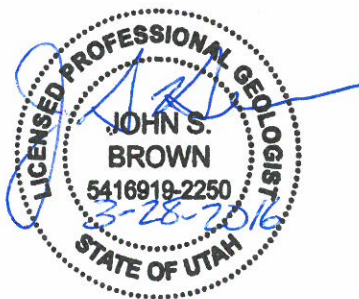


**TECHNICAL SPECIFICATIONS
CONSTRUCTION OF GROUNDWATER MONITORING WELLS
FOR COAL COMBUSTION RESIDUALS
GROUNDWATER MONITORING
AT THE BONANZA POWER PLANT
NEAR VERNAL, UTAH**

Prepared for
**DESERET GENERATION
& TRANSMISSION CO-OPERATIVE**

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Typical 6-inch Diameter Well – Figure 3

ATTACHMENT – BID SHEET

1.0 PROJECT DESCRIPTION

1.1 General

These technical specifications describe construction activities for the installation of groundwater monitoring wells at the Deseret Generation & Transmission (DG&T) Bonanza Power Plant facility, located approximately 37 miles southeast of Vernal, Utah, Uintah County. The general construction activities include installation of four 4-inch diameter monitoring wells and two 6-inch diameter monitoring wells that will be completed through about 40 to 60 feet of alluvium to the bedrock alluvium interface. The work will include drilling, well construction and development and testing of the completed wells. Figure 1 shows the locations of the proposed monitoring wells.

The work consists of providing necessary access conditions; the complete drilling; cutting sample collection; water sample collection; furnishing and installing complete screen and casing assembly; sand packing and grouting; providing driller's logs and daily logs; well development, well testing and completing other work as needed for the construction of these monitoring wells. DG&T (OWNER) will stake locations and provide all required surveying services. Figures 2 and 3 show schematic illustrations of the proposed well construction.

Restrictions shall be imposed upon the introduction of drilling fluids or foreign materials into the well borings in order to protect ground water quality during drilling and following well completion. The use of mud-rotary techniques will not be allowed. No drilling fluid additives shall be allowed unless approved in advance in writing by the ENGINEER (Loughlin Water Associates LLC). The use of drilling additives will not be approved unless it is shown that the additives will not significantly affect water quality, even at trace levels. The use of clean water

in small amounts will be approved by the ENGINEER if obtained from a high quality potable water source. CONTRACTOR shall take all reasonable precautions to prevent the entrance of oils, grease, and other contaminants from entering the borings through his equipment, materials and actions.

CONTRACTOR — is to supply all equipment, materials and labor necessary to complete these wells. CONTRACTOR shall remain on site until the completion of all work.

LOCATION — The proposed monitoring well locations are shown on Figure 1. The specific locations of the proposed monitoring well sites will be staked and specified by OWNER. ENGINEER will specify the order in which the wells shall be constructed.

PLANS AND WORKING DRAWINGS — Plans included with the specifications are complete and adequate for construction. While every effort has been made to have the plans free of errors and ambiguities, any such points must be brought to the ENGINEER'S attention prior to contract award.

SITE ACCESS — The CONTRACTOR shall provide access to all sites and shall obtain all necessary permits and or permission to utilize public roads. The OWNER will obtain necessary permits and/or permission to utilize private roads or lands. The CONTRACTOR shall confine his apparatus, storage of materials, and operation of his workmen to the limits indicated by law, ordinance, permits or direction of the ENGINEER and/or OWNER, and shall not unreasonably encumber the premises with his materials. Contractor shall, at all times, keep the site free from accumulations of waste materials or rubbish resulting from his work.

MATERIALS FURNISHED BY CONTRACTOR — If CONTRACTOR proposes equivalent material or equipment, CONTRACTOR must submit information data to the ENGINEER in written form to prove such equivalence. The information shall consist of drawings, specifications, and catalogs, etc., as applicable. The proposed material must be approved by the ENGINEER in writing before proceeding with purchase, production or manufacture of any material. ENGINEER must be allowed reasonable review time prior to his approval or denial of this request. ENGINEER'S approval will not relieve CONTRACTOR of any responsibility or guarantee it is required to comply with under the terms of this contract.

REQUEST FOR VARIANCES FROM THE PLANS AND SPECIFICATIONS — In the event that CONTRACTOR may wish to deviate, vary or otherwise alter the design or method of construction of the wells, he shall make a formal request to the ENGINEER. This request must be in writing, with whatever drawings, calculations, costs and other information that will be needed by the ENGINEER to evaluate this request. The ENGINEER must be allowed reasonable review time prior to his approval or denial of this request.

CORRESPONDENCE FROM CONTRACTOR — All correspondence from the CONTRACTOR to the ENGINEER shall be submitted in writing to the Engineer.

