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WHC-S-053
Revision 0
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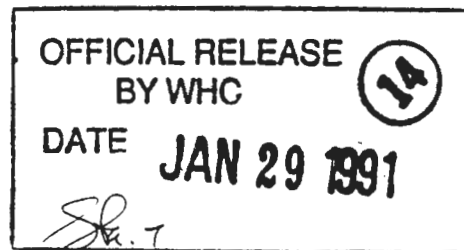
SPECIFICATION FOR

REMEDIAL INSTALLATION OF GROUNDWATER WELL SEALS AND SURFACE PROTECTION FOR 200 BP-1 OPERABLE UNIT WHC-S-053, Revision 0

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SPECIFICATION FOR
 REMEDIAL INSTALLATION OF GROUNDWATER WELL SEALS
 AND SURFACE PROTECTION FOR 200 BP-1 OPERABLE UNIT
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SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.1 REFERENCES

1.1.1 200-BP-1 Operable Unit Work Plan, USDOE, "Remedial Investigation/-Feasibility Study Work Plan for the 200-BP-1 Operable Unit Hanford Site, Richland, Washington." DOE/RL 88-32, Rev. 1, March 1990.

1.2 INTRODUCTION

1.2.1 These specifications provide requirements for remedial installation of surface and annular seals and surface protective measures for selected ground water wells located within or designated for data collection within the 200-BP-1 Operable Unit (OU) Work Plan.

1.2.2 Included are prerequisites and requirements for installation, inspection and documentation of those remediation activities.

1.2 APPLICABILITY

1.2.1 This specification is for remediation of existing groundwater wells listed in Table 02670-1.

1.3 SCOPE OF WORK

1.3.1 Remediation is necessary to upgrade existing non-RCRA standard or compliant groundwater wells to preclude migration of surface contaminants into or between aquifers and to protect the well structure from damage and introduced contamination.

1.3.2 The sequence of work is dependent upon existing conditions and remediation required. Remediation activities may require:

- 1.3.2.1 Casing perforation,
- 1.3.2.2 Running an inner casing liner to specified depths,
- 1.3.2.3 Grouting the liner,
- 1.3.2.4 Excavation around the existing casing,
- 1.3.2.5 Pouring of concrete pads and setting of protective posts.

1.3.3 Sequence of these activities may be changed upon the direction of the Cognizant Engineer.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01040

COORDINATION

PART 1 GENERAL

1.1 REFERENCES

- 1.1.2 Environmental Investigations and Site Characterization Manual
(WHC-CM-7-7)
EII 6.1, "Activity Reports of Field Operations."

1.2 SUBMITTALS

Not used

1.3 DEFINITIONS

1.3.1 WHC Cognizant Engineer:

1.3.1.1 The Cognizant Engineer is assigned complete technical responsibility for the design, protective maintenance and modification of equipment, systems, or components, as well as evaluating adequacy of spares and maintenance.

1.3.2 WHC Drilling Engineer:

1.3.2.1 The Drilling Engineer is responsible for technical documentation of activities necessary for installation of ground water well annular seals, surface seals and surface protection measures.

1.3.2.2 The Drilling Engineer is also responsible for assuring proper implementation of functional design criteria and fitness for use.

1.3.2.3 The Drilling Engineer has "stop work" authority if technical adequacy of the installation appears to be compromised or if work activities may adversely impact the installation.

1.3.3 Remediation Contractor:

1.3.3.1 The Remediation Contractor provides remediation and remediation management services, including quality assurance, quality control receiving inspection of Government furnished material, safety, scheduling, estimating and cost control during remediation.

1.3.3.2 Remediation activities for the 200-BP-1 OU will be performed by the onsite Construction Contractor (Kaiser Engineers Hanford or KEH) or by a KEH subcontractor.

1.4 DAILY ACTIVITY DOCUMENTATION

1.4.1 Documentation of remediation field activities shall be according to Environmental Investigations and Site Characterization Instruction (EII) 6.1, (Latest Rev), "Activity Reports of Field Operations."

1.4.2 The report shall be prepared by the WHC Drilling Engineer. The Remediation Contractor's representative or drill rig operator shall review the report on a daily basis and sign the report in the appropriate block indicating acceptance of the contents.

1.4.3 The WHC Cognizant Engineer shall resolve any dispute as to contents of the report.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01050

FIELD ENGINEERING

PART 1 GENERAL

1.1 REFERENCES

1.1.1 "A Compendium of Superfund Field Operational Methods,"
EPA/540/P-87/001, 1987, U. S. Environmental Protection Agency

1.2 SUBMITTALS

1.2.1 Survey report specified in Part 2, paragraph 2.1.1.

1.3 REQUIREMENTS

1.3.1 All survey work shall be performed by experienced survey personnel, supervised by a licensed land surveyor.

1.3.2 Horizontal positioning shall be according to standards for third-order plane surveys per Section 14 of "A Compendium of Superfund Field Operations Methods."

