface is interpreted and mapped to be a groundwater no-flow boundary. The basalt surface beneath the 200 East Area dips south forming the southern limb of the Gable Mountain anticline (PNNL-12261). Two smaller basalt folds or anticlinal ridges trending northwest-southeast extend above the water table and create barriers to groundwater flow just north and east of the 200 East Area. Intercommunication of groundwater between the uppermost basalt-confined aquifer and overlying suprabasalt aquifer system does occur in some areas of the Hanford Site.

The Ringold Formation continental fluvial and lacustrine sediments deposited on the Elephant Mountain basalt by ancestral Columbia and Clearwater-Salmon rivers during late Miocene to middle -Pliocene time (PNNL-12261), consist of intercalated layers of indurated to semi-indurated and/or pedogenically altered sediment, including clay, silt, fine- to coarse-grained sand, and granule -to-cobble gravel.

Hanford formation consists of post-Ringold fluvial deposits from the ancestral Columbia River and glaciofluvial sediments deposited during cataclysmic flooding (PNNL-12261). It is continuous over the entire study area except on the Gable Mountain basalt outcrop and locally on the basalt high northeast of B-Pond. Hanford formation sediments are composed of relatively unconsolidated pebble -to-boulder gravel, fine-to-coarse grained sand, and silt-to-clayey silt.

The uppermost aquifer in the vicinity of the IDF disposal site is within the fluvial gravels of the Ringold Formation and flood deposits of the Hanford formation. The Elephant Mountain Member of the Columbia River Basalt Group forms the base of the unconfined aquifer (BHI-01531, *Borehole Summary Report for the 2001 ILAW Site Characterization Well*).

The suprabasalt aquifer system includes all the saturated geologic units or strata that occur above the basalt bedrock. This aquifer system is the most significant and direct pathway for contaminants disposed to the ground (via cribs, ponds and ditches, leaking single -shell tanks, or through accidental discharge) to migrate off the Hanford Site and impact the public (via the Columbia River) (PNNL-12261).

2.3 CONCEPTUAL MODEL

200-UP-1 OU (200 West)

Liquid process waste containing uranium was discharged to the 216-U-1 / 216-U-2 cribs, 216-U-8 crib, 216-U-12 crib and U Pond during the uranium recovery process (1952-1957) and during the decontamination of the 221-U facility (1957-1967). Much of the uranium was retained above the impervious Cold Creek unit paleosols and caliche layer. In 1985 sharp increases in uranium and nitrate concentrations at groundwater wells around the 216-U-1 / 216-U-2 cribs were observed. This was attributed to concurrent high-volume discharges at the nearby 216-U-16 Crib, which mobilized the retained uranium and entered the groundwater through poorly sealed wells penetrating the impervious sediments. At the same time, elevated concentrations of technetium-99 were noted. Discharges to the 216-U-16 Crib were halted, and a 6-month pumping campaign sent groundwater to the 242-S Evaporator for treatment. At the end of the treatment, contaminant concentrations rebounded significantly despite the removal of mass (WMP-18046). Additional information on the wastes, pump and treat activities, and site geology can be found in BHI-01311, *Hydrogeological Conceptual Model for the Carbon Tetrachloride and Uranium / Technetium Plumes in the 200 West Area: 1994 Through 1999 Update.*

IDF Program (200 East)

The IDF will provide burial trenches for Immobilized Low-Activity Waste (ILAW), Mixed Low-Level Waste (MLLW), and Low-Level Waste (LLW) (D3198718, *Integrated Disposal Facility & DOE O 413.3 Project Determination*). The IDF will be separated into two separate and expandable landfill cells both with the capacity to handle 82,250 cubic meters of MLLW (including 38,250 cubic meters of ILAW and failed melters from the Waste Treatment Plant (WTP)) and 81,000 cubic meters of LLW. One cell will handle RCRA (subtitle C) waste and will be constructed and held to WAC-173-303-665 "Dangerous Waste Landfills" regulations. The second cell will receive no hazardous material; though will be constructed to the same landfill standard (RPP-15479, *Project Definition Criteria for the Integrated Disposal Facility*). The design and construction of the IDF will be similar to that of the Environmental Restoration Disposal Facility (ERDF) and Mixed waste disposal trenches already in use on site. IDF will continue to be expanded in the future for all site and off-site solid waste needs (RPP-15479).