TIME TO COMPLETE — The number of days for performance allowed here-in is based on the original quantities as defined in the Agreement. If satisfactory fulfillment of the contract requires performance of work in substantially greater quantities than those set forth in the Agreement, the contract time allowed for performance may be increased on a basis commensurate with the amount and

difficulty of the added work after written request by the CONTRACTOR. Normal delays associated with provisions of Section 14.0 “Stand—by” time shall not entitle CONTRACTOR an extension of time.

EXTENTION OF TIME TO COMPLETE — If the CONTRACTOR finds it impossible for reasons beyond his control to complete the work within the contract time as specified or as extended, he may, at any time prior to the expiration of the contract time, make a written request to the ENGINEER for an extension of time, setting forth therein the reasons which he believes will justify the granting of his request. If the ENGINEER finds that the work was delayed because of conditions beyond the control and without the fault of the CONTRACTOR, he may extend the time for completion in such amount as the conditions justify. The extended time for completion shall then be in full force and effect the same as though it were the original time for completion.

The WORK will be performed in accordance with the current requirements of: (1) Utah Department of Natural Resources (DNR), Division of Water Rights (DWRi), sometimes referred to as the Office of the State Engineer, including Utah Administrative Code (UAC) Rule R655-4 and R655-4-15, Administrative Rules for Well Drillers; (2)) DEQ Division of Water Quality (DWQ), Utah Water Quality Act, 19-5-107(1); and (3) the requirements of the Contract Documents, including these Technical Specifications.

2.0 STATEMENT OF WORK

The work is to be comprised of the performance and completion of the following construction activities by a State of Utah Licensed Water Well Driller:

- Obtain Start Card from the State of Utah Division of Water Rights;
- Mobilization to the site, demobilization, and provision of all necessary equipment to complete drilling, construction of the monitoring wells;
- Decontamination of all downhole drilling, testing, and monitoring wells construction equipment and materials prior to arriving at the site and following completion of activities;
- Drilling, furnishing necessary materials for, and installation of 6 monitoring wells with estimated depths of about 40 to 60 feet;
- Assisting in the collection of vertical water samples during drilling of borings prior to monitoring well completions, if requested by site engineer;
- Providing driller's logs and daily logs;
- Completion of well driller reports;
- Completing other work as necessary for construction of the monitoring wells.

Location of the monitoring wells will be determined and surveyed by the OWNER. Figure 1 shows the approximate location of the monitoring wells. Figures 2 and 3 show schematic illustrations of the proposed monitoring well construction. Four of the six wells will be 4-inch diameter PVC wells and two of the six wells will be 6-inch diameter wells constructed of PVC and steel casing.

3.0 ESTIMATED DRILLING CONDITIONS

The monitoring well bores will be advanced through approximately 40 to 60 feet of silt, sand and gravel that is loosely consolidated to unconsolidated. Alluvial materials consist of sand to coarse hard gravel deposited by fluvial sequences. ODEX, air rotary, sonic, cable-tool or reverse circulation drilling methods will be used. Temporary steel casing shall be used to stabilize the boring to the bedrock interface and will be retracted during completion of the monitoring wells. Each boring is expected to reach total depth at the bedrock interface just beneath the alluvium.

Contractor must assume all responsibility for conclusions which may be made as to the nature of the materials through which the borings are to be advanced, and the difficulties of making and maintaining the required borings and of other work affected by subsurface conditions.

If caving zones are encountered the contractor must assume all responsibility for stabilizing the boring. Any actions taken by the contractor, however, to stabilize a caving zone must allow for the monitoring wells to be completed as specified in this document and must be approved by the Engineer.

DISCLAIMER - Subsurface information cited above is presented solely for the convenience of the contractor as an aid to identifying and evaluating suitable materials in the field during construction of the monitoring wells described herein. Neither the OWNER nor the ENGINEER represents that the subsurface information presented shows conditions that will be encountered in performing the work.

4.0 TECHNICAL SPECIFICATIONS

4.1 General Monitoring Well Construction Procedures

Construction details for the monitoring wells are shown on Figures 2 and 3 and are described in the following specifications. General procedures for drilling and completion of the monitoring wells are summarized as follows:

1. Steam clean all down-hole drilling equipment and any contaminated drilling equipment prior to mobilizing to the monitoring well site, and upon completion of the drilling and construction of each monitoring well. Engineer may request cleaning of equipment prior to initiation of work if equipment appears contaminated. This decontamination will be completed at no additional cost to the OWNER and shall be included in the cost of mobilization.
2. Drill and install temporary 8-inch diameter steel casing (for 4-inch well completion) or 10-inch diameter temporary steel casing (for 6-inch well completion), as specified by the ENGINEER through alluvial material to bedrock surface to stabilize boring to the depth specified by the ENGINEER. Anticipated completion depths are approximately 40 to 60 feet below grade, but drill depths will be determined by ENGINEER during drilling.
3. Obtain drill cuttings samples and water levels and vertical water samples (if requested) as specified by ENGINEER.
4. Clean boring of all drill cuttings and other accumulated materials and any drilling fluids introduced into the boring. Produced water shall be contained or directed to a location specified by ENGINEER. Any materials that fall into the boring following drilling must be removed prior to completion of the monitoring well.
5. Install 4-inch or 6-inch diameter, Schedule 40 PVC screen, sediment end cap and PVC casing. All materials shall be flush-coupled. A steel casing steel assembly will be utilized on the upper 8 -foot sections of the 6-inch diameter wells. Assembly will have a minimum of 3 stainless steel centralizers on each screen to centralize screen in boring. The

ENGINEER will specify the depth and slot size of the screen. The PVC casing and the upper steel casing will be joined using a flush-coupled joint.

6. Tremie sand pack into annulus surrounding screen to approximately 3 feet above top of screen section while retracting temporary casing. The inside of the well shall be surged during the addition of the sand pack using a surge block or bailer. Tremie pipe shall remain within five feet of the top of the sand pack at all times during tremie and surging operations. The natural formation will not be allowed to cave against the screen or casing sections. Place seal of bentonite pellets on top of sand pack and hydrate the seal.
7. Tremie bentonite grout into annulus surrounding casing to within 2 feet of ground surface.
8. Place 12-inch diameter by 5-foot locking protective galvanized steel surface completion casing over the centralized well casing such that the bottom of the protective surface casing is 2 feet below ground surface and the top of the protective casing is 6-inches above the well casing. The top of the protective steel casing shall be secured with a locking well cap. Pour 4-foot diameter concrete surface seal and pad around the well and hand finish with smoothing trowel such that the slope on the surface pad is 2 degrees to the outer edge. If neat cement is used for grout seal, a 24 hour delay will be required between installing the grout seal and constructing the surface completion.
9. Allow the surface pad to cure for minimum of 24 hours.
10. Develop well using airlift, bailing, surge block, or other method acceptable to the ENGINEER. A minimum evacuation of 20 borehole volumes will be required and must be documented by driller.
11. Install painted locking surface casing completion.

4.2 Materials

4.2.1 Casing

4.2.1.1 Steel Casing

All casing shall be steel and be of adequate size, strength, and wall thickness to facilitate subsequent drilling and must meet the requirements of R655-4-11.2.3, Steel Casing. All steel casing installed shall meet or exceed the minimum ASTM, ANSI, or AWWA standards for steel pipe. Mild steel casing used to maintain the boring during drilling shall be new 8-inch or 10-inch diameter with a minimum wall thickness of 0.250 inches. Either welded or seamless steel conforming to AWWA C202-64, or welded wrought-iron pipe conforming to ASTM A-72-45 may be used. Casing must be joined by flush couplings to PVC casing. Coupling threads at both ends of the pipe must be protected during shipping and handling. Driven casing shall be fitted with a suitable drive shoe and retracted during well completion.

Mild steel casing used for the upper section of well casing shall be new 6-inch inside diameter with a minimum wall thickness of 0.250 inches. Seamless steel conforming to ASTM A53 or ASTM A120 may be used.

4.2.1.2 PVC Casing

The PVC casing shall be constructed using new 4-inch diameter or 6-inch diameter NSF (National Sanitation Foundation) approved PVC Schedule 40 plastic pipe. All couplings and adapters shall also be NSF approved PVC Schedule 40 plastic. All couplings and/or adapters shall be joined to the pipe (or screen) using

mechanical screw joints. Casing joints shall be rated for differential pressures through the joint in excess of 50 psi with no leakage. The use of solvents, glues and/or other adhesives will not be allowed. The use of pipe dope or other pipe joining compounds is also prohibited. The use of gaskets and/or other types of seals must be approved by the ENGINEER.

4.2.2 PVC Screen

Monitoring well screens shall be new commercially-fabricated using NSF approved, flush-coupled 4-inch or 6-inch inside diameter Schedule 40 PVC. All screen joints shall be mechanical screw joints. The pipe shall be factory slotted with saw-cut slots. Slotted widths are expected to be 0.010 inches (10 slot) based on anticipated subsurface conditions. Screen length shall be 10 feet. Slot lengths shall be 1.0 inches with at least 40 slots per row per foot. There shall be a minimum of six rows of slots. All screens shall have stainless steel centralizers installed at the base, center and 7 feet above the screen to ensure that the screen will be centered within the diameter of the boring (casing). No glues or solvents shall be allowed for use in the construction of the monitoring wells.

4.2.3 Sand pack

Sand pack shall consist of clean-washed silica sand. Sand pack gradation shall be 16-40 graded Colorado silica sand based on a review of site conditions.