1.3.3 Report vertical elevations of the survey marker, top of final casing and top of any protective casing to the nearest 0.01 ft and 0.001 meter. Report horizontal coordinates of the final casing centerline to the nearest 0.1 meter.

1.3.4 The maximum allowable error of leveling is computed as $12mm \times \sqrt{K}$, where K is the horizontal distance of closure in kilometers.

1.3.5 Surveys shall utilize the Washington State Plane Coordinates (south zone), of North American Datum of 1983. The vertical control survey shall be referenced to NGVD of 1929 if practical.

PART 2 PRODUCTS

2.1 SURVEY DATA REPORT

2.1.1 Provide a survey data report which includes the Hanford Coordinates as location references only. Each Survey Data Report must indicate the horizontal and vertical datums used.

PART 3 EXECUTION

3.1 SURVEYING

3.1.1 Survey the survey marker, top and centerline of final well casing and top of any protective casing.

END OF SECTION

SECTION 01060

REGULATORY REQUIREMENTS

PART 1 **GENERAL**

1.1 **REFERENCES**

1.1.1 The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)
Sherwood, D. R., US-EPA Letter to J.K. Erickson, DOE-RL, October 5, 1990, "Installation of Surface and Annular Well Seals for the 200-BP-1 Operable Unit."

1.2 **SUBMITTALS**

Not used

1.3 **INTRODUCTION**

1.3.1 Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement); The Tri-Party Agreement is an agreement reached among U.S. Department of Energy - Richland Operations (DOE-RL) the Environmental Protection Agency (EPA) and the Washington State Department of Ecology (Ecology) on a cleanup schedule for hazardous wastes on the Hanford Site.

1.3.2 Certain functional design requirements for use of existing wells are developed based upon approved records of decisions reached under this agreement. Applicable agreements regarding remediation of existing wells are incorporated into this specification, (Sherwood, 1990).

1.4 **PERMITS**

1.4.1 The Cognizant Engineer shall be responsible for obtaining permits necessary for remediation including excavation, hazardous work and cultural reviews.

PART 2 **PRODUCTS**

Not used

PART 3 **EXECUTION**

Not used

END OF SECTION

SECTION 01090

REFERENCES

PART 1 GENERAL

- 1.1 REFERENCES: The following codes, standards and specifications, (latest date or addendum in effect), listed below form a part of this specification to the extent designated herein.
- 1.1.1 Federal Regulations and Guidance
29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."
40 CFR 260-265, "Resource Conservation and Recovery Act Hazardous Waste Regulations."
- 1.1.2 Washington Administrative Code (WAC)
WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."
WAC 173-162, "Rules and Regulations Governing the Regulation and Licensing of Well Contractors and Operators."
WAC 173-303, "Dangerous Waste Regulations."
- 1.1.3 The Hanford Federal Facility Agreement and Consent Order (Tri-Party Agreement)
Sherwood, D. R., US-EPA Letter to J.K. Erickson, DOE-RL, October 5, 1990, "Installation of Surface and Annular Well Seals for the 200-BP-1 Operable Unit."
- 1.1.4 American National Standards Institute (ANSI)
ANSI Z53.1, "Safety Color Code for Marking Physical Hazards."
- 1.1.5 American Society of Mechanical Engineers (ASME)
ASME B31.1, American National Standard Code for Pressure Piping - Power Piping
ASME NQA-1-1989, "Quality Assurance Program Requirements for Nuclear Facilities."
ASME Code, Section II Part C -- Welding Rods, Electrodes and Filler Metals
- 1.1.6 American Society for Testing and Materials (ASTM)
ASTM A53, Welded and Seamless Steel Pipe Type E or S, Grade B, Sch 40
ASTM C 150-89, "Standard Specification for Portland Cement."
ASTM C 226-86, "Standard Specification for Air-Entraining Additions for Use in the Manufacture of Air-Entraining Portland Cement."
- 1.1.7 "A Compendium of Superfund Field Operational Methods,"
EPA/540/P-87/001, 1987, U. S. Environmental Protection Agency

- 1.1.8 Environmental Investigations & Site Characterization Manual (WHC-CM-7-7)
EII 4.2, "Interim Control of Unknown, Suspected Hazardous and Mixed Waste."
EII 5.4, "Field Decontamination of Drilling, Well Development and Sampling Equipment."
EII 6.1, "Activity Reports of Field Operations."
EII 6.7, "Groundwater Well and Borehole Drilling."
EII 8.3, "Remediation of Groundwater Wells."
EII 10.3, "Disposal of Well Construction/Development Waters."
- 1.1.9 200-BP-1 Operable Unit Work Plan, USDOE, "Remedial Investigation/- Feasibility Study Work Plan for the 200-BP-1 Operable Unit Hanford Site, Richland, Washington." DOE/RL 88-32, Rev. 1, March 1990.

