

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT			1. CONTRACT ID CODE J	PAGE OF PAGES 1 1
2. AMENDMENT/MODIFICATION NO. 0004	3. EFFECTIVE DATE 06-Aug-2004	4. REQUISITION/PURCHASE REQ. NO. W807PM-4153-2497	5. PROJECT NO.(If applicable)	
6. ISSUED BY VBURG CONSOL CONTRACTING OFC 4155 CLAY ST VICKSBURG MS 39183-3435		7. ADMINISTERED BY (If other than item 6) See Item 6		
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)			X	9A. AMENDMENT OF SOLICITATION NO. W912EE-04-B-0015
			X	9B. DATED (SEE ITEM 11) 18-Jun-2004
				10A. MOD. OF CONTRACT/ORDER NO.
				10B. DATED (SEE ITEM 13)
CODE		FACILITY CODE		
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS				
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input type="checkbox"/> is extended, <input checked="" type="checkbox"/> is not extended.				
Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>1</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.				
12. ACCOUNTING AND APPROPRIATION DATA (If required)				
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.				
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.				
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).				
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:				
D. OTHER (Specify type of modification and authority)				
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.				
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) Reference Solicitation No. W912EE-04-B-0015 for New Water Well, Sardis Lake, Mississippi, scheduled to open 17 August 04 at 1400 hrs. is amended as follows: <div style="text-align: center;">(CONTINUED ON PAGE 2.)</div>				
Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.				
15A. NAME AND TITLE OF SIGNER (Type or print)			16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)	
			TEL:	EMAIL:
15B. CONTRACTOR/OFFEROR		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA
(Signature of person authorized to sign)				BY _____
				(Signature of Contracting Officer)
				16C. DATE SIGNED 05-Aug-2004

SECTION SF 30, BLOCK 14, CONTINUATION PAGE
W912EE-04-B-0015

TECHNICAL SPECIFICATIONS

The Bid Form, page 3 of 139, has been revised and replaced.

The SUBMITTAL REGISTER (located at the end of Section 01330 SUBMITTAL PROCEDURES) has been revised and replaced in its entirety.

Section 01270 MEASUREMENT AND PAYMENT, page 3 has been revised and replaced.

Section 02521 WATER WELLS has been revised and replaced in its entirety.

Section 16264 DIESEL-GENERATOR SET, STATIONARY 15-300 KW, STANDBY APPLICATIONS, page 11 has been revised and replaced.

Pages revised by this amendment have the notation "Revised by Amendment 0004" at the bottom of the page. Text added by this amendment is shown as underlined. Text deleted by this amendment is shown as overstruck.

Encls: Bid Form, page 3
Submittal Register, pages 1 thru 8
Section 01270, page 3
Section 02521, pages 1 thru 23
Section 16264, page 11

SECTION 00010—BID FORM

NEW WATER WELL.
SARDIS LAKE, MISSISSIPPI

ITEM	DESCRIPTION	EST QTY	U/M	UNIT PRICE	AMOUNT
0001	TEST HOLE	350	LF	\$ _____	\$ _____
0002	WATER WELL	325	LF	\$ _____	\$ _____
0003	400 GPM - 60 PSI VERTICAL TURBINE PUMP	1	LS	FOR	\$ _____
0004	ELECTRICAL WORK	1	LS	FOR	\$ _____
0005	CHAIN LINK FENCE	1	LS	FOR	\$ _____
0006	DEMOLITION	1	LS	FOR	\$ _____
0007	16,000 GALLON HYDROPNEUMATIC	1	LS	FOR	\$ _____
0008	WATER LINE, 8-INCH	5,750	LF	\$ _____	\$ _____
0009	WATER LINE, 4-INCH	3,000	LF	\$ _____	\$ _____
0010	WATER VALVES, 8-INCH	3	EA	\$ _____	\$ _____
0011	WATER VALVES, 4-INCH	1	LS	FOR	\$ _____
0012	BORING, 8-INCH WATER LINES	110	LF	\$ _____	\$ _____
0013	BORING, 4-INCH WATER LINES	60	LF	\$ _____	\$ _____
0014	EROSION CONTROL	1	LS	FOR	\$ _____
* 0015	100 KW DIESEL GENERATOR	1	LS	FOR	\$ _____ *

TOTAL \$ _____

Bidders are reminded that if a bid bond is required under this solicitation, proper bid bonds and documents related thereto are a matter which may not be corrected after bid opening. The Comptroller General of the General Accounting Office has issued a recent decision that may impact acceptability of bid bonds and related documents. This case, in part, concludes that a Power of Attorney (POA) bearing mechanically produced signatures may be insufficient to evince a surety's intent to be bound and may result in rejection of the bid as non-responsive. For this reason your attention is directed to All Seasons Construction, Inc. B-291166.2, December 6, 2002, which may be found at <http://www.gao.gov/decisions/bidpro/bidpro.htm>. Bidders are encouraged to refer to this case for guidance prior to submitting their bids.

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION

New Water Well, Sardis Lake, MS

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS	
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE			DATE OF ACTION
		01356	SD-07 Certificates														
			Filter Fabric	2.2.2	FIO												
		02052	SD-01 Preconstruction Submittals														
			Project/Site Conditions	1.7	FIO												
			Interruption of Services	1.5	G												
			SD-07 Certificates														
			Demolition: Structure Removal Plan	1.6	FIO												
		02521	SD-02 Shop Drawings														
			Installation Diagrams	3.13.2	G												
			SD-03 Product Data														
			Well Installation Plan	1.5	G												
			Well Material	2.1	G												
			Qualifications	1.6	G												
			Site Conditions	1.12	G												
			Geophysical Logging	1.8	G												
			SD-06 Test Reports														
			Well Development Records	3.13.3	FIO												
			Geophysical Logs	3.13.4	FIO												
			Decommissioning/Abandonment Records	3.12	FIO												
			Other Records		FIO												
			Project Photographs	3.13.6	FIO												
			Filter Pack	2.3	FIO												
			Tests	3.5	FIO												
			SD-07 Certificates														

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																		(g)
		02521	Casing	2.1	FIO													
			Cement and Bentonite Grout	2.5	FIO													
			Air line and gauge	1.5	FIO													
			Drilling mud	1.5	FIO													
			Water meter		FIO													
			Well Screens	2.2	FIO													
			Water removed		FIO													
			Graveling equipment	3.3.4	FIO													
			Construction of Filter Pack	3.3.4	FIO													
		02661	SD-01 Preconstruction Submittals															
			Materials and Equipment	2.1	G													
			SD-06 Test Reports															
			Hydrostatic Tests	3.2.1	FIO													
			Bacteriologic Testing	3.3.5	FIO													
			SD-07 Certificates															
			Materials	2.1	FIO													
			Boring Under Existing Pavement	3.1.11	G													
		02821	SD-07 Certificates															
			Chain Link Fence	2.1.1	FIO													
			GA		FIO													
		02960	SD-03 Product Data															
			Fertilizer	2.1	FIO													
		03308	SD-01 Preconstruction Submittals															
			Concrete Placement	3.2.1	FIO													
			SD-03 Product Data															
			On-Site Batching and Mixing	3.1.4.3	FIO													