<u>U.S. Standard Sieve Size</u>	<u>Permissible Range Passing (in percent)</u>
#16	100
#20	90 - 100
#30	0 - 10
#40	0 - 5

The sand pack shall be free of deleterious materials such as wood, debris, organic material and other degradable materials, and shall contain less than 5 percent calcareous materials.

4.2.4 Grout Materials

Grout and seal material shall meet the requirements of UAC R655-4-2 *Definitions*, and UAC R655-4-11.4.2 *Seal Material*. Grout and seal material shall conform to the following specifications.

4.2.4.1 Concrete Grout

A mixture of Portland cement (ASTM C150), sand, coarse aggregate and water in the proportion of at least five (5) bags of cement per cubic yard of concrete to not more than 5.2 gallons of clean water per bag of cement (one cubic foot or 94 pounds). The use of special cements or other admixtures (ASTM C494) to reduce permeability, increase fluidity, and/or control time of set, and the composition of the resultant slurry must be approved by the ENGINEER.

4.2.4.2 Sand Cement Grout

A mixture of Portland cement (ASTM C150), sand and water in the proportion of not more than two parts by weight of sand to one part of cement with not more than six (6) gallons of clean water per bag of cement (one cubic foot or 94 pounds). The use of special cements or other admixtures (ASTM C494) to reduce permeability, increase fluidity, and/or control time of set, and the composition of the resultant slurry must be approved by the ENGINEER.

4.2.4.3 Neat Cement Grout

A mixture of Portland cement (ASTM C150) and not more than 6 gallons of clean water per bag (one cubic foot or 94 pounds) of cement and five pounds bentonite per bag of cement shall be used. The use of special cements, or other admixtures (ASTM C494) to reduce permeability, increase fluidity, and/or control time of set, and the composition of the resultant slurry must be approved by the ENGINEER. Bentonite shall meet the requirements specified in Section 4.2.5.1.1, and shall be mixed as a slurry prior to adding the cement.

4.2.5 Bridging Materials

In the event that large voids are encountered during drilling or grouting operations, it may become necessary to use bridging materials in addition to grouting to plug off the void. Bridging materials must be approved by the ENGINEER in advance in writing and will include the following material categories.

4.2.5.1 Bentonite

4.2.5.1.1 Bentonite Bridging Materials

Bentonite bridging materials shall consist of commercially processed granular or pellet bentonite approved by the ENGINEER.

4.2.5.1.2 Bentonite Powders

Bentonite used in powder form shall be able to pass through a -200 mesh sieve

and conform to A.P.I. standards, with a minimum purity of 90 percent sodium montmorillonite and a maximum hydration time of 12 hours.

4.2.5.1.3 Bentonite Pellets

Bentonite used in pellet form shall be $\frac{1}{4}$ inch and conform to A.P.I. standards, with a minimum purity of 90 percent sodium montmorillonite and a maximum hydration time of 12 hours.

4.2.5.2 Bank-Run Sand

Bank-run sand shall consist of clean washed fine to coarse-grained aggregate sand approved by ENGINEER.

4.2.5.3 Pea Gravel

Pea gravel shall be clean washed $\frac{1}{4}$ -inch gravel approved by ENGINEER.

4.2.6 Protective Monitoring Well Covers

Protective well covers shall be fabricated using 12-inch diameter galvanized steel pipe having a minimum wall thickness of 0.25 inches, and a 0.25-inch thick galvanized steel cover. The cover shall be tight fitting. The design of the protective casing and cap are shown on Figures 2 and 3. Prior to painting, a bead shall be welded to the casing displaying well identification number. The protective covers shall be painted, using proper primers and high quality oil-based paints, prior to their installation. A $\frac{1}{8}$ -inch diameter weep hole shall be drilled in the steel pipe to allow moisture to drain from the well cover. A durable case-hardened steel lock will be provided by the CONTRACTOR to lock the cap to the protective

casing. All locks shall be keyed alike. The color of the exterior coat of paint shall be as specified by the OWNER. Other protective cover arrangements may be allowed if approved in writing by the ENGINEER.

4.2.7 Well Location Marker and Protection Posts

The well location marker posts shall consist of a 2-inch diameter steel pipe approximately 8 feet long. The minimum wall thickness of the pipe shall be 0.154 inches. The pipe shall be painted using proper primers and a high quality oil based paint. The color of the exterior coat of paint shall be as specified by the OWNER. Posts shall be set in concrete to 2 feet below grade.