2.4 CONTAMINANTS OF CONCERN

Contaminants of Concern (COC) associated with drilling waste generated during the installation of these five wells will be discussed separately based on relation to the saturated zone (groundwater vs vadose zone) and on the individual locations of each well relative to known waste sites. Groundwater COCs will be applied to the wells based on a summary of historical chemical data. COCs for waste sampling will be addressed in the waste Data Quality Objective (DQO) documents.

2.4.1 Vadose Zone Contaminants of Concern

200-UP-1 OU (200 West)

Radiological and chemical contamination is not expected to be encountered in the vadose zone drilling of monitoring well C4639. This monitoring well is not located immediately adjacent to any known waste site or unplanned releases. The well sites have been assessed as low radiological risk by radiological control engineers.

IDF Program (200 East)

Land designated for the Integrated Disposal Facility is assumed to be clean and free of radiological or chemical contamination, based on past borehole drilling and sampling activities in the vicinity of the IDF (RPP-15479). Therefore, there are no contaminants of concern expected during the vadose zone drilling evolution. The well site has been assessed as low radiological risk by radiological control engineers.

2.4.2 Groundwater Contaminants of Concern

200-UP-1 OU (200 West)

Technetium-99 and uranium are contaminants of concern for the 200-UP-1 OU. Carbon tetrachloride, iodine-129 and nitrate are secondary contaminants of concern for this OU. Low levels of uranium, technetium-99, carbon tetrachloride, and iodine-129 may be encountered due to the placement of the well.

IDF Program (200 East)

Land designated for the Integrated Disposal Facility is assumed to be clean and free of radiological or chemical contamination, based on past borehole drilling and sampling activities in the vicinity of IDF (RPP-15479). Therefore, there are no contaminants of concern expected during the groundwater zone drilling evolution.

3.0 DESCRIPTION OF WORK ACTIVITIES

The planning and construction of the wells will be conducted under this description of work (DOW) and will adhere to the guidelines and requirements presented in Fluor Hanford (FH) procedure GRP-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings." A completed drilling planning form will be submitted to Fluor Hanford Geoscience Support prior to initiation of field activities. Wells will conform to resource protection well standards as defined in WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."

3.1 WELL SITE PREPARATION

200-UP-1 (200 West)

The monitoring well, C4639, will require gravel drill pad construction; no additional road construction will be necessary.

IDF Program (200 East)

The monitoring wells, C4647 and C4648, will require gravel drill pad construction; no additional road construction will be necessary.

3.2 DRILLING

The drilling activities for all five monitoring wells are presently evaluated at low radiological risk, based on previous drilling and sampling in nearby areas. The level of radiological support is currently planned for daily AM/PM checks for all active boreholes. Drilling activities at each well site will be documented by the assigned field geologist(s) on field activity report (FAR) sheets. The geologist will observe material from the borehole and prepare a borehole log as specified in the FH procedure GRP-EE-01-7.0, "Geologic Logging."

The drilling contractor will be responsible for complying with well drilling and construction criteria defined in the WAC 173-160. The drill rig and all down-hole equipment will be pressure washed between Operable Units to minimize remnant contaminants. The final total depth of the wells will be determined by the field geologist and may change depending on the hydrogeologic conditions encountered. See the Well Construction Summary table for expected total drill depths at each monitoring well location.

3.3 CONSTRUCTION

A proposed well construction summary is presented in Table 3-1.