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		03308	On-Site Batching and Mixing	3.1.4.3	FIO												
			Accelerating Admixtures		FIO												
			Air-Entraining Admixtures	2.1.4.1	FIO												
			Water-Reducing or Retarding Admixtures	2.1.4.3	FIO												
			Reinforcement Steel	2.1.7	FIO												
			Curing Materials	2.1.5	FIO												
			Expansion Joint Filler Strips	2.1.10	FIO												
			Joint Sealants	2.1.11	FIO												
			SD-06 Test Reports														
			Aggregates	2.1.3	FIO												
			Concrete Mixture Proportions	1.3.1.1	FIO												
			SD-07 Certificates														
			Concrete Mixture Proportions	1.3.1.1	FIO												
			Cement	2.1.1	FIO												
		04200	SD-02 Shop Drawings														
			Masonry Work		G												
			SD-03 Product Data														
			Clay or Shale Brick	2.2	G												
			Cold Weather Installation	3.1.2	G												
			SD-07 Certificates														
			Clay or Shale Brick	2.2	G												
			Concrete Masonry Units (CMU)	2.4	G												
			SD-08 Manufacturer's Instructions														
			Masonry Cement	2.8.4	FIO												
		11212	SD-02 Shop Drawings														

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																		(g)
		11212	Installation	3.1	G													
			SD-03 Product Data															
			Vertical Turbine Pumping Units	2.1.1	FIO													
			Spare Parts	1.5	FIO													
			Posted Instructions	3.6	FIO													
			SD-06 Test Reports															
			Testing	3.3	FIO													
			SD-10 Operation and Maintenance Data															
			Vertical Turbine Pumping Units	2.1.1	FIO													
		15124	SD-01 Preconstruction Submittals															
			Materials and Equipment	2.1	G													
			SD-02 Shop Drawings															
			Tests and Inspections	3.4	G													
			Materials and Equipment	2.1	G													
			SD-03 Product Data															
			Materials and Equipment	2.1	G													
			SD-06 Test Reports															
			Tests and Inspections	3.4	FIO													
			SD-10 Operation and Maintenance Data															
			Operation and Maintenance Manuals	3.7	FIO													
		16010	SD-01 Preconstruction Submittals															
			Electric Services	1.16	FIO													
			SD-02 Shop Drawings															

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						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE			DATE OF ACTION
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		16010	Rough-In Drawings	1.9	G												
			Staking Sheets	1.8	G												
			SD-04 Samples														
			Framing Channel	2.2	G												
			Channel Nuts	2.2	G												
			Hardware	2.2	G												
			Accessories	2.2	G												
			Wire and Cable	2.2	G												
			Terminations	2.2	G												
			Conduit	2.2	G												
			Conduit Fittings	2.2	G												
			Wiring Devices	2.2	G												
			Cover Plates	2.2	G												
			SD-07 Certificates														
			System Equipment and Apparatus	3.2	FIO												
			SD-08 Manufacturer's Instructions														
			Posted Operating Instructions	3.12	G												
			SD-10 Operation and Maintenance														
			Data														
			System and Apparatus	3.13	FIO												
		16110	SD-03 Product Data														
			Conduit	2.1	G												
			Boxes	2.3	G												
			Fittings	2.1	G												
		16264	SD-02 Shop Drawings														
			Layout		G												

SUBMITTAL REGISTER

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New Water Well, Sardis Lake, MS

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	GOVT CLASSIFICATION REVIEW	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION		APPROVING AUTHORITY				REMARKS			
						SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE		DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	
																		(g)
(a)	(b)	(c)	(d)	(e)	(f)													
		16264	Drawings		G													
			Acceptance	3.9	G													
			SD-03 Product Data															
			Performance Tests	3.5.5	FIO													
			Sound Limitations	2.6	G													
			Generator	2.12	FIO													
			Integral Main Fuel Storage Tank	2.3.4	FIO													
			Power Factor	3.5.1.2	FIO													
			Heat Rejected to Engine-Generator Space		FIO													
			Time-Delay on Alarms	2.16.5	FIO													
			Cooling System	2.5	FIO													
			Manufacturer's Catalog	2.2	FIO													
			Vibration Isolation	1.4.8	FIO													
			Instructions	3.8	G													
			Experience	1.4.9	FIO													
			Field Engineer	1.4.10	FIO													
			Site Welding	1.4.6	FIO													
			General Installation	3.1	FIO													
			Site Visit		FIO													
			SD-06 Test Reports															
			Onsite Inspection and Tests	3.5	G													
			SD-07 Certificates															
			Vibration Isolation	1.4.8	FIO													
			Prototype Tests		FIO													
			Reliability and Durability		FIO													

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		16264	Emissions	2.9	FIO												
			Sound limitations	2.6	FIO												
			Flywheel Balance		FIO												
			Materials and Equipment	2.1	FIO												
			Factory Inspection and Tests	2.25	FIO												
			Inspections	3.5.3	FIO												
			Cooling System	2.5	FIO												
		16400	SD-02 Shop Drawings														
			Electrical Work		G												
			SD-06 Test Reports														
			Materials and Equipment	2.1	FIO												
		16410	SD-02 Shop Drawings														
			Switches		FIO												
			Equipment	1.3.1	FIO												
			Installation	3.1	FIO												
			SD-03 Product Data														
			Material	1.3.1	FIO												
			Equipment	1.3.1	FIO												
			SD-06 Test Reports														
			Testing	2.4	G												
			SD-07 Certificates														
			Equipment	1.3.1	FIO												
			Material	1.3.1	FIO												
			Switching Equipment		FIO												
			SD-10 Operation and Maintenance														
			Data														

existing 7,500 gallon hydropneumatic tank and demolition of tank saddles, slab and building wall, disposal of all materials, and all work incidental thereto.

(2) Unit of measure: lump sum.

e. "16,000 Gallon Hydropneumatic Tank"

(1) Payment will be made for all cost associated with furnishing and installing a 16,000 gallon hydropneumatic tank, including concrete saddles, concrete slab, building wall, and all work incidental thereto.

(2) Unit of measure: lump sum.

f. "Erosion Control"

(1) Payment will be made for all costs associated with performing erosion control, including grading and dressing, fertilizing, disking and harrowing, seeding, compacting, mulching, and all work incidental thereto.

(2) Unit of measure: lump sum.

g. "~~44~~100 KW Diesel Generator"

(1) Payment will be made for all cost associated with furnishing and installing a ~~44~~100 KW diesel generator, and all work incidental thereto.

(2) Unit of measure: lump sum.

1.2 UNIT PRICE PAYMENT ITEMS

1.2.1 General

Payment items for the work of this contract on which unit price payments will be made are listed in the BIDDING SCHEDULE and described below. The unit price and payment made for each item listed shall constitute full compensation for furnishing all plant, labor, materials, and equipment, and performing any associated Contractor quality control, submittal procedures, environmental protection, storm water pollution prevention, meeting safety requirements, tests and reports, providing as-built drawings, for using the Government-furnished software (RMS) for electronic exchange of information and management of the contract (See Section 01312 QUALITY CONTROL SYSTEM), and for performing all work required for each of the unit price items.

1.2.2 Unit Price Items

a. "Test Hole"

(1) Payment will be made at the contract unit price for all costs associated with constructing the test hole, including all material, equipment, and labor required to drill and perform tests on the test hole, and all work incidental thereto.