4.3 Mobilization and Demobilization

Upon receiving the "Notice to Proceed", the CONTRACTOR shall notify the DWRi in accordance with UAC R655-4-4.2, Start Cards. The CONTRACTOR shall then move in all tools, equipment, and supplies necessary for the WORK and upon completion of the WORK, shall remove all such items from the premises promptly and leave the site in a clean, smoothed, and orderly condition. Site preparation and restoration shall be the responsibility of the CONTRACTOR. Mobilization and demobilization shall include all work and costs required to mobilize to and demobilize from the site and to and from each drill location shown on Figure 1, all equipment, materials, vehicles, trucks, water trucks, drills, drilling supplies, temporary containment vessels and crews necessary to complete the work required in these specifications. Mobilization and demobilization shall include all work and costs required to clean all drill rods, cable-tool components, bits and downhole equipment so that they are free of grease, oil and other contaminants prior to arriving at the site, between well sites and prior to demobilization from the site.

4.4 Equipment Decontamination

All construction equipment will be thoroughly steam cleaned or high-pressure washed to the ENGINEER'S satisfaction prior to use. This will include the drill rig, drilling mud hopper, all drill pipe and bits, tremie pipe, pumps, and any tools as directed by the ENGINEER. Construction supplies and monitoring well construction materials will be new and kept wrapped in clean plastic and stored off the ground in a safe location until used for intended construction activities.

After the monitoring wells are completed, the drill rig will be moved to a designated location for decontamination. At this location, any mud or grease that has accumulated during drilling will be removed by steam cleaning or a high-pressure wash. If muddy conditions exist, the tires of the drill rig and any other equipment will be cleaned of mud before the equipment is demobilized from the site. All equipment and material that have been contaminated must be cleaned between each well location and prior to demobilization from the site.

5.0 DRILLING OF BORINGS

5.1 Location and Depth

The monitoring wells shall be drilled at the location designated by the ENGINEER. Location shall be marked and staked by the OWNER. OWNER will establish access and provide a level drill pad location. Estimated monitoring well depth is expected to be approximately 40 to 60 feet, however the total depth will be specified by the ENGINEER during drilling. ENGINEER shall specify the actual depth to be drilled and interval to be screened during drilling and monitoring well construction operations. A clean source of water for drilling will be available on the DG&T site but it is the CONTRACTORS responsibility to haul the water to the job location. Only the use of clean potable water will be allowed for use in drilling.

The CONTRACTOR will drill borings from the ground surface to the total depth using ODEX, air rotary, sonic, reverse circulation or cable-tool method drilling techniques. Other suitable drilling methods may be proposed by contractor but must be approved in writing by the ENGINEER prior to implementing such methods. Care shall be taken to make each boring as straight and plumb as possible. Each hole must be clean and stable to allow completion of the monitoring wells to the specified depth. No drilling fluid additives other than clean water will be allowed unless approved in writing by the ENGINEER. Use of drilling foam may be used to help lift the cuttings and maintain hole stability during drilling and casing advancement must be approved by the ENGINEER. After drilling to total depth but before installation of monitoring wells materials, each boring shall be cleaned until boring is reasonably free to the satisfaction of the ENGINEER of drill cuttings, sand, clay, and other accumulated materials and drilling fluids to the prescribed depth specified by the ENGINEER. Unless

otherwise approved in writing by the ENGINEER, any steel casing (other than protective well covers) shall be completely removed from the boring during well completion. If temporary casing is used during drilling, the temporary casing shall be removed in a manner so as to prevent breakage of the PVC casing and screen, and so as to ensure that the sand pack and grout completely surround the screen/casing assembly. This will require that sand pack and grout are installed as the temporary casing is withdrawn.

Control of drill cuttings, fluids, and produced water shall conform with UAC R309-515-6(6)(d), Disposal of Cuttings, UAC R655-4-11.6.2, Containment of Drilling Fluids, rules of the DWQ, and the Utah Water Quality Act, 19-5-107(1). The CONTRACTOR shall (1) take all necessary precautions to prevent contamination of the water in the well by preventing the introduction of any foreign substance, including contaminated water, gasoline, oil, and the like and (2) conform to all laws applicable to the protection of water quality including UAC R309-515-6(6)(j), Water Entered Into Well During Construction.

5.2 Temporary Steel Casing

The CONTRACTOR shall temporarily install 8 or 10-inch diameter protective steel casing into the boring during the drilling as necessary to allow for completion of the boring to the depth specified by the ENGINEER. Steel casing shall meet the requirements of Section 4.2.1.1. **The casing shall be fitted with a suitable drive shoe.** Casing shall be retracted during completion of monitoring wells.

5.3 Daily Drillers Report

Clear and accurate driller's records of drilling, monitoring well construction and

testing and records of all pertinent circumstances arising during the progress of the work shall be kept. The ENGINEER shall have access to the records at all times. One copy of each daily record shall be delivered to the ENGINEER each day. At the completion of the work or any portion thereof, if requested, additional copies of the logs and other records shall be furnished.