1.2 **SUBMITTALS**

Not used

PART 2 **PRODUCTS**

Not used

PART 3 **EXECUTION**

Not used

END OF SECTION

SECTION 01100

SPECIAL PRECAUTIONS AGAINST CONTAMINATION

PART 1 GENERAL

1.1 REFERENCES

- 1.1.1 Environmental Investigations and Site Characterization Manual
(WHC-CM-7-7)
EII 4.2, "Interim Control of Unknown, Suspected Hazardous and
Mixed Waste."
EII 5.4, "Field Decontamination of Drilling, Well Development and
Sampling Equipment."
EII 10.3, "Disposal of Well Construction/Development Waters."

1.2 SUBMITTALS

- 1.2.1 Manufacturer's cleaning procedures specified in 1.3.1 below.

1.3 CLEANING

1.3.1 Cleaning and Packaging of Materials: All well casings, cement
baskets and other metal items used to remediate the well, or that remain in
the borehole, shall have been cleaned to remove all oils, greases, solvents,
glues and waxes. The cleaning procedure used by the manufacturer shall be
submitted to and approved by the cognizant or drilling engineer before use.

1.3.2 The Remediation Contractor shall steam clean the remediation rig
(tools, cables) before use and between well remediation per EII 5.4 to prevent
cross contamination of wells.

1.3.3 Foreign materials from the land surface shall not be allowed to
fall into the hole being remediated.

1.3.4 Plastic or fabric material shall be used underneath the
remediation and completion rigs to catch grease and oil spills or other
potential contaminants coming from the equipment.

1.3.5 At all times during the progress of the work, the well shall be
protected in such a manner as to prevent either tampering with the well or the
entrance of foreign matter into it, for example during welding or cutting work
at the surface, take precautions to prevent slag or cuttings from entering the
well. Also, when the well is expected to be unattended for a day or more,
well caps and locks must be used to preclude entrance of materials into the
well by tampering or natural causes.

1.4 DECONTAMINATION

1.4.1 The Remediation Contractor shall supply the equipment necessary for decontamination. Temporary decontamination sites are to be set up at locations approved by the Cognizant Engineer outside the immediate drilling site. Rinsate fluids are to be collected, drummed, and temporarily stored by the contractor pending testing for possible hazardous/radiological constituents and final disposition per EII 4.2.

1.4.2 The Drilling Engineer will observe rig decontamination and inspect the rig to ensure that visible dirt, excess oil, and grease are removed. Fittings are to be carefully greased and fluids carefully added to the rig before cleaning. Periodic lubrication can be performed after steam cleaning only as part of routine equipment maintenance. The Drilling Engineer will inspect downhole tools, and casing to insure that all visible dirt, rustflakes, paint, oil, grease, solvents and waxes are removed.

1.4.3 The contractor is to notify the Cognizant or Drilling Engineer when any decontamination will be taking place prior to performance.

1.5 DRILLING AIDS (Mudding Agents, Lubricants)

1.5.1 Drilling aids such as bentonite, other clay-based agents, potable water or any foreign matter capable of affecting the characteristics of the ground water shall not be placed in the well without prior approval of the Cognizant Engineer.

1.5.2 Lubricant used for making up drill strings or other down-hole tools must be environmentally compatible as per industry standards: GREEN-STUFF, ORANGE AID, WELL GUARD. Hydrocarbon based lubricants are not acceptable.

1.6 CONTROL OF PURGE WATER

1.6.1 Purge water (well cleanout) will be contained as directed by the WHC Cognizant Engineer and according to EII 10.3.

1.7 HANDLING AND STORAGE OF MATERIALS

1.7.1 The Remediation Contractor shall use all means necessary to protect permanent well construction materials before, during, and after installation. All materials shall be kept off the ground on pallets, stands, racks, or sawhorses. All materials shall be stored in their original containers until needed for construction. Personnel handling the materials will use new cotton or latex gloves.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 REFERENCES

1.1.1 Washington Administrative Code (WAC)
WAC 173-160, "Minimum Standards for Construction and Maintenance
of Wells."

1.2 SUBMITTALS

1.2.1 RECORDS REQUIRED BY WAC 173-160: The Remediation Contractor shall complete and submit the Resource Protection Well Record required by WAC 173-160-050 to the Washington Department of Ecology (Ecology) on the required form. The WHC Cognizant or Drilling Engineer shall review the Resource Protection Well Record prior to submittal to Ecology by the contractor.

1.2.2 The Remediation Contractor shall submit the following as applicable to the WHC Cognizant Engineer.

1.2.2.1 Remediation Contractor surveillance and audit reports

1.2.2.2 Remediation Contractor Design Field Changes

1.2.2.3 Material Certifications

1.2.2.4 Manufacturer's cleaning procedures specified in Section 01100-
Paragraph 1.3.1.

1.2.2.5 Well survey reports (as specified in Section 01050, Part 2).

1.2.2.6 Records of personnel exposure to radiological and nonradiological
constituents

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

1.1.1 Environmental Investigations and Site Characterization Manual
(WHC-CM-7-7)
EII 8.3, "Remediation of Groundwater Wells."

1.2 SUBMITTALS

Not used.