200-UP-1 Monitoring Well

The monitoring well in the 200 West Area (C4639) will be drilled to approximately 120 feet below static water level. Well construction will consist of 10-cm (4-in.) diameter stainless steel screen and casing. Well screen will be 35 feet in length and 0.020-in. (20 slot) continuous wire wrap if the well in completed at the top of the aquifer. If another depth interval is determined to be more appropriate, a 10 foot 20 slot continuous wire wrap well screen should be used with DOE-RL and Washington State Ecology's concurrence. Depth of the screen interval will be determined based on field screening of contaminants carbon tetrachloride, uranium, and technetium-99. A 2-ft stainless steel sumps will be placed below the screen. If the bottom of the screen is not placed at the bottom of the borehole, the borehole will be backfilled with silica sand, and 5-ft thick bentonite seal will be placed five feet below the chosen depth of the bottom of the stainless steel well. The filter pack will be 10-20 mesh silica sand placed 5 ft below the well to 10 ft above static water level. Bentonite pellets will be placed immediately on top of the filter pack to a minimum of 5 feet above the filter pack. Granular bentonite or crumbles will be placed from the top of the bentonite pellets to approximately 10 feet below ground surface. Cement grout will be placed from the top of the granular bentonite up to ground surface.

IDF Program Monitoring Wells

The monitoring wells in the 200 East Area (C4647 and C4648) will be drilled to approximately 35 feet below the static water level. Well construction will consist of 10-cm (4-in.) diameter stainless steel screens and casings. Well screens will be 35 feet in length and 0.020-in. (20 slot) continuous wire wrap. Depth of screen intervals will be determined by the project or site geologist. A 2-ft stainless steel sump will be placed below the screens. If the bottom of the screen is not placed at the bottom of the borehole, the borehole will be backfilled with silica sand, and 5-ft thick bentonite seal will be placed five feet below the chosen depth of the bottom of the stainless steel well. The filter pack will be 10-20 mesh silica sand placed 5 ft below the well to 10 ft above static-water level. Bentonite pellets will be placed immediately on top of the filter pack to 5 feet above the filter pack. Granular bentonite or crumbles will be placed from the top of the bentonite pellets to approximately 10 feet below ground surface. Cement grout will be placed from the top of the granular bentonite up to ground surface.

Surface protection for each well shall be installed in accordance with WAC 173-160-420 and GPR-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings." With the following modifications:

- The protective casing of the monitoring wells shall rise approximately 0.9 m (3 ft) above the concrete pad. The concrete pad will be 1.2 m by 1.2 m (4 ft by 4 ft) by 15.2 cm (6 in.) thick, and reinforced with 6-in. by 6-in. W1.4 welded wire fabric as a minimum.

- A brass survey marker with the well name and ID number inscribed shall be installed on the north side of the pad. Protective posts shall be set in concrete to allow

sufficient access for operational and maintenance activities. Posts shall be primed and painted yellow (ANSI Z53.1) and meet the requirements of WAC 173-160-420(12)(a) with one additional removable post (four posts per well pad).

Well sampling pumps will be installed in all monitoring wells.

Table 3-1 Proposed Well Construction

Well Name and Well # (Use)	Est. Depth to Water (ft)	Est. Drill Depth (ft)	Est. Screen Interval (ft)	Est. Filter Pack Interval (ft)	Bentonite Interval (ft)	Cement Seal Interval (ft)
C4639 C4639 (Monitoring)	242	367	TBD	TBD	10 – 232	0 – 10
299-E24-24 C4647 (Monitoring)	312	352	312 – 347	302 – 352	10 – 302	0 – 10
299-E17-26 C4648 (Monitoring)	324	364	324 – 359	314 – 364	10 – 314	0 – 10

Note:
Est. Depth to water taken from data from previously drilled monitoring wells in their respective areas.
Est. Drill Depth = required or requested depth below static water table + 5 ft
TBD: to be determined
C4639 screen placement dependent on field screening tests in relation to COC's.