The driller's report shall contain the following as a minimum:

- Hole number
- Location
- Driller and helper's names
- Number of hours on the job
- Number of feet drilled
- Casing used and total length of casing hole
- Water loss if any and depth of loss
- Daily water level measurement
- Notes on drilling speed, vibrations, rate of drilling, etc.
- Color of return water
- General geological character of formation penetrated
- Time spent at each task, drilling, casing, cementing, etc.
- Materials used, including type, amount and viscosity of drilling fluids used
- Bit numbers on/off and depths changed
- Shutdown times due to breakdown
- Feet of casing and screen set, diameter, slot size
- Volume and weight of grout
- Type, Volume and top level of sand pack
- Depth, volume and type of seal materials
- Any other pertinent information requested by ENGINEER

ENGINEER will be on site to inspect the drilling and installation of the monitoring well, and to evaluate water quality vertically during drilling. CONTRACTOR shall provide ENGINEER with any relevant data, and/or samples requested by the ENGINEER. While the ENGINEER will prepare a report, the driller's log shall also be prepared and submitted as an independent document.

5.4 Well Driller's Report

During the drilling of the boring, CONTRACTOR shall prepare and keep a complete drilling log. This log should include as a minimum:

- 1) The depths at which changes in soil/rock types, voids and fractures occur.
- 2) A brief description of each soil/rock type encountered.
- 3) The depth of each occurrence of water or other fluid.
- 4) Measurements of the depth to water in the boring after completion of the boring.

A copy of the driller's log shall be given to the ENGINEER upon completion the monitoring well. The driller must also file their report to the State Engineer as Required.

5.5 Sampling

5.5.1 Cutting Samples

Representative cutting samples shall be collected at intervals of 5 feet or when there is a significant change in the drilling characteristic as directed by the ENGINEER. Each sample shall be properly labeled with the hole number, date, time, and depth, placed in a sealed plastic bag by the driller or driller's helper and given to the ENGINEER. Labeling shall include hole number, depth, date, and time. Plastic sample bags shall be minimum capacity of 1 quart and have a minimum 2 mil thickness. Sample bags will be provided by the CONTRACTOR.

5.5.2 Ground Water Sampling During Drilling

If requested by the ENGINEER during the course of drilling operations, the CONTRACTOR shall efficiently bail water from the boring in order to obtain a representative ground water sample. CONTRACTOR shall provide and use a bailer made of NSF approved PVC if so requested by the ENGINEER. The ENGINEER shall specify the length of time the boring is to be bailed. The CONTRACTOR shall then fill bottles supplied by the ENGINEER with a representative ground water sample. The CONTRACTOR shall accurately measure the depth to ground water in the boring if so requested by the ENGINEER.

5.6 Cleaning of Boring

After drilling has reached total depth, boring shall be made free to the satisfaction of the ENGINEER of drill cuttings, sand, clay and other accumulated materials and drilling fluids.

5.7 Grouting Back Boring

ENGINEER may require that a portion of the boring be grouted back. In the event grouting back is required, ENGINEER will specify to CONTRACTOR the depth to which the boring is to be grouted, the type and the volume of grout to be installed. Grout shall be allowed sufficient time to set prior to redrilling or sand packing the monitoring well. Grout shall meet material specifications given in Section 4.2.4.

The grout must be tremied to within five feet of the bottom of the boring. The tremie pipe shall be kept at all times within the grout while the grout is being introduced.

6.0 INSTALLATION OF MONITORING WELL SCREEN AND CASING ASSEMBLY

6.1 General

A 4-inch or 6-inch diameter PVC monitoring well screen and PVC (and steel on 6-inch diameter wells) casing assembly will be installed in each boring. The top casing section of the well will be backfilled with granular bentonite or neat cement grout to within 2 feet of the ground surface. The top 8 feet of the 6-inch diameter wells will be constructed using Schedule 40 6-inch steel.

The screen and casing assembly shall be constructed and installed such that the screen is located in the interval specified by the ENGINEER. The base of the screen and casing assembly shall be closed with a bottom cap to provide a positive seal. The casing shall extend from the top of the screen to an elevation above the ground surface specified by the ENGINEER (30 inches). The casing shall be closed at the top with a slip cap. The casing, fittings and screens shall be cut, assembled (insofar as possible), and measured prior to lowering any of the assembly into the boring. The ENGINEER shall be allowed to measure the assembled portions of the casing and screen assembly prior to their installation. The ENGINEER shall also be allowed to inspect the screen and casing for signs of potential contamination or damage. The screen and casing assembly shall be hung and shall not touch the bottom of the boring prior to sand packing.