1.3 HOLD POINTS/DEVIATIONS

1.3.1 If hold points (verification that must be performed prior to proceeding) are identified in the specification, the Remediation Contractor shall notify the Cognizant/Drilling Engineer prior to proceeding.

1.3.2 Deviations from any specifications shall be brought to the attention of the WHC Cognizant Engineer. Any deviation to the specifications shall be documented on a non-conformance report.

1.3.3 Existing field conditions, i.e. proximity to structures, or location within tank farms or near cribs, may require modification of dimensions and requirements detailed in this document. Such modifications are specified in Table 02670-1.

1.4 VERIFICATIONS

1.4.1 Material Verification: Material specifications shall be checked and documented by verifying that the materials specified are being used for the construction of these wells. All material shall be accepted for fitness for use by the Drilling Engineer prior to installation into a well.

1.4.1.1 Liner casing and centralizers.

1.4.1.2 Cement grout.

1.4.1.3 Properly fitting locking cap (not more than one standard casing size larger), providing at least 15 inches vertical clearance.

1.4.1.4 Air-entrained Concrete.

1.4.2 Remediation Specification Verification: Documentation of conformance with these specifications shall be verified by the WHC Cognizant or Drilling Engineer by completion of a Groundwater Well Remediation/-Decommissioning Checklist for each well per EII 8.3. Remediation specification verification activities shall be documented for the following items, when applicable:

- 1.4.2.1 Drilling rig and materials cleaned to procedures.
- 1.4.2.2 Lubricants and drilling aids.
- 1.4.2.3 Material/properly packaged/stored/installed
- 1.4.2.4 Perforations according to specification.
- 1.4.2.5 Liner and grout installed as specified.
- 1.4.2.6 Pad excavation completed and reinforcing material installed per specifications.
- 1.4.2.7 Concrete installed per specifications.
- 1.4.2.8 Guard posts installed per specifications.
- 1.4.2.9 Hasp, well cap, and lock installed per specifications.
- 1.4.2.10 Well identification stamped and correct.
- 1.4.2.11 Ecology well reports complete/submitted to state.
- 1.4.2.12 Survey complete and records complete.
- 1.4.2.13 Site restored.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 GENERAL

1.1 REFERENCES

- 1.1.1 Environmental Investigations and Site Characterization Manual
(WHC-CM-7-7)
EII 6.7, "Groundwater Well and Borehole Drilling."

1.2 SUBMITTALS

Not used

1.3 REMOVAL OF EXISTING CONCRETE PAD

- 1.3.1 Remove existing concrete pads where specified. Pads shall be removed by pneumatic hammers or other suitable means. Care shall be taken to prevent damage to existing casing or well seals.

1.4 SURFACE SEAL ANNULUS EXCAVATION

- 1.4.1 Excavate the annulus surrounding the outer casing to a depth of not less than 18 ft when required. Excavation shall be done using rotary auger drilling techniques per EII 6.7, "Groundwater Well and Borehole Drilling."

- 1.4.2 The excavation shall provide a minimum 2 in annular space surrounding the casing.

- 1.4.3 Provisions shall be made at the direction of the Drilling Engineer to maintain the annular opening until grouting is completed. Such provisions may include installation of temporary casing or saturation of penetrated sediments with potable water.

1.5 EXCAVATION FOR PAD

- 1.5.1 Excavate surrounding existing casing to allow installation of the specified pad. Provide protection to prevent entry of material into the casing.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION

SECTION 02670

WELL REMEDIATION

PART 1 GENERAL

1.1 REFERENCES

- 1.1.1 Washington Administrative Code (WAC)
WAC 173-160, "Minimum Standards for Construction and Maintenance of Wells."
- 1.1.2 American National Standards Institute (ANSI)
ANSI Z53.1, "Safety Color Code for Marking Physical Hazards."
- 1.1.3 American Society of Mechanical Engineers
ASME B31.1, American National Standard Code for Pressure Piping - Power Piping
- 1.1.4 American Society for Testing and Materials (ASTM)
ASTM A53, Welded and Seamless Steel Pipe Type E or S, Grade B, Sch 40
ASTM C 150-89, "Standard Specification for Portland Cement."
ASTM C 226-86, "Standard Specification for Air-Entraining Additions for Use in the Manufacture of Air-Entraining Portland Cement."
- 1.1.5 Environmental Investigations & Site Characterization Manual (WHC-CM-7-7)
EII 4.2, "Interim Control of Unknown, Suspected Hazardous and Mixed Waste."
- 1.1.6 "Hanford Wells", V. L. McGhan, June 1989, PNL-6907, Pacific Northwest Laboratory, Richland, Washington, 99352.

1.2 SUBMITTALS

Refer to Section 1300

1.3 QUALITY ASSURANCE

1.3.1 Groundwater well remediation activities shall meet applicable state and federal minimum standards for well construction and maintenance and Hanford Site requirements for public and environmental protection and waste minimization.

1.3.1.1 Washington Administrative Code (WAC) 173-160

1.3.1.1.1 Groundwater wells shall have surface seals equivalent to the applicable minimum requirements of WAC 173-160-075.