(2) Depth shall be measured as the total linear distance between ground surface and bottom of the test hole. Test shall include well capacity, geotechnical analysis, water quality and

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DIVISION 02 - SITE WORK

SECTION 02521

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- 1.6 QUALIFICATIONS
- 1.7 TEST HOLES AND OBSERVATION WELLS
 - 1.7.1 Test Holes
 - 1.7.2 Sampling
 - 1.7.4 Sampling for Geotechnical Analysis
- 1.8 GEOPHYSICAL LOGGING
- 1.9 ABANDONMENT OF WELLS
- 1.10 NOTIFICATION
- 1.11 DELIVERY, STORAGE, AND HANDLING
- 1.12 SITE CONDITIONS

PART 2 PRODUCTS

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 - 2.1.1 Steel Casing and Couplings
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 - 2.2.1 Metal Screen
- 2.3 FILTER PACK
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 - 2.5.1 Cement Grout
 - 2.5.2 Bentonite Grout
- 2.6 PERMANENT PUMP

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- 3.2 PREPARATION
 - 3.2.3 Water Source
- 3.3 WELL CONSTRUCTION
 - 3.3.1 Setting Outer Casing
 - 3.3.3 Construction of Inner Casing and Screen
 - 3.3.4 Construction of Filter Pack
- 3.4 WELL DEVELOPMENT
 - 3.4.1 Jetting
 - 3.4.3 Surging
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 - 3.5.1 Capacity Test
 - 3.5.2 Test for Plumbness and Alignment
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-- End of Section Table of Contents --

SECTION 02521

WATER WELLS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A 53/A 53M	(2002) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 139	(2000) Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
ASTM A 312/A 312M	(2002) Seamless and Welded Austenitic Stainless Steel Pipes
ASTM A 409/A 409M	(2001) Welded Large Diameter Austenitic Steel Pipe for Corrosive or High-Temperature Service
ASTM C 136	(2001) Sieve Analysis of Fine and Coarse Aggregates
ASTM C 150	(2002a) Portland Cement
ASTM D 1586	(1999) Penetration Test and Split-Barrel Sampling of Soils
ASTM D 1587	(2000) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D 1785	(1999) Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2216	(1998) Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D 2239	(2001) Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
ASTM D 2487	(2000) Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D 2488	(2000) Description and Identification of Soils (Visual-Manual Procedure)

ASTM D 4318 (2000) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D 4750 (1987; R 2001) Determining Subsurface Liquid Levels in a Borehole or Monitoring Well (Observation Well)

ASTM D 5079 (2002) Preserving and Transporting Rock Core Samples

ASTM D 5088 (2002) Decontamination of Field Equipment Used at Nonradioactive Waste Sites

ASTM D 5299 (1999) Decommissioning of Ground Water Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities

ASTM D 5521 (1994el)Development of Ground-Water Monitoring Wells in Granular Aquifers

ASTM D 5608 (2001) Decontamination of Field Equipment Used at Low Level Radioactive Waste Sites

ASTM F 480 (2002) Thermoplastic Well Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40 AND SCH 80

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA EWW (1998) Standard Methods for the Examination of Water and Wastewater

AWWA A100 (1997) Water Wells

AWWA B300 (1999) Hypochlorites

AWWA B301 (1999) Liquid Chlorine

AWWA C200 (1997) Steel Water Pipe - 6 In. (150 mm) and Larger

AWWA C206 (1997) Field Welding of Steel Water Pipe

AWWA C210 (1997) Liquid-Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines

AWWA C654 (1997) Disinfection of Wells

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 5L (2000) Line Pipe

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

49 CFR 172 Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response

Information, and Training Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-79/020

(1983) Methods for Chemical Analysis of
Water and Wastes

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE TR GL-85-3

(1985) Geotechnical Descriptions of Rock
and Rock Masses

1.3 GENERAL REQUIREMENTS

The well shall be located as shown, and be constructed in accordance with these specifications. The well shall be installed to prevent aquifer contamination by the drilling operation and equipment, intra- and inter-aquifer contamination, and vertical seepage of surface water adjacent to the well into the subsurface, especially the well intake zone.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Installation Diagrams; G

As-built installation diagram for the well installed, prepared by the Contractor provided geologist during well installation operations, within 10 working days of the completion of the well installation procedure.

SD-03 Product Data

Well Installation Plan; G

A plan as specified in paragraph WELL INSTALLATION PLAN describing the drilling methods, sampling, and well construction and well development 14 calendar days prior to beginning drilling operations. Mobilization activities may start prior to submittal of the plan. The plan shall be approved and signed by an experienced geologist as specified in paragraph QUALIFICATIONS.

Well Material; G

Catalog data, and name of supplier, for well screens (to include the screen slot size), casing, riser pipe, filter pack material, bentonite, cement, centralizers, surface protective covers, well vaults, locking caps, airline oil filters for pneumatic drilling, dedicated sampling equipment, pumps, and chemical specifications on drill lubricants, tracers, disinfecting agents, and drill fluid additives, if used. Catalog data shall include any information, written or otherwise, supplied by the manufacturers or suppliers

of the above listed items.

Qualifications; G

Personnel qualification documentation.

Site Conditions; G

A copy of all permits, licenses, or other legal requirements necessary for execution of the work shall be furnished 10 working days before commencement of the work.

Geophysical Logging; G

The Contractor shall prepare a graphic boring log to scale showing the required details. Five prints of the boring log drawing shall be submitted within 5 working days after completion of the test hole. This drawing shall be used for determining the well design, design of the filter pack, well screen location and screen openings.

SD-06 Test Reports

Well Development Records

A well development record, for the well, shall be submitted within 10 working days of the completion of development.

Geophysical Logs

Interpreted geophysical logs shall be submitted within 10 working days of the completion of said logging.

Decommissioning/Abandonment Records

A well decommissioning record, for each well, or test hole abandoned, shall be submitted within 10 working days of the completion of the abandonment procedure.

Other Records

The Contractor shall also submit waterwell driller's logs and waterwell decommissioning forms, and shall register the well with the State of Mississippi as required.

Project Photographs

Before, during, and after completion of the work, the Contractor shall take photographs of the well installation site. Photographs shall also be taken of any rock that is cored at the site.

Filter Pack

Filter pack material test results; sieve and chemical analyses, shall be submitted within 10 working days after completion of the test hole.

Tests

Test Reports, including capacity, plumbness and alignment, quality, and sand, within 48 hours following the conclusion of each test.

SD-07 Certificates

Casing

Cement and Bentonite Grout

Air line and gauge

Drilling mud

Water meter

Well Screens

Water removed

Graveling equipment list

Construction of Filter Pack

1.5 WELL INSTALLATION PLAN

The following requirements shall be incorporated into the Contractor's Well Installation Plan and followed in the field. The plan shall include, but shall not be limited to, a discussion of the following:

- a. Description of well drilling methods, and installation procedures, including any temporary casing used, placement of filter pack and seal materials, drill cuttings and fluids disposal, and soil/rock sample disposition.
- b. Description of well construction materials, including well screen, riser pipe, centralizers, air line and gauge, tailpiece (if used), filter pack and filter pack gradation, bentonite or drilling mud, drilling fluid additives (if used), drilling water, cement, and well protective measures.
- c. Description of quality control procedures to be used for placement of filter pack and seals in the boring, including depth measurements.
- d. Forms to be used for written boring logs, installation diagrams of wells, geophysical logs, well development records, well sampling data records, state well registration forms, and well abandonment records.
- e. Description of contamination prevention and well materials and equipment decontamination procedures.
- f. Description of protective cover surface completion procedures, including any special design criteria/features relating to frost heave prevention. The maximum frost penetration for the site shall be included in this description.
- g. Description of well development methods to be used.