3.4 SAMPLING ACTIVITIES

The geologist will observe the cuttings generated during drilling and shall prepare a borehole log in accordance with the FH procedure GPR-EE-01-7.0, "Geologic Logging." The three monitoring wells have short screened intervals, and will require only two split-spoon samples for grain size analysis. Efforts will be made to collect representative samples of finer grained intervals below the water table. The sieve analysis information will be used to verify well screen slot size and filter pack selection.

The site geologist will collect chip tray grab samples solely for the 200-UP-1 and the IDF Program monitoring wells. The geologist will also collect 1-pint grab samples of sediment every 5 feet while drilling for the 200-UP-1 and IDF Program monitoring wells.

A total of five groundwater samples will be collected during the drilling of only the 200-UP-1 monitoring well (C4639). The first water sample shall be collected from the top few feet (0 – 3 ft) of the water table using a sampling bailer. Remaining samples will be taken by using a submersible pump to purge and sample the borehole at 30 ft intervals to total depth. The borehole will be purged at each interval for a maximum of 1 hour, or until indicator parameters as determined by the site geologist have stabilized. At borehole C4639 water samples will be analyzed for volatile organinc compounds including carbon tetrachloride, as well as technetium-99 and uranium. As this borehole is

being drilled 120 feet below static ground water, four water samples will be collected during drilling. The results of these water samples will be used to determine the optimum placement of the well screen within the 120-foot saturated interval.

Spectral gamma instruments will be used to geophysically log all intervals in each of the 200-UP-1 and IDF Program monitoring wells. A sampling summary can be located in Table 3-2.

The collection of waste designation samples are addressed in section 4.0 Waste Management.

Table 3-2 Sampling Summary

Well No.	Est. Water Level (ft)	Split Spoon Samples	Lithologic Grab Samples	Groundwater Samples	Geophysical Logging
C4639	~ 242	2 in aquifer	Chip Tray 1-pint grab every 5 feet	Bailer sample at WT. Purge and pump sample collected at every 30 feet below WT to total depth.	RLS logging performed 0 ft – TD
299-E24-24 (C4647)	~ 312	2 in aquifer	Chip Tray 1-pint grab every 5 feet	NA	RLS logging performed 0 ft – TD
299-E17-26 (C4648)	~ 324	2 in aquifer	Chip Tray 1-pint grab every 5 feet	NA	RLS logging performed 0 ft – TD

3.5 WELL DEVELOPMENT

All wells will require extensive surging and pumping for development. The project hydrologist or site geologist will determine when development is complete per criteria in FH procedure GPR-EE-01-6.3, "Well Development and Testing." The objectives of well development are to settle the filter pack, prevent uncontrolled infiltration of fines, maximize well response to changes in hydraulic head, and to maximize production rates. Dual block surging will be performed to settle filter pack and conduct initial development.

Final development will consist of pumping down the well 50 to 70% of available screen to remove silt and clay particles, minimize turbidity of the extracted water, and to measure the initial response of the aquifer to pumping. Well surging will be performed as needed to maximize well yield and assist with sediment removal. During pumping, water samples will be collected for analysis of turbidity, temperature, pH, and specific conductance using field instruments. Development will continue until the well produces clear water (<5 nephelometric turbidity units (NTU)) and the temperature, pH, and conductivity have stabilized (at least three consecutive measurements within 10% of each other). The development should be performed in two stages, for those well screens that are greater than 6 m (20 ft) in length. Additionally, the wells must be pumped for a long enough period of time to estimate sustainable pumping rate data. A development pump with the capacity of pumping approximately 25 gallons per minute (gpm) is estimated to complete the final development and achieve desired drawdown levels in the monitoring wells. Well development shall occur within one week of well screen/casing installation per well.

The site geologist will monitor aquifer response and monitor recovery time.

Installation of all other required operation equipment will be performed at a later date as part of additional planned design upgrades.