1.3.1.1.2 Groundwater wells shall be capped and protected equivalent to the applicable minimum requirements of WAC 173-160-510.

1.3.1.1.3 Groundwater wells shall have casing sealed equivalent to the applicable requirements of WAC 173-160-075 and 173-160-550.

1.4 WELL LOCATION

1.4.1 Well locations are provided in Figure 2, "Water Well Location Map -- 200 East Area" and the Hanford Site Well Location map contained in Hanford Wells.

1.5 TECHNICAL REQUIREMENTS

1.5.1 Figures 02670-1 and 02670-2 are schematic diagrams depicting general requirements for installation of the surface seal and surface protective measures.

1.5.2 Table 02670-1 provides a data sheet tabulation of specific remediation requirements based upon existing condition and defined data quality objectives for each well.

1.6 WELDING REQUIREMENTS

1.6.1 Personnel and procedures for welding carbon steel casing shall have been qualified in accordance with ASME B31.1 before welding.

1.6.2 Perform welding of carbon steel casing in accordance with ASME B31.1.

1.6.3 Visual weld examination acceptance criteria shall meet the requirements of ASME B31.1, Paragraph 136.4.2.

PART 2 PRODUCTS

2.1 LINER CASING

2.1.1 The well casing (liner casing) shall be steel pipe conforming to ASTM A53, Type E or S, Grade B, Sch 40.

2.1.2 The minimum diameter and expected amount of liner casing is specified for each individual well in Table 02670 - 1.

2.2 CEMENTING BASKETS

2.2.1 Cementing baskets shall be of flexible steel staves mounted on a steel ring with a canvas insert riveted to the staves.

2.2.2 The basket shall be fixed with a steel limiting clamp.

2.3 WELL CENTERING GUIDES

2.3.1 Centering Guides or Centralizers shall be of the same type of steel as the well casings.

2.4 CEMENT GROUT

2.4.1 Cement grout shall consist of a mixture of Portland Cement (ASTM C-150) and water in the proportion of 5 to 6 gallons of Hanford Site system potable water or Columbia River raw water per bag (94 lb or 1 ft³) of cement.

2.4.2 An additive shall be added to the cement to cause it to expand on setting, thus providing a tighter seal.

2.4.2.1 Approved additives are either gypsum (3 to 6 % by volume) or aluminum powder mixed as follows: Mix 1 part aluminum powder to 50 parts cement.

2.4.2.2 Add this mixture to type I or II Portland Cement at the rate of 3 to 5 oz per 94 pound sack of cement prior to adding water.

2.5 CONCRETE FOR SURFACE PAD AND SEAL

2.5.1 Concrete, when used in monitoring well surface pad and seal construction, shall be composed of either premixed, bagged concrete, or a mix of five sacks of cement per cubic yard.

2.5.2 An air-entraining agent (ASTM C-226-86) shall be added to prevent freeze/thaw cracking (6% ± 2%). Additives (other than air entraining agents) or borehole cuttings shall not be mixed with the concrete.

2.5.3 With the addition of water, the maximum slump shall be 6 in.

2.6 REINFORCING STEEL

2.6.1 Reinforcing steel shall be of sufficient size (6x6 - W1.4 x W1.4 Welded Wire Fabric WWF minimum), configuration, and placement to minimize damage to the pad during normal use for its expected lifetime.

2.7 WELL CAPS

2.7.1 Caps shall be designed to slip over the permanent casing without wobbling.

2.7.2 Caps shall provide adequate vertical clearance for any type of dedicated sampling pump hardware, (minimum vertical clearance shall be 15-in).

2.8 PRIMER AND PAINT

2.8.1 Primer and paint materials shall conform to the following federal specifications.

2.8.1.1 Primer for metal parts -- TT-P-645

2.8.1.2 Finish enamel -- TT-E-489F, Class A

3.0 EXECUTION

3.1 SURFACE SEAL INSTALLATION

3.1.1 Install a surface seal of cement grout, when specified. The seal shall be installed by use of a tremie tube. The discharge end of the tremie tube shall be submerged in the grout to avoid breaking the seal while filling the annular space.

3.1.2 The grout shall extend to approximately 3 ft below the projected level of the surface pad.

3.2 CASING PERFORATION

3.2.1 When required, perforate existing casing as specified in Table 02670-1.

3.2.2 Perforations shall be at least 4 equidistant cuts per row, and 1 row per ft. Each cut shall be at least 1½ in long.

3.3 LINER INSTALLATION

3.3.1 Make up and install the inner liner of diameter and to depth for those wells specified in Attachment 1. The top of the liner shall be set 4 in (± 2 in) below the level of the existing casing.

3.3.1.1 The liner shall have two cementing baskets securely attached to the bottom and a protective cap welded or securely fastened to the top to prevent entry of grout or debris. Expanding plugs are acceptable.