- h. List of applicable publications, including state and local regulations and standards.
- i. List of personnel assignments for this project, and personnel qualifications.
- j. Description of well decommissioning/abandonment procedures.
- k. Description of well capacity testing techniques.
- l. Description and discussion of geophysical techniques to be employed at the site.
- m. Description of permanent pump to be installed, and discussion of pump operating tests to be employed at the site.
- n. Description of specific methods to be employed to control potential contamination or pollution arising from well installation activities.

1.6 QUALIFICATIONS

~~A qualified geologist with the Federal Government will be on-site to observe the drilling, well installation, development and testing activities. The Government geologist will be responsible for completing borehole logs and collecting samples. Geophysical well logging will be performed by the Mississippi Department of Environmental Quality. Coordinating and scheduling of the geophysical well logging activity will be the responsibility of the on-site Government geologist.~~ The Contractor shall provide a geologist with at least 3 years experience in soil and rock logging, and well installation. The geologist shall be on site and responsible for all geophysical and borehole logging, drilling, well installation, developing and testing activities. The driller shall be licensed in the state of Mississippi, according to the state requirements. Geophysical log interpretation shall be done by a qualified log analyst. The log analyst shall be able to demonstrate competence through background, training, and experience when so called upon. The Contractor shall have a minimum of 3 years of well installation experience.

1.7 TEST HOLES AND OBSERVATION WELLS

1.7.1 Test Holes

Before starting construction of the well, a test hole of at least 8 inches in diameter shall be drilled at the location of the well into the target water bearing strata as directed by the Contracting Officer. Test holes should be drilled in a manner to protect the subsurface from surface contamination. Test holes should be carefully advanced and sampled to determine the presence of the upper aquiclude if one exists. The boring should then be properly cased, grouted, and sealed into the aquiclude before the boring is advanced through the aquiclude into the aquifer. The test hole shall be used to determine the expected yield from the well, water quality, optimum depth, and to log the strata encountered. Before conducting a capacity test, the well shall be cased, and screened in accordance with these specifications. Test holes shall be logged in accordance with paragraph BOREHOLE LOGS. A temporary casing may be used. If used, the temporary casing shall be seated at the top of the stratum being tested. The test hole shall be converted to the permanent well, in

accordance with these specifications.

1.7.2 Sampling

1.7.4 Sampling for Geotechnical Analysis

Samples shall be taken of all materials penetrated by each drilled well/test hole. Drill cutting samples shall be collected at ten foot intervals from ground surface to total depth of the boring/well. These samples ~~will~~shall be utilized for the sieve analysis to determine the size of the filter pack. Representative soil samples ~~will~~shall be collected by the on-site ~~Government~~ geologist provided by the Contractor. Samples ~~may~~shall be obtained continuously through the area expected to be screened. The Contractor shall provide sieve analyses of sampled material collected in the area to be screened. Sieve analyses shall be conducted in accordance with ASTM C 136. The gradation of the natural formation shall be determined by the Contractor through the use of sieve analyses performed on formation samples taken from the areas to be screened. Sampled materials shall be placed in airtight containers and labeled as specified in paragraph SAMPLE CONTAINERS. Samples shall be delivered to the Contracting Officer designated facility. Representative soil samples shall be tested for grain-size distribution by mechanical means (sieves down to the No. 200 size according to ASTM C 136), moisture content according to ASTM D 2216 and Atterberg limits according to ASTM D 4318. Description and identification of soils shall be done in accordance with ASTM D 2488. Laboratory classification of soils shall be done in accordance with ASTM D 2487. Sampling shall be performed to allow completion of the documents described in paragraph BOREHOLE LOGS.

1.8 GEOPHYSICAL LOGGING

The total depth of the test hole drilled shall be geophysically logged. Geophysical logging shall be documented in accordance with paragraph Geophysical Logs. The Contractor shall run one successful natural gamma ray or gamma-gamma for the full depth, (top to bottom of test hole); one successful (top to bottom of test hole) spontaneous potential (self-potential); and one successful (top to bottom of test hole) resistivity log, for the test hole. Log analyses and interpretations ~~will~~shall be made by ~~the on-site Government geologist~~ a person qualified in accordance with paragraph QUALIFICATIONS.

1.9 ABANDONMENT OF WELLS

If the Contractor fails to construct a well of the required capacity, or if the well is abandoned because of loss of tools, or for any other cause, the Contractor shall abandon the hole as specified in paragraph WELL DECOMMISSIONING/ABANDONMENT.

1.10 NOTIFICATION

The Contracting Officer shall be notified 10 days prior to drilling. The Contractor shall be responsible for contacting the State of Mississippi in accordance with the applicable reporting requirements. Before beginning work, the local United States Geological Survey office (USGS) and the State Geological Agency, and state health department shall be notified of the type and location of wells to be constructed, the method of construction and anticipated schedule for construction of the wells.

1.11 DELIVERY, STORAGE, AND HANDLING

Well materials shall be stored and maintained in a clean, uncontaminated condition throughout the course of the project. Filter pack material shall not be allowed to freeze before installation.

1.12 SITE CONDITIONS

Access to the well site, including any utility clearance, permits, licenses, or other requirements and the payment thereof necessary for execution of the work, is the responsibility of the Contractor. Obtaining rights-of-entry is the responsibility of the Government. The Contractor shall visit the proposed well location to observe any condition that may hamper transporting equipment or personnel to the site. If clearing, or relocation is necessary, the Contractor and the Contracting Officer shall agree on a suitable clearing, or relocation plan, and the location of any required access road.

PART 2 PRODUCTS

2.1 CASING

All casing, screen, and other well material shall be of compatible materials to prevent galvanic reaction between components of the completed well.

2.1.1 Steel Casing and Couplings

Steel casing shall be new standard weight black steel pipe, conforming to ASTM A 53/A 53M or API Spec 5L, Grade A or B and shall be nominal 12 inch diameter, 1/4 inch wall thickness. Joints shall be either threaded and coupled, or field welded in accordance with AWWA C206. Inside wall of outside casing shall be coated with two coats of epoxy coating meeting requirements of AWWA C210. The inner casing or lap pipe shall be nominal 8-inch diameter and shall be type 304 stainless steel conforming to ASTM A 409/A 409M schedule 40.

2.2 WELL SCREENS

Well Screens shall be a minimum of 8 inches nominal diameter, and shall be directly connected to the bottom of the inner casing by an approved method. The length of the screen shall be sufficient to provide an intake area capable of passing not less than the minimum required yield of the well, at an entrance velocity not exceeding 0.1 fps. The opening, or slot size of the screen, ~~will~~shall be determined by the ~~Contracting Officer~~Contractor and designed based on analysis of the distribution of the grain size of the artificial filter pack, be compatible with the material surrounding the screen, and shall be submitted for approval as part of the well installation plan. The well screen shall be of sufficient size and design to hold back and support the gravel used in the filter pack envelope. The screen and all accessories required for satisfactory operation shall be essentially standard products of manufacturers regularly engaged in the production of such equipment. Field constructed screen is not acceptable. "Blanks" in the well screen may be utilized in nonproductive zones, or where centering devices are needed in the screened area, and shall be considered "casing." The bottom section, below the screen, shall be fitted with a properly sized non-corrosive metal back pressure valve to permit washing and prevent inflow of sand.

2.2.1 Metal Screen

Metal screen shall be of an approved rod-based and wire-wrapped type and shall be type 304 stainless steel, conforming to the applicable requirements of AWWA A100. A wire-wound screen manufactured with supporting bars or core of material different from the wire will not be acceptable. Joints shall be made of threaded couplings of the same material as the screens.