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4.0 WASTE MANAGEMENT

All purgewater generated during drilling, sampling, and well development activities will be placed in a purgewater truck supplied by Fluor Hanford. The contractor willl notify the assigned BTR when the truck requires purgewater transport to the PSTF.

200-UP-1 OU (200 West)

Waste generated by installation of well C4639 (drill cuttings, purgewater, decon waste, miscellaneous waste) will be managed in accordance with WMP-2204 *Data Quality Objective Summary Report for Drilling Waste Associated with the Q Well for the 200-UP-1 Groundwater Monitoring Network*, DOE/RL-2000-51 Rev. 5 (or current revision), *Interim Action Waste Management Plan for the 200-UP-1 Operable Unit*, and the specific Waste Packaging/ Labeling Instruction Sheet. It is anticipated that vadose zone material will be dispositioned based on field screening. However saturated zone waste materials, based on the highest historical groundwater elevation, are considered contaminated due to groundwater listed waste codes. Therefore all material will require containerization and disposition will be based on groundwater data from adjacent wells and soil analysis. Site specific waste handling for the vadose and saturated zones will be completed in accordance with the Waste Packaging.

IDF Program (200 East)

Waste generated by installation of wells C4647 and C4648 (drill cuttings, purgewater, decon waste, miscellaneous waste) shall be managed in accordance with WMP-21109 *Data Quality Objectives Summary Report for FY 2004 Seismic Well in 200 East* and the site specific Waste Packaging Instruction. Although WMP-21109 was completed for the Seismic well in 200 East, additional review of the C4647 and C4648 vadose and saturated zone determined the WMP-21109 was valid for waste generated during the installation of the two monitoring wells.

Site specific information on the waste management will be presented in follow up Waste Packaging Instructions. Vadose and saturated zone miscellaneous waste will be placed in containers and disposed based on field screening results as stated in WMP-21109. Vadose zone soils will be placed on plastic and periodically surveyed. If vadose soil surveys detect contamination, the soil will be sampled and analyzed prior to disposition. Otherwise the soil will be released to the ground surface in accordance with WMP-21109. The saturated zone cuttings will be periodically surveyed and containerized. The purgewater which carries mobile contaminates will be decanted and transported to the PSTF. If saturated surveys detect contamination the saturated soils will be sampled and analyzed prior to disposition. Otherwise the soil will be released to the environment (RTE) in accordance with WMP-21109.

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5.0 QUALITY ASSURANCE

Fluor Hanford issued HNF-MP-599, Quality Assurance Program Description, which describes how FH implements the Quality Assurance requirements conveyed in DOE O 414.1A and 10 CFR 830.121. HNF-MP-599 also shows how the *Hanford Federal Facility Agreement and Consent Order* and HASQARD apply to Environmental QA Program Plans. Project management requirements are also detailed in HNF-RD-14988, *Project Management Requirements*. A project specific Quality Assurance Program plan for the Groundwater Remediation Project (GRP) scope is presented in HNF-20635, *Groundwater Remediation Project Quality Assurance Project Plan (GRP-QA-001)*.

All work performed under this description of work will be performed in compliance with HNF-MP-599, HNF-20635, or subsequent and equivalent FH Quality program plans.

All operations including drilling, sampling and well completion/ decommissioning, testing and associated documentation are subject to surveillance by FH, FH's authorizing agent and/or owner. This surveillance shall in no way relieve the contractor of any contractual responsibilities. Note: the term "surveillance" as used here may include inspection, survey, and/or assessment. The drilling contractor will implement a quality assurance program as submitted and approved under the drilling master agreement.

Technical procedures are listed in section 7.2 of this document, "Technical Procedures/Specifications."

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6.0 SCHEDULE

Drilling operations for the three new monitoring wells is scheduled to begin October 20, 2004. The wells shall be completed no later than December 31, 2004.

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7.0 GENERAL REQUIREMENTS

Field work for the wells will be conducted in accordance with existing FH procedures and protocols and the specifications of this DOW. The applicable procedures are discussed in the following sections.