3.3.1.2 Casing stabilizers shall be attached above the baskets (4 ft \pm 2 ft) and every 40 ft (\pm 5 ft) thereafter.

3.3.2 Liners made up by welding shall be welded to acceptable industry practice as specified in Paragraph 1.6 of this Section. Welds shall be fully penetrating and continuous to prevent leakage of grout to the interior of the liner.

3.4 WELL CLEANOUT

3.4.1 Clean out the well by bailing as directed by the Drilling Engineer.

3.4.2 Cleanout Debris Disposal: Debris bailed or pumped from the hole will be surveyed with radiation and organic vapor detection monitoring instruments. Materials with any contamination above the prescribed action levels will be contained on site until proper disposal methods are identified by the WHC Cognizant Engineer in accordance with EII 4.2.

3.5 SURFACE PAD INSTALLATION

3.5.1 Install a 4-ft by 4-ft (± 3 in) by 6-in (± 2 in) concrete pad around the well. The concrete shall be steel reinforced and have an air entraining agent added to prevent freeze/thaw cracking of the pad.

3.5.2 The concrete placed in the pad shall extend no more than 3.0 ft nor less than 2.5 ft down the borehole. The surface of the pad shall be sloped away from the well for drainage, (at least $\frac{1}{2}$ -in per radial foot).

3.5.3 Provide a liquid drain hole in the outer casing immediately above the annular grout surface when a liner has been installed.

3.6 WELL IDENTIFICATION

3.6.1 Install a brass 3-in diameter domed survey marker in the surface pad, one foot (± 3 in) from the well. The brass survey marker should be placed on the north side of the casing. Stamp the well identification number on the brass marker and on the outer well casing.

3.7 POST INSTALLATION

3.7.1 Install four metal posts around the casing. One metal post shall be removable and contained in a 5-in diameter schedule 40 carbon steel pipe, set from ground level to 3-ft below the ground.

3.7.2 The guard posts shall be at least 3-in diameter, set in concrete. The guard posts shall be at least 6-ft long and extend at least 3-ft above the surface of the ground.

3.8 PROTECTIVE CAP

3.8.1 The well casing shall be provided with a locking cap designed to slip over the outermost casing without wobbling and to provide adequate vertical clearance for any type of dedicated sampling pump hardware. Minimum vertical clearance shall be 15 inches.

3.9 PAINTING

3.9.1 Prime and paint protective posts, existing exposed casing and caps yellow as defined in ANSI Z53.1, Safety Color Code for marking physical hazards. Protect the inner casing from entry of any spray or paint residue.

3.9.2 In addition, paint the well identification number on the outer casing and on a protective post visible from approach roads or paths, (numbers should be at least 2-inches high).