2.3 FILTER PACK

~~The Contracting Officer, based upon the results of the sieve analysis from paragraph SAMPLING, will provide the Contractor with the filter gradation for the well.~~ Filter pack material shall be a product of a commercial sand and gravel supplier, shall be properly sized and graded for the surrounding soil encountered, and shall be composed of clean, round, hard, waterworn siliceous material, free of flat or elongated pieces, organic matter, or other foreign matter. The filter material shall be of a size which will allow the maximum flow of water into the well and prevent the infiltration of sand and silt. The gradation of the filter material shall be such that the uniformity coefficient is not more than 2.5. The filter material shall be thoroughly sterilized with 100 mg/l chlorine solution immediately before being placed in the well.

2.5 CEMENT AND BENTONITE GROUT

2.5.1 Cement Grout

Cement grout shall consist of Portland cement conforming to ASTM C 150, Type I or II, sand and water. Cement grout shall be proportioned not to exceed 2 parts, by weight, of sand to 1 part of cement with not more than 6 gallons of water per 94 lb bag of Portland cement, with a mixture of such consistency that the well can be properly grouted. No more than 5 percent by weight of bentonite powder may be added to reduce shrinkage. The cement grout shall weight at least 14 pounds per gallon.

2.5.2 Bentonite Grout

High-solids bentonite grout shall be made from sodium bentonite powder and/or granules. Water from an approved source shall be mixed with these powders or granules to form a thick bentonite slurry. The slurry shall consist of a mixture of bentonite and the manufacturer's recommended volume of water to achieve an optimal seal. The slurry shall contain at least 20 percent solids by weight and have a density of 9.4 lb/gallon of water or greater.

2.6 PERMANENT PUMP

Permanent pump shall be an approved vertical turbine pump with a capacity sufficient to deliver 400 gpm and as specified in Section 11212 PUMPS: WATER VERTICAL TURBINE.

PART 3 EXECUTION

3.1 PROTECTION OF EXISTING CONDITIONS

The Contractor shall maintain existing survey monuments and wells, and protect them from damage from equipment and vehicular traffic. Any items damaged by the Contractor shall be repaired by the Contractor. Wells requiring replacement due to Contractor negligence shall be re-installed

according to these specifications. Wells scheduled for abandonment shall be protected from damage so that abandonment may be performed according to these specifications. Prior to excavation, the Contractor shall obtain written approval from the local utility companies to drill at each site, to avoid disturbing buried utilities.

3.2 PREPARATION

3.2.3 Water Source

All water used in the drilling operation shall be obtained by the Contractor from sources of proven satisfactory bacteriological quality. It shall be the responsibility of the Contractor to make his own arrangements for providing water at the drilling site. The Government will provide water at no cost at the nearest available outlet.

3.3 WELL CONSTRUCTION

The drilling method shall be as approved by the Contracting Officer and shall conform to all state and local standards for water well construction. The execution of the work shall be by competent workmen and shall be performed under the direct supervision of an experienced well driller. The drilling method shall prevent the collapse of formation material against the well screen and casing during installation of the well. The inside diameter of any temporary casing used shall be sufficient to allow accurate placement of the screen, riser, centralizer(s), filter pack, seal and grout. Casing pipe, well screens, and joint couplings shall be of compatible materials throughout the well. The well shall be a filter pack well activated in the stratum based on test hole data. The well shall be drilled straight, plumb, and circular from top to bottom. The well shall be initially drilled from the ground surface to the uppermost level of the water bearing strata and the bottom of the outer casing set at this elevation. The hole below the outer casing shall penetrate the water bearing stratum a sufficient depth to produce the required amount of water without causing excessive velocities through the aquifer. During construction of the well, precautions shall be used to prevent tampering with the well or entrance of foreign material. Runoff shall be prevented from entering the well during construction. If there is an interruption in work, such as overnight shutdown or inclement weather, the well opening shall be closed with a watertight uncontaminated cover. The cover shall be secured in place or weighted down so that it cannot be removed except with the aid of the drilling equipment or through the use of drill tools.

3.3.1 Setting Outer Casing

The outer casing shall not be less than 12 inches in diameter. The hole shall be of sufficient size to leave a concentric annular space of not less than 2-1/2 inches and not more than 6 inches between the outside of the outer casing and the walls of the hole. The annular space between the outer casing and the walls of the holes shall be filled with cement grout. Acceptable methods of grouting are detailed in AWWA A100; the approved method shall specify the forcing of grout from the bottom of the space to be grouted towards the surface. A suitable grout retainer, packer, or plug shall be provided at the bottom of the inner casing so that grout will not leak into the bottom of the well. Grouting shall be done continuously to ensure that the entire annular space is filled in one operation. After grouting is completed, drilling operations shall not be resumed for at least 72 hours to allow proper setting of the grout.

3.3.3 Construction of Inner Casing and Screen

After the grout has set, the hole below the outer casing shall be reamed at the required diameter, to the required depth, by an approved method which will prevent caving of the hole before or during installation of the filter pack, well screen and inner casing. In lieu of reaming, the entire well may be drilled to the diameter of the filter pack with an annular space between the inner casing and outer casing equal to the thickness of the filter pack. The outer casing shall be increased in size to provide for this space, if this option is elected. The well screen and inner casing shall be firmly attached, and lowered into the hole by a method which will allow for control of the rate of fall of the well screen and inner casing at all times. Well screen and inner casing shall not be dropped or allowed to fall uncontrolled into the hole. The inner casing shall be as shown on the drawings. Approved centering devices shall be installed at a spacing of 120 degrees, between the outer casing and inner casing prior to well construction at intervals not exceeding 25 feet along the length.

3.3.4 Construction of Filter Pack

After the screen and inner casing have been concentrically set in the hole below the outer casing, the approved filter pack shall be constructed around the screen by filling the entire space between the screen and the wall of the hole in the water bearing stratum with filter pack material. A tremie pipe having an inside nominal diameter of not less than 1-1/2 inches shall be lowered to the bottom of the well between the hole and screen. The tremie pipe shall be arranged and connected, at the surface of the ground, to water pumping and graveling equipment so that water and filter material, fed at uniform rates, are discharged as the filter material fills the hole from the bottom up. The tremie pipe shall be raised at a rate that will keep the bottom of the pipe no more than 3 feet above the filter material level at all times. If the Contractor desires to use methods of placing filter material other than those specified, the details of the method and equipment proposed shall be submitted to the Contracting Officer, before filter pack placement is begun; however, dumping filter pack material from the surface of the ground and agitating the well in an effort to settle the filter will not be allowed. The filter pack shall be installed continuously and without interruption until the filter pack has been placed to within 1 foot of the top of the inner casing. The depth to the top of the filter pack shall be directly measured, and recorded. Any water added to the filter pack material shall be obtained in accordance with paragraph Water Source. Filter pack material shall be protected from contamination prior to placement by either storing it in plastic lined bags, or in a location protected from the weather and contamination on plastic sheeting. Filter pack material shall not be allowed to freeze before installation. Filter pack material shall be transported to the well site in a manner which prevents contamination by other soils, oils, grease, and other chemicals. Temporary drill casing, if installed, or hollow stem auger, shall be removed simultaneously with the above operation. Filter pack material shall be placed in no greater than 3 foot lifts prior to retraction of the temporary casing/auger. A minimum of 6 inches of filter pack shall remain in the temporary casing/auger at all times during filter pack installation. Frequent measurements shall be made inside the annulus during retraction to ensure that the filter pack is properly placed.