7.1 SAFETY AND HEALTH

All personnel working at the drilling sites addressed by this plan will gave completed, at a minimum, an Occupational Safety and Health Administration Act 40-hour Hazardous Waste Site Worker training program (29 CFR 1910.120). Hanford General Employee Training (HGET) is required for access to the 100 and 200 Areas. Radiation Worker II training required. Work will be performed in accordance with the following procedures:

- HNF-5173, PHMC Radiological Control Manual
- Site specific plans, as applicable:
- Health and safety plans
- Radiological evaluation/radiation work permits
- Activity hazard analysis/job safety analysis
- Waste Packaging/ Label Instruction Sheet
- HNF-IP procedures
- CP Radiological Control Procedures

7.2 TECHNICAL PROCEDURES/SPECIFICATIONS

This section identifies technical procedures/specifications applicable to field activities performed under this description of work. Activities associated with the drilling and installation of these wells and management of waste generated by these activities will adhere to, at a minimum, the following FH procedures and requirements:

HNF-PRO-10863, "Notebooks and Logbooks"

GPR-EE-01-1.11, "Purgewater Management"

GPR-EE-01-3.0, "Chain of Custody"

GPR-EE-01-3.1, "Sample Packaging and Shipping"

GPR-EE-01-4.0, "Soil and Sediment Sampling"

GPR-EE-01-4.1, "Groundwater Sampling"

GPR-EE-01-6.2, "Field Cleaning and/or Decontamination of GeoProbe® and Drilling Equipment"

GPR-EE-01-6.3, "Well Development & Testing"

GPR-EE-01-7.0, "Geologic Logging"

GPR-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings"

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

8.0 PROJECT DOCUMENTATION

Documentation requirements for these activities are separated into scoping documents, field activity documents, and reporting documents. The following documents will be prepared to support the well drilling activity:

- Scoping Documents
  - This document
  - Data Quality Objective summary report
  - Drilling specifications/subcontractor scope of work (procurement package)
  - Excavation Permit
  - Additional waste management documents as required.

- Field Documentation
  - Well Drilling/Decommissioning Planning form
  - Daily Field Activity Reports
  - Sample collection, custody, and shipment documentation for waste samples
  - Well logs (borehole lithologic and completion)
  - Field Logbook
  - Well Construction summary report
  - Well Summary sheet
  - Field Cleaning and/or Decontamination sheets
  - Well Development and Test data sheets
  - Sieve Analysis sheets
  - Well Survey Data Report
  - Well Acceptance Report

- Reporting Documents
  - Field documentation will be transmitted to FH Geoscience Support for incorporation into the well database
  - Borehole Summary Report (including geophysical data)

The records produced for this project will undergo technical and management review in accordance with FH practices and procedures. The required reviewers will be identified prior to document completion, and the review time will be established as soon as practical.

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9.0 REFERENCES

29 CFR 1910.120, "*Hazardous Waste Operations and Emergency Response*," Code of Federal Regulations, as amended.

DOE-RL, 1990, *Strategy for Handling and Disposing of Purgewater at the Hanford Site, Washington*, (Letter No. 90-ERB-040, to P.T. Day, U.S. Environmental Protection Agency, and T.L. Nord, Washington State Department of Ecology, July 19, 1990), U.S. Department of Energy, Richland, WA.

DOE-RL, 2000, *Interim Action Waste Management Plan for 200-UP-1 Operable Unit*, DOE/RL-2000-51, Rev. 5, U.S. Department of Energy, Richland Operations Office, Richland, WA.