3.10 SITE CLEANUP

3.10.1 All lumber, forms, scrap materials and other debris shall be removed from the site upon completion of activities.

3.10.2 Uncontaminated excavation spoils shall be spread at the site to blend in with the normal surface elevations.

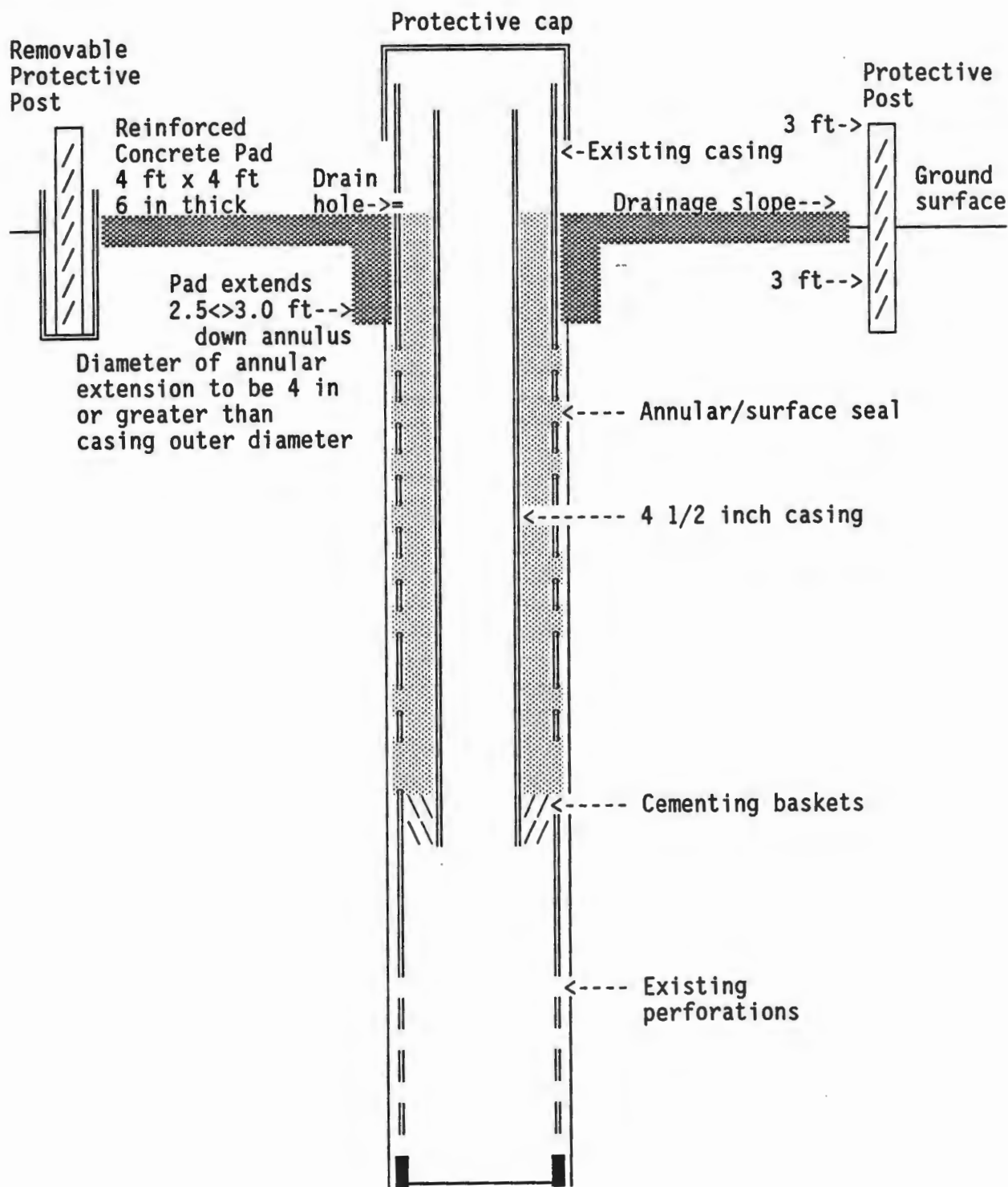


Figure 02670-1. Schematic diagram of remediated well annular seal

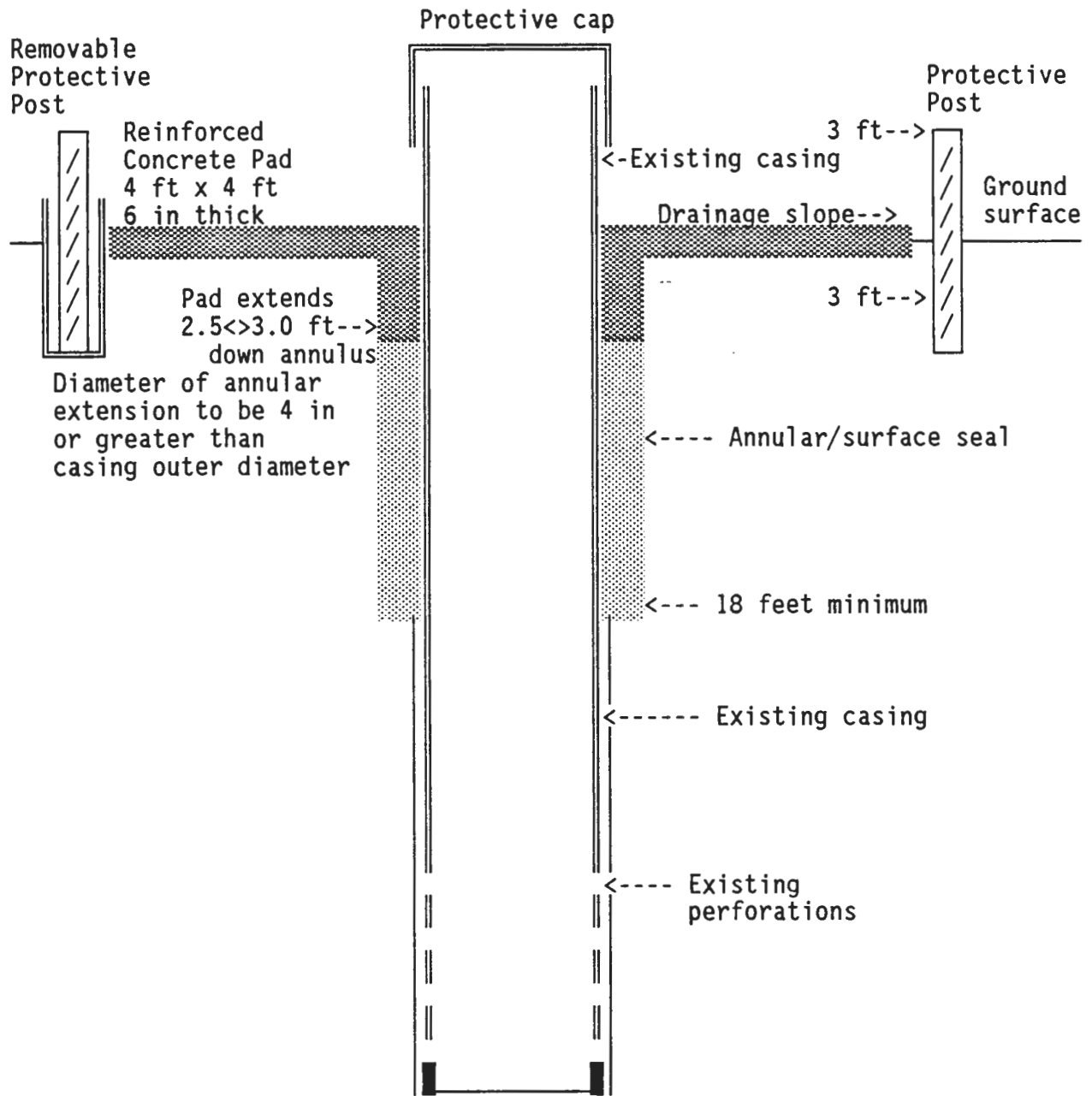


Figure 02670-2 Schematic diagram of remediated well surface seal

Table 02670-1, Page 1 of 2
Ground Water Wells Located Within the 200 BP-1 Operable Unit
Requiring Installation of Annular/Surface Seals and Surface Protection

WELL DESIGNATION	HANFORD COORD N/W	DRILL DATE DEPTH	CSNG SIZE (In)	REQUIRED REMEDIATION ACTIVITIES
299-E33-01A	N46,375 W53,335	Aug54 235 ft	8.0 4%	•Remove existing pad; install pad, posts, marker; paint. •Survey.
299-E33-03	N46,547 W53,331	Nov54 236 ft	8.0 4%	•Remove existing pad; install pad, posts, marker; paint. •Survey.
299-E33-04	N46,635 W53,384	Dec54 231 ft	8.0 4%	•Install pad, posts, marker, paint. •Survey.
299-E33-05	N46,353 W53,523	Jun55 238 ft	8.0 4%	•Remove existing pad; install pad, posts, marker, paint. •Survey.
299-E33-07	N46,619 W53,520	Apr55 233 ft	8.0 4%	•Remove existing pad; install pad, posts, marker; paint. •Survey.
299-E33-12	N46,434 W52,850	Sep53 415 ft	10.0 8.0 6.0	•Remove surface casing, overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing; paint. •Survey.
299-E33-13	N46,278 W53,093	Oct53 235 ft	8.0	•Perforate 8-in casing 3-200 ft; place 4½-in casing to 205-ft and pressure grout. •Install pad, posts, marker; paint. •Survey.
299-E33-14	N46,223 W52,177	Dec53 230 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
299-E33-15	N46,066 W52,751	Feb53 251 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
299-E33-18	N46,624 W52,825	Feb50 278 ft	8.0	•Remove existing pad. Overdrill 8-in casing & install 2-in void surface seal to 18-ft. Perforate 8-in casing 238-250 ft. •Install pad, posts, marker; paint. •Survey.
299-E33-24	N45,260 W53,790	May67 256 ft	8.0	•Remove existing pad. Perforate 8-in casing 3-200 ft; place 4½-in casing to 205-ft and pressure grout. •Install pad, posts, marker; paint. •Survey.