3.4 WELL DEVELOPMENT

Within 7 days of completion of the well, but no sooner than 48 hours after cement grouting is completed, the well shall be developed. The well shall

be developed in accordance with the Well Installation Plan, by approved methods until the water pumped from the well is substantially free from sand, and until the turbidity is less than 5 NTU (nephelometer turbidity units). Developing equipment shall be of an approved type and of sufficient capacity to remove all cutting fluids, sand, rock cuttings, and any other foreign material. The well shall be thoroughly cleaned from top to bottom before beginning the well tests. Development shall be performed using only mechanical surging, over pumping, or jetting, or a combination thereof per ASTM D 5521. Details of the proposed development method shall be included in the Well Installation Plan. At the time of development of any well, the well shall be free of drawdown or surcharge effects due to pump testing, developing or drilling at another location. The Contractor shall be responsible for maintaining at the well site the needed access and work area and clearance, necessary to accomplish development. The Contractor shall furnish, install, or construct the necessary discharge line and troughs to conduct and dispose of the discharge a sufficient distance from the work areas to prevent damage. Development shall be conducted to achieve a stable well of maximum efficiency and shall be continued until a satisfactory sand test, as specified in paragraph Sand Test, is obtained. During predevelopment of the well, filter pack material shall be added to the annular space around the screen to maintain the top elevation of the filter pack to the specified elevation. The Contractor shall provide an open tube or other approved means for accurately determining the water level in the well under all conditions. If, at any time during the development process it becomes apparent in the opinion of the Contracting Officer that the well may be damaged, development operations shall be immediately terminated. The Contracting Officer may require a change in method if the method selected does not accomplish the desired results. The Contracting Officer may order that wells which continue to produce excessive amounts of fines after development for 6 hours be abandoned, plugged, and backfilled, and may require the Contractor to construct new wells nearby. All materials pulled into the well by the development process shall be removed prior to performing the pumping test.

3.4.1 Jetting

Jetting should be performed using either a single or double ring jet. If a double ring jet is used the rings should be 2 feet apart. The jetting tool shall be constructed of high-strength material and conservatively designed and proportioned so that it will withstand high pressures. The jetting tool shall have two 1/4 inch diameter hydraulically balanced nozzles spaced 180 degrees apart or four 1/4 inch diameter holes spaced 90 degrees apart and which shall exert the jetting force horizontally through the screen slots. The rings shall be constructed such that the tips of the jets shall be within 1/2 inch from the inner surface of the well screen. The pump used in conjunction with the jetting tool shall be capable of providing pressures up to 250 psi. Prior to commencing jetting, and following each jetting cycle, all sand and/or other materials shall be removed from inside the screen. The jetting process shall start at the bottom of the screen and consist of rotating the jetting tool slowly while rotating the pipe 180 degrees for two minutes at each location then raising the pipe 6 inches. All wells, more than 4 inches in diameter, shall be pumped during the jetting cycle to remove incoming sand and other material. Such pumping shall be at a rate not less than 115 percent of the rate at which fluid is introduced through the jetting tool. This will allow a flow of material into the well as it is being developed. Water used for development shall be free of sand. The contracting officer may require other means of developing the well such as intermittent pumping method, variation of the intermittent pumping method, or surge block if it appears that the

development of the well is not producing the desired results.

3.4.3 Surging

Surging of the well shall require use of a circular block, or multiple blocks, which are approximately 1 inch smaller in diameter than the inside diameter of the well and is constructed of a material which will not damage the screen if the block comes in contact with the screen, and a bailer or pump to remove materials drawn into the well. The surging shall be continued for a period of approximately one hour, or until little or no additional material from the foundation or filter pack can be pulled through the screen. The surge block shall be moved by a steady motion up and down the full length of the well screen. Prior to commencing surging, and periodically during development by this method, all sand and/or other materials shall be removed from inside the screen. All materials pulled into the well by the surging process shall be removed by the Contractor.

3.4.4 Well Development Criteria

A well development record shall be maintained in accordance with paragraph Well Development Records. Development is complete when all of the following criteria are met:

- a. Well water is clear to the unaided eye, and turbidity less than or equal to 5 Nephelometric Turbidity Units (NTUs),
- b. Sediment thickness in the well is less than 0.1 foot,
- c. A minimum of three times the standing water volume in the well is removed plus three times the volume of all added water and drilling fluid lost during drilling and installation of the well is removed, and
- d. Temperature, specific conductivity, pH, oxidation-reduction potential (ORP), dissolved oxygen (DO), and turbidity readings, measured before, twice during and after development operations, have stabilized. Stabilization shall mean variation of less than 0.2 pH units, variation of plus or minus ± 1 degree Fahrenheit; ± 3 percent change in specific conductance; and less than a ± 10 mV for ORP; and ± 10 percent for DO, and turbidity, measured between three consecutive readings with one casing volume of water removed between each reading. ORP shall be determined in accordance with AWWA EWW. Temperature, specific conductance, DO, turbidity, and pH readings shall be conducted in accordance with EPA 600/4-79/020. At completion of well development, approximately 1 pint of well water shall be collected in a clear glass jar. The jar shall be labeled with project name, well number and date; and photographed using 35 mm color print film. The photograph (minimally 5 x 7 inch) shall be a suitably backlit close-up which shows the clarity of the water and any suspended sediment. The photograph and negative shall become a part of the well development record. Water removed during development and testing operations shall be discharged to the ground surface at least 50 feet from the well in a down gradient area.

3.5 TESTS

After the well has been developed, the Contractor shall notify the Government and shall make the necessary arrangements for conducting the

capacity tests. If the capacity test indicates that the required capacity can be obtained, the tests for quality of water shall be made. If the capacity and quality tests indicate that the required capacity and quality can be obtained, the permanent well, as specified, shall be completed at that depth. Prior to making quality tests, drilling equipment, tools and pumps contacting well water shall be cleaned with live steam.

3.5.1 Capacity Test

The Contractor shall furnish and install an approved temporary test pump, with discharge piping of sufficient size and length to conduct the water being pumped to point of discharge, and equipment necessary for measuring the rate of flow and water level in the well. A 24 hour constant-rate capacity test shall be run with the pumping rate and drawdown at the pump well recorded 1/2 minute during the first 5 minutes after starting the pump; then every 5 minutes for an hour; then every 20 minutes for 2 hours. From this point on, readings taken at hourly intervals, until the water level stabilizes, shall be sufficient. If this capacity cannot be maintained for the test period, the capacity test shall be terminated and the test hole drilled deeper or relocated as directed. When the pump is shut off, water level readings shall be taken during the rebound period for the same intervals of time as the drawdown test. The record of the test, in triplicate, shall be delivered to the Contracting Officer.

3.5.2 Test for Plumbness and Alignment

Upon completion of the permanent well, plumbness and alignment shall be tested by lowering into the well, to the total depth of the well, a plumb 40 feet long or a dummy of the same length. The outer diameter of the plumb shall not be more than 1/2 inch smaller than the diameter of that part of the hole being tested. If a dummy is used, it shall consist of a rigid spindle with three rings, each ring being 12 inches wide. The rings shall be cylindrical and shall be spaced one at each end of the dummy and one in the center. The central member of the dummy shall be rigid so that it will maintain the alignment of the axis of the rings. The dummy shall be decontaminated as specified in paragraph Decontamination, before use. If the plumb or dummy fail to move freely throughout the length of the casing or well screen for the depth of well or should the well vary from the vertical in excess of two-thirds the inside diameter of that part of the well being tested for each 100 feet of depth, the plumbness and alignment of the well shall be corrected by the Contractor. If the faulty alignment and plumbness is not correctable, as determined by the Contracting Officer, the well shall be abandoned as specified in paragraph WELL DECOMMISSIONING/ABANDONMENT and a new well drilled at no additional cost to the Government.