Groundwater Protection Program Procedures:

GPR-EE-01-6.2, "Field Cleaning and/or Decontamination if GeoProbe® and Drilling Equipment"
GPR-EE-01-7.0, "Geologic Logging"
GPR-EE-02-14.1, "Drilling, Remediating, and Decommissioning Resource Protection Wells, and Geotechnical Soil Borings"
GPR-EE-05-1.17, "Determination of Hexavalent Chromium in Water, Wastewater, and Soils Utilizing the Hach DR/2000 and DR/2010 Spectrophotometers"

Kruger, A.A, 2003, *Project Definition Criteria for the Integrated Disposal Facility*, RPP-15479, WASTREN, Inc. Richland, WA

Lindsey, K.A., B.N. Bjornstad, and M.P. Connelly, 1991, *Geologic Setting of the 200 West Area: An Update*, WHC-SD-EN-TI-008, Rev.0, Westinghouse Hanford Company, Richland, WA.

Parsons, G.L., 2003, *Integrated Disposal Facility & DOE O 413.3 Project Determination*, CH2M Hill Hanford Group, Inc. Richland, WA.

RCW 70.105, "*Hazardous Waste Management*," Revised *Code of Washington*, as amended.

Reidel, S.P. and D.G. Horton, 1999, *Geologic Data Package for the 2001 Immobilized Low-Activity Waste performance Assessment*, PNNL-12257, Pacific Northwest National Laboratory. Richland, WA.

Reidel, S.P., 2004, *Geological Data Package for 2005 Integrated Disposal Facility Waste Performance Assessment*, PNNL-14586, Pacific Northwest National Laboratory, Richland, WA.

WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells"

WAC 173-303-665, "Dangerous Waste Landfills"

Walker, L.D., 2001, *Borehole Summary Report for the 2001 ILAW Site Characterization Well*, BHI-01531, Bechtel Hanford, Inc. Richland, WA.

Walker, L.D., 2003, *Description of Work for the Installation of Groundwater Wells at 100-HR-3, 200-ZP-1, and 200-UP-1 Operable Units*, WMP-18046, Rev.0, Fluor Hanford, Inc. Richland, WA.

Williams, B.A., B.N. Bjornstad, R. Schakka, and W.D. Webber, 2000, *Revised Hydrogeology for the Suprabasalt Aquifer System, 200 East Area and Vicinity,* PNNL-12261, Pacific Northwest National Laboratory. Richland, WA.

WMI-WELL005, Rev. 2, "*Site Specific Waste Management Instruction RCRA Well Drilling – 200 E/W Areas*"

WMP-21109, 2004, *Data Quality Objectives Summary Report for FY 2004 Seismic Well in 200 East,* Rev. 0

WMP-2204, 2004, *Data Quality Objective Summary Report for Drilling Waste Associated with the Q Well for the 200-UP-1 Groundwater Monitoring Network,* Rev. 0