299-E33-26	N46,600 W54,315	Mar69 240 ft	6.0	•Remove existing pad. Overdrill 6-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
299-E34-01	N45,129 W50,023	Jun61 245 ft	8.0	•Remove existing pad. Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing, paint. •Survey.

Table 02670-1, Page 2 of 2
Ground Water Wells Located Within the 200 BP-1 Operable Unit
Requiring Installation of Annular/Surface Seals and Surface Protection

WELL DESIGNATION	HANFORD COORD N/W	DRILL DATE DEPTH	CSNG SIZE (In)	REQUIRED REMEDIATION ACTIVITIES
699-47-50	N47,266 W49,508	Jun80 295 ft	10.0 6.0	•Remove existing pad. Overdrill 10-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
699-47-60	N47,137 W60,286	Jul48 286 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing, paint. •Survey.
699-49-55A	N48,805 W54,926	Jul61 149 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing, paint. •Survey.
699-49-55B	N48,803 W54,951	May82 227 ft	10.0 8.0	•Overdrill 10-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
699-49-57	N48,960 W56,913	Jul56 168 ft	10.0 8.0	•Remove existing 10-in casing; overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing, paint. •Survey.
699-50-53	N49,840 W53,267	Feb55 185 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing; paint. •Survey.
699-53-55A	N53,006 W55,014	Aug61 455 ft	8.0 2.06	•Remove existing round pad. Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; repair casing, paint. •Survey.
699-53-55B	N52,970 W55,030	May75 252 ft	8.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
699-53-55C	N52,976 W55,015	May75 220 ft	16.0 12.0	•Remove existing 16-in casing & install 2-in void surface seal around 12-in casing to 18-ft. Install pad, posts, marker; paint. •Survey.
699-54-57	N54,311 W56,639	Jun55 199 ft	8.0 6.0	•Overdrill 8-in casing & install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.
699-55-57	N54,608 W57,208	May75 180 ft	8.0 6.0	•Remove existing 8-in casing, overdrill 6-in casing and install 2-in void surface seal to 18-ft. •Install pad, posts, marker; paint. •Survey.

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

END OF SECTION