6.2 Assembly of PVC Monitoring Well Screen and Casing

The 6-inch diameter PVC screens and metal and PVC casings and 4-inch PVC casing and screen assemblies shall be installed as a single string in the boring. All couplings, adapters and other fittings shall be joined using flush-coupled

threaded joints. No glue or solvent shall be used. Proper care shall be taken to ensure that the PVC casing, screen or joints are not cracked or broken during their installation.

7.0 PLACEMENT OF SAND PACK

7.1 General

ENGINEER will specify the depth intervals of the sand pack prior to installation of the casing and screen assembly. Sand pack includes silica sand placed in the annular space between the boring and the screen assembly, and a 5-foot seal of bentonite pellets immediately above the sand pack.

7.2 Tremieing Sand pack

A temporary tremie pipe placed outside of the screen-casing assembly shall be lowered in the annulus to within 5-feet above the bottom of the screen and/or casing assembly. The tremie pipe shall have a minimum diameter of 1 inch.

Sand pack shall be added at a constant rate and CONTRACTOR shall measure and/or otherwise keep an accurate record of the volume of sand pack placed. A sounder marked at 1.0-foot intervals and of adequate weight to positively feel the sand pack shall be used to determine the level of gravel as it is being placed. These measurements shall be correlated with the actual volume added.

As the sand pack is added, the tremie pipe may be withdrawn, but at no time shall the bottom of the tremie pipe be more than 10 feet above the top of the sand pack in the annulus. The sand pack shall be placed in the annulus up to the depth specified by the ENGINEER. The sand pack will be surged using a bailer or slug at the same time that the sand is added and re-measured to ensure proper placement in the annulus. The CONTRACTOR shall measure the sand pack level while surging the inside of the well with the bailer or slug until specified amount of sand has been added.

8.0 INSTALLATION OF GROUT SEAL

8.1 Well Completions

It is intended to seal the annular space between the PVC casing and boring with bentonite grout described in Section 4. Granular or powdered bentonite may not be used to seal the annular space below the water table. Bentonite must conform to the specifications of 4.2.5.1.1. A positive displacement method is one in which the annular space is filled with grout from the bottom up; water in the annular space is pushed out into the formation or out the top of the temporary casing by the denser grout. A tremie method is one in which a pipe is lowered in the annular space to about 5-feet above the total depth of the boring and grout is then poured or pumped down the pipe. As the annular space fills with grout, lengths of pipe can be removed. Grout shall be allowed sufficient time to set prior to additional well construction.

9.0 MONITORING WELL DEVELOPMENT

After the complete installation and grouting of the well, the well is to be cleaned of all sand, clay and other materials, which may have accumulated in the well. The grout seal shall be properly set before development work may commence. The well shall be bailed and/or pumped or developed using air lift methods for a length of time sufficient to remove any drilling fluids introduced into the borehole during the drilling procedures. The removal of a minimum of 20 casing volumes will be required. If air is used, the contractor must demonstrate that measures have been taken to prevent the introduction of any oils or other organic materials into the well. The well shall not be considered developed until the water removed from the well is reasonably free of sand, silt and clay, and CONTRACTOR warrants that the well can be pumped using submersible pumps without damage to the pump. CONTRACTOR must keep accurate records of discharge and samples of development water.

The parameters of pH, specific conductivity, and temperature will be monitored by the site geologist during well development using portable pH and specific conductivity meters. A minimum of six readings will be taken and these parameters will be allowed to stabilize using the following criteria:

- pH = ± 0.2 units;
- Temperature = ± 1.0 C, and;
- Specific conductivity = ± 10 percent.

At least three consecutive readings should fall within the ranges stated above before well development will be considered complete. The discharge water will be routed to the ground.

10.0 INSTALLATION OF SURFACE COMPLETION

As part of each surface completion a locking monitor well cap shall be installed to make the monitor well secure and protected from the environment, as shown on Figures 2 and 3. Monitor well cap design must be approved by the ENGINEER. Wellhead construction shall conform to the requirements UAC R655-4-11.7.3 Completion or Abandonment. The 12-inch diameter protective casing shall extend from 2 feet below grade to 3 feet above ground surface level. The PVC casing shall extend above grade to within 6 inches of the top of the steel surface casing. A hole with a diameter of 1 foot and having a depth of approximately 2.5 feet shall be dug around the monitor well. The protective covers shall be painted, using proper primers and high quality oil-based paints, prior to their installation. A 1/8-inch diameter weep hole shall be drilled in the steel pipe to allow moisture to drain from the well cover. A concrete pad having a minimum diameter of 48 inches and a minimum thickness of 6 inches shall be placed around the protective monitor well casing. Pad shall slope away from casing. Padlocks for the locking monitor well caps will be provided by the CONTRACTOR. All locks will be keyed alike.