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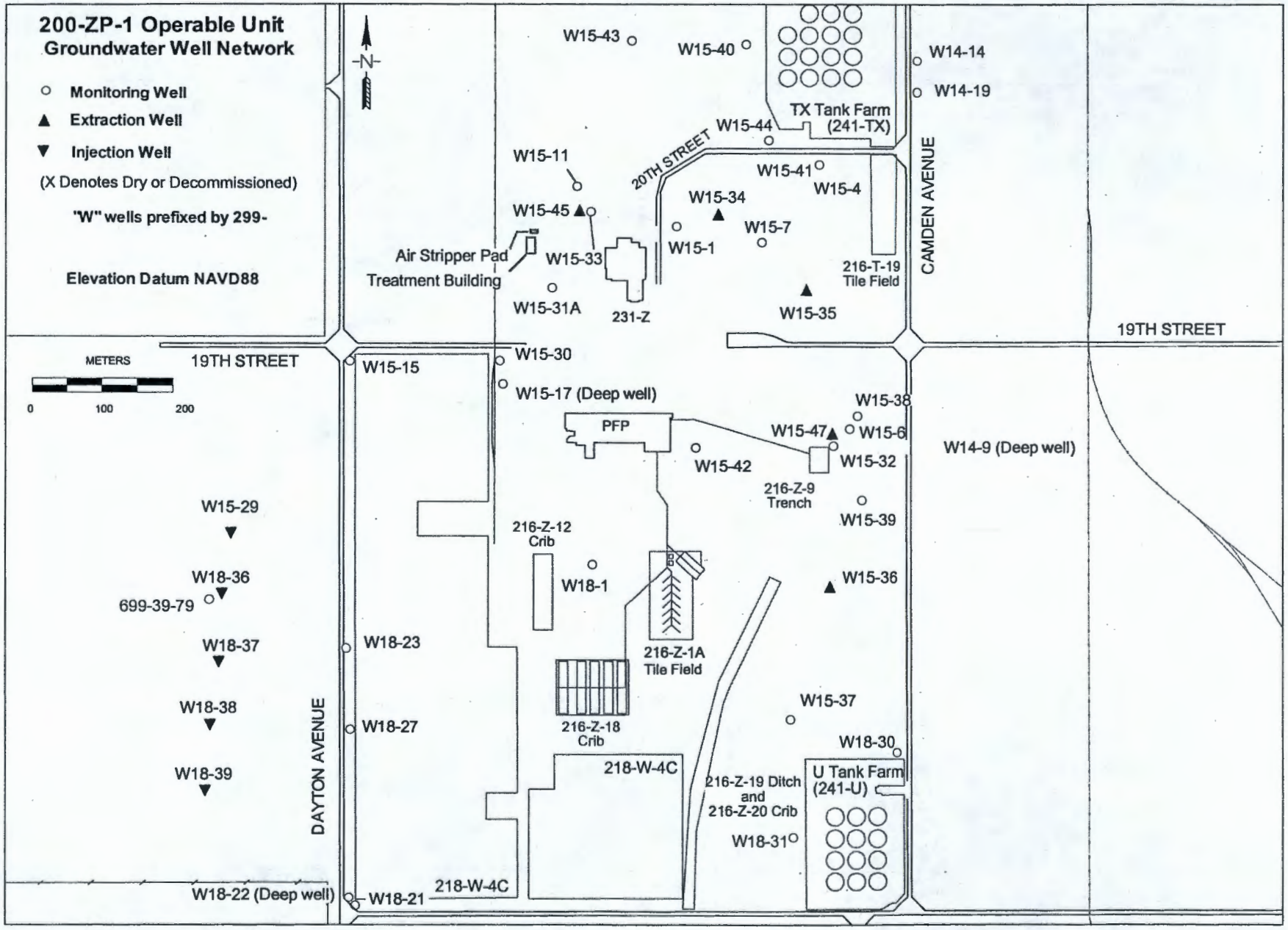
200-ZP-1 Operable Unit
Groundwater Well Network
Monitoring Well
Extraction Well
Injection Well
(X Denotes Dry or Decommissioned)
"W" wells prefixed by 299-
Elevation Datum NAVD88
N
METERS
0
100
200
19TH STREET
DAYTON AVENUE
20TH STREET
CAMDEN AVENUE
W15-43
W15-40
W14-14
W14-19
TX Tank Farm
(241-TX)
W15-44
W15-11
W15-41
W15-4
W15-34
W15-45
W15-7
W15-1
Air Stripper Pad
Treatment Building
W15-33
216-T-19
Tile Field
W15-31A
231-Z
W15-35
W15-30
W15-15
W15-17 (Deep well)
W15-38
PFP
W15-47
W15-6
W14-9 (Deep well)
W15-42
W15-32
216-Z-9
Trench
W15-29
W15-39
216-Z-12
Crib
W18-36
W18-1
W15-36
699-39-79
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W18-23
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W15-37
W18-38
W18-27
216-Z-18
Crib
W18-30
W18-39
218-W-4C
216-Z-19 Ditch
and
216-Z-20 Crib
U Tank Farm
(241-U)
W18-31
W18-22 (Deep well)
W18-21
218-W-4C