3.5.3 Test for Quality of Water

When the capacity test in the test hole has been completed, and again after the yield in the permanent well and drawdown test or capacity test have been completed, the Contractor shall secure samples of the water in suitable containers, and of sufficient quantity, to have bacterial, physical, and chemical analyses made by a Mississippi State Department of Health approved laboratory, except that the bacterial analysis may be made by the applicable State Board of Health, if desired. Water Quality Analysis shall address each item specified in the Water Quality Analysis Table at the end of this section. Expenses incident to these analyses shall be borne by the Contractor and the results of the analyses shall be furnished to the Contracting Officer. All sampling and analyses shall be

performed using EPA and State approved methods, procedures, and holding times.

3.5.4 Sand Test

As part of each capacity test, or at the end of each intermittent pumping, a determination of the amount of sand (filter pack and/or foundation material) a well is producing shall be performed. Prior to starting the sand test all material shall be removed from the bottom of the tailpipe. The Contractor shall test the well by pumping at a rate of 400 gpm. After the pump is at the desired pumping rate the flow from the discharge shall be diverted into a container that will collect all the sand being carried by the water. Development of the well is satisfactory if the amount of sand collected is less than 1 pint per 25,000 gallons of water pumped at the specified rate. Upon completion of the test the amount of sand in the tailpipe shall be determined to verify that no material is being deposited in the bottom of the well.

3.6 INSTALLATION OF PERMANENT PUMP

The permanent well pump shall be installed in the well at a minimum depth of 30 feet below the maximum drawdown groundwater level after the drawdown test has been completed. The pump shall be secured at the required elevation as recommended by the pump manufacturer. After installation of the pumping units and appurtenances is complete, operating tests shall be carried out to assure that the pumping installation operates properly. Tests shall assure that the pumping units and appurtenances have been installed correctly, that there is no objectionable heating, vibration, or noise from any parts, and that all manual and automatic controls function properly.

3.7 DISINFECTING

After completion of tests of well, or installation of permanent pump, or at time of tests for yield and drawdown test, whichever is later, the well shall be disinfected by adding chlorine, conforming to AWWA B301, or hypochlorite, conforming to AWWA B300, in sufficient quantity so that a concentration of at least 50 ppm of chlorine shall be obtained in all parts of the well. Chlorine solution shall be prepared and introduced into the well in an approved manner and shall remain in the well for period of at least 12 hours but not more than 24 hours. Information on methods for preparing chlorine solution and introducing it into the well may be found in AWWA C654. After the contact period, the well shall be pumped until the residual chlorine content is not greater than 1.0 ppm. The well shall be pumped to waste for an additional 15 minutes with less than 1 ppm chlorine residual after which two samples shall be taken not less than 30 minutes apart and tested for the presence of coliform bacteria. The well shall be disinfected and re-disinfected as may be required until two consecutive samples of water are found upon test to be free from Coli Acrogenes group of organisms.

3.9 SITE CLEAN-UP

After completion of the work, tools, appliances, surplus materials, temporary drainage, rubbish, and debris incidental to work shall be removed. Excavation and vehicular ruts shall be backfilled and dressed to conform with the existing landscape. Utilities, structures, roads, fences, or any other pre-existing item which must be repaired or replaced due to the Contractor's negligence shall be the Contractor's responsibility;

repair or replacement shall be accomplished prior to completion of this contract.

3.10 DRILLING WASTE DISPOSAL

Slurry, drill cuttings, rock core; other solid or liquid material bailed, pumped, or otherwise removed from the borehole during drilling, installation, completion, and well development procedures; and fluids from material/equipment decontamination activities shall be disposed of by spreading onsite and shaped to drain.

3.11 SURVEYS

Coordinates and elevations shall be established for each well/test hole. Horizontal coordinates shall be determined to the closest 1.0 foot and referenced to the State Plane Coordinate System, or Universal Transverse Mercator (UTM). If the State Plane Coordinate System/UTM is not readily available, an existing local grid system shall be used. A ground elevation to the closest 0.1 foot shall be obtained at the well. The highest point on the top of the riser pipe will serve as a measurement point. The elevation of the well shall reference this point, and shall be surveyed to the nearest 0.01 foot using the National Geodetic Vertical Datum of 1929. If the datum is not readily available, the existing local vertical datum shall be used. The location, identification, coordinates, and elevations of the well and monuments shall be plotted on maps with a scale large enough to show their location with reference to other structures.

3.12 WELL DECOMMISSIONING/ABANDONMENT

Any well disapproved by the Contracting Officer, or any well decommissioned/abandoned by the Contractor for any reason shall be decommissioned/abandoned according to the requirements of the State of Mississippi, and the requirements of these specifications. Well decommissioning/abandonment includes the removal of all materials left in the borehole/well, excluding the filter pack, and including backfill materials, casing, screen, and any other material placed into the hole before the decision was made to abandon the borehole/well. Test holes decommissioned/abandoned for any reason shall be grouted from the bottom to within 1 foot of the top of the ground surface according to the protocol for grout/bentonite placement established in paragraph Grout Placement, using the grout mix specified in paragraph CEMENT AND BENTONITE GROUT. The top 1 foot shall be backfilled with material appropriate for the intended land use. The Contractor shall maintain a well decommissioning/abandonment record as specified in paragraph Well Decommissioning/Abandonment Records. Groundwater levels, if encountered before the decision is made for decommissioning/abandonment, shall be measured in all borings prior to backfilling. These water levels shall be included in the well decommissioning/abandonment records. No well shall be decommissioned/abandoned without the approval of the Contracting Officer.

3.13 DOCUMENTATION AND QUALITY CONTROL REPORTS

The Contractor shall establish and maintain documentation and quality control reports for well construction and development to record the desired information and to assure compliance with contract requirements, including, but not limited to, the following:

3.13.1 Borehole Logs

A borehole log shall be completed for each boring drilled. Borehole logs shall be prepared by the ~~Government~~ geologist present onsite during all well drilling and installation activities. The log scale shall be 1 inch equals 20 feet. Copies of complete well logs shall be kept current in the field at the well site and shall be available at all times for inspection by the Contracting Officer. Information provided on the logs shall include, but not be limited to, the following:

- a. Name of the project and site.
- b. Boring/well identification number.
- c. Location of boring (coordinates, if available).
- d. Make and manufacturer's model designation of drilling equipment and name of drilling firm.
- e. Date boring was drilled.
- f. Reference data for all depth measurements.
- g. Name of driller and name and signature of geologist preparing log.
- h. Nominal hole diameter and depth at which hole diameter changes.
- i. Total depth of boring.
- j. Method of drilling, including sampling methods and sample depths, including those attempted with no recovery. Indication of penetration resistance such as drive hammer blows given in blows per 6 inches of driven sample tubes. Information shall include hammer weight and drop distance. Information such as rod size, bit type, pump type, etc., shall be recorded. A description of any temporary casing used, drill fluids and fluid additives used, if any, including brand name and amount used, along with the reason for and start (by depth) of its use shall be included. If measured, mud viscosities and weight shall be recorded.
- k. Depth of each change of stratum. If location of strata change is approximate, it shall be so stated.
- l. Description of the material of which each stratum is composed, in accordance with ASTM D 2488, and/or standard rock nomenclature in accordance with COE TR GL-85-3, as necessary. Soil parameters for logging shall include, but shall not be limited to, classification, depositional environment and formation, if known, Unified Soil Classification Symbol, secondary components and estimated percentages, color, plasticity, consistency (cohesive soil), density (non-cohesive soil), moisture content, structure and orientation, and grain angularity. Rock core parameters for logging shall include, but shall not be limited to, rock type, formation, modifier denoting variety (shaly, calcareous, siliceous, etc.), color, hardness, degree of cementation, texture, crystalline structure and orientation, degree of weathering, solution or void conditions, primary and secondary permeability, and lost core. The results of any chemical field screening shall also be included on the boring log. Classification shall be prepared in the field at the time of sampling. The results of visual observation of the material encountered, and any unusual

odor detected shall also be duly noted and recorded.

- m. Depth of any observed fractures, weathered zones, or any abnormalities encountered.
- n. Depth and estimated percent of drill fluid loss or lost circulation. Measures taken to regain drill water circulation. Significant color changes in the drilling fluid return.
- o. Depth to water, and any non-aqueous phase liquids (NAPLs) and date measured before, during, and after each drilling shift, and prior to well installation. The Contractor shall provide and maintain at the well under construction a portable water, level measuring device of sufficient length to measure the water level to 150 foot depth. The device shall be available onsite at all times and measuring wire shall be graduated in 0.01 foot. The method of measuring the liquid level shall be noted on the boring log. Water level measurements shall be taken to the nearest 0.01 foot. It shall be noted on the boring log if the boring was purged and allowed to recover at intervals during the installation, or that water used in drilling was allowed to dissipate into the formation prior to measuring the water level.
- p. Box or sample number. Depths and the number of the core boxes and/or samples shall be recorded at the proper interval.
- q. Percent Rock Core Recovery. The percent core recovery for the individual drill runs, if rock is cored, shall be shown.

3.13.2 Installation Diagrams

The well will not be accepted before the geologic logs and installation diagrams are received. The diagram shall illustrate the as-built condition of the well and include, but not be limited to, the following items:

- a. Name of the project and site.
- b. Well identification number.
- c. Name of driller and name and signature of the geologist preparing diagram.
- d. Date of well installation.
- e. Description of material from which the well is constructed, including well casing/riser pipe and screen material, centralizer composition, if used, diameter and schedule of casing and screen, gradation of filter pack, lithologic description, brand name (if any), source, and processing method, and method of placement of the filter pack, bentonite seal type (pellets, granules, chips, or slurry), grout type (cement or high-solids bentonite) and type of protective cover (protective casing or flush-to-ground), if used.
- f. Total depth of well.
- g. Nominal hole diameter.
- h. Depth to top and bottom of screen, and filter pack.

- i. Depth to top and bottom of any seals installed in the well boring (grout or bentonite).
- j. Type of cement and/or bentonite used, mix ratios of grout, method of placement and quantities used.
- k. Elevations/depths/heights of key features of the well, such as top of well casing/riser pipe, top and bottom of protective casing (if used), ground surface, the depth of maximum frost penetration (frost line), bottom of well screen, top and bottom of filter pack, and top and bottom of seal.
- l. Other pertinent construction details, such as slot size and percent open area of screen, type of screen, and manufacturer of screen.
- m. Well location by coordinates. A plan sheet shall also be included showing the coordinate system used and the location of the well. A plan sheet is not required for the well installation diagram; multiple wells may be shown on the same sheet.
- n. Static water level upon completion of the well.
- o. Special problems and their resolutions; e.g., grout in wells, lost casing, or screens, bridging, etc.
- p. Description of surface completion.

3.13.3 Well Development Records

A well development record shall be prepared for each well installed under the supervision of the geologist present during well installation operations. Information provided on the well development record shall include, but not be limited to, the following:

- a. Date, time, and elevation of water level in the well, before development.
- b. Depth to bottom of well, name of project and site, well identification number, and date of development.
- c. Method used for development, to include size, type and make of equipment, bailer, and/or pump used during development.
- d. Time spent developing the well by each method, to include typical pumping rate, if pump is used in development.
- e. Volume and physical character of water removed, to include changes during development in clarity, color, particulates, and odor.
- f. Volume of water added to the well, if any.
- g. Volume and physical character of sediment removed, to include changes during development in color, and odor.
- h. Source of any water added to the well.
- i. Clarity of water before, during, and after development. Nephelometric turbidity unit (NTU) measurements.

- j. Total depth of well and the static water level as per ASTM D 4750 from top of the casing, immediately after pumping/development, and 24 hours after development.
- k. Name and job title of individual developing well.
- l. Name and/or description of the disposal facility/area, for the waters removed during development.

3.13.4 Geophysical Logs

Geophysical logs shall be prepared and completed for each well/test hole installed. Information provided on the logs shall include, as a minimum, the following:

- a. Project name.
- b. Test hole/well identification number.
- c. Location of test hole (coordinates, and state, and county name).
- d. Date test hole was drilled.
- e. Fluid level in test hole before logging.
- f. Fluid type and temperature.
- g. Fluid resistance in ohm-m.
- h. Casing type, diameter, and elevation (top and bottom).
- i. Cement type and elevation (top and bottom).
- j. Screen type, diameter, and elevation (top and bottom).
- k. Date and time test hole was logged.
- l. Reference elevation for all depth measurements.
- m. Operator's name.
- n. Equipment name and address.
- o. Logger type and number.
- p. Tool type.
- q. Tool length, cable head to detector.
- r. Calibration.
- s. Logging speed ft/min.
- t. Log vert. scale ft/in.
- u. Module settings.
- v. Recorder settings.

Materials and Equipment;

A letter stating that where materials or equipment are specified to comply with requirements of UL, or other standards, written proof of such compliance has been obtained. The label or listing of the specified agency, or a written certificate from an approved, nationally recognized testing organization equipped to perform such services, stating that the items have been tested and conform to the requirements and testing methods of the specified agency are acceptable as proof.

Factory Inspection and Tests;

A certification that each engine generator set passed the factory tests and inspections and a list of the test and inspections.

Inspections;

A letter certifying that all facilities are complete and functional, that each system is fully functional, and that each item of equipment is complete, free from damage, adjusted, and ready for beneficial use.

Cooling System;

Certification that the engine-generator set and cooling system function properly in the ambient temperatures specified.

1.3 SYSTEM DESCRIPTION

Each engine-generator set shall be provided and installed complete and totally functional, with all necessary ancillary equipment to include air filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; and engine exhaust system. Each engine generator set shall satisfy the requirements specified in the Engine Generator Parameter Schedule.

1.3.1 Engine-Generator Parameter Schedule

ENGINE GENERATOR PARAMETER SCHEDULE

Service Load	44 kVA <u>100 kW</u>
Power Factor	0.8 lagging
Motor Starting kVA (maximum)	131 <u>255</u> kVA
Maximum Speed	1800 rpm
Engine-Generator Application	stand-alone
Engine Cooling Type	water/ethylene glycol
Heat Exchanger Type	fin-tube
Governor Type	Isochronous
Frequency Bandwidth	<u>± 0.25%</u>