11.0 WELL TESTING

After each well development has been concluded, the completed monitoring well shall be tested by CONTRACTOR to estimate aquifer parameters using a temporarily installed pump, pumping assembly and drawdown tube and flow discharge regulator valve. Power shall be provided by a portable generator furnished by the CONTRACTOR. CONTRACTOR shall notify the ENGINEER when these tests are to be run and allow his inspection of these tests.

A specific capacity test shall be conducted in each well using a temporarily installed submersible pumping system after the well has returned to static condition. Specific capacity data can be used to estimate the transmissivity and hydraulic conductivity of the formation in the immediate vicinity of the well and the efficiency of the well. Specific capacity is the well yield per unit drawdown and shall be determined using a temporary pumping system installed as follows:

1. Decontaminate pumping equipment prior to installation to ENGINEER'S satisfaction and install pumping and discharge assembly.
2. After the temporary pump system is installed, measure the static water level.
3. Turn on pump. Pump at rate specified by ENGINEER. Pumping rate shall be up to the maximum pump flow, but rates are anticipated to range from 0.25 to 5 gpm.
4. Measure flow rate of pump periodically during test.
5. Continue to measure water levels until difference between successive measurements is determined by ENGINEER to be negligible. Pumping period shall be a minimum of 1 hour and a maximum of 4 hours, unless otherwise determined by ENGINEER.

6. Turn off pump.
7. Continue to measure water levels (at least 60 minutes) until the difference between the current and original static water level is determined by the ENGINEER to be negligible.
8. Remove pump and equipment and decontaminate pump and pumping equipment.

12.0 SITE RESTORATION

After completion of all work of installing each monitoring well, all unused materials and refuse resulting from CONTRACTOR'S work shall be removed from the site and properly disposed of off of the property. All costs of site restoration shall be included in the item: MOBILIZATION AND DEMOBILIZATION.

The CONTRACTOR shall thoroughly clean the site after completion of the drilling, well construction, and development and test pumping operations. All drill cuttings, debris, and other materials used or generated during these operations shall be properly disposed of by the CONTRACTOR. The disposal of cuttings and drilling fluids shall conform with UAC R309-515-6(6)(d), Disposal of Cuttings, UAC R655-4-11.6.2, Containment of Drilling Fluids and the Utah Water Quality Act, 19-5-107(1). Following all operations, the site shall be returned to a condition better than or equal to its condition at the commencement of WORK, as approved by the OWNER.

The CONTRACTOR shall promptly remove their equipment, temporary facilities, and materials, and leave the site in a condition acceptable to the OWNER. The CONTRACTOR shall repair any damage to property or facilities caused by their operations prior to final acceptance of the WORK by the ENGINEER. The CONTRACTOR shall return all landscape, roadway, and adjoining surfaces to their original condition and appearance as soon as reasonably feasible. No reseeding is to be done during the final cleanup. However, the area should be smoothed to the satisfaction of the ENGINEER.

13.0 EXTRA WORK

The object of these specifications is to outline the work and materials needed for the complete installation of monitoring wells. Payment for the construction of these monitoring wells will be based solely on the bid items listed in the Agreement. Materials, equipment and labor required to complete and test the monitoring wells as detailed in these specifications shall not be considered as additional or extra work. Only work and materials that are specifically authorized, in writing, by the ENGINEER will be considered additional extra work.

14.0 STANDBY TIME

Standby time shall be allowed only for time periods in which CONTRACTOR is unable to use CONTRACTOR'S drilling equipment and tools. Standby time will be charged only during time periods in which CONTRACTOR is unable to proceed because CONTRACTOR is waiting for information or services to be provided by the ENGINEER or OWNER as detailed in these specifications. Only periods of time in which all equipment and crews are available shall be charged as standby time. CONTRACTOR shall give ENGINEER immediate written notice of the cause and duration of any standby time charges for the ENGINEER'S written approval of standby time charges. ENGINEER shall not unreasonably withhold approval of standby time charges. No more than 8 hours per day will be approved for standby time.

15.0 PAYMENT, MEASUREMENT FOR PAYMENT, AND CONTRACT DATA

15.1 Payment

Payment shall be in accordance with the Schedule of Contract Prices and Payment in the bid form and shall be full compensation for the work described herein, including without limitations the furnishing of all plant, tools and equipment, labor supervision, technical and professional services, materials, supplies, and articles (other than materials and equipment specified as furnished by OWNER), and the performance of all operations and incidentals necessary and required, and all other direct expenses and profit, and shall be for all work complete in-place in accordance with the Contract.

Compensation for work shall be based on the description of the pay items as listed on the bid form.

15.2 Payment for Mobilization and Demobilization

Payment for this item shall be a lump sum payment and includes full compensation for the following:

- Providing access roads and drill pads at each well site;
- Set up of all equipment necessary to complete all work described by these specifications at each of the well sites;
- Delivery of all construction equipment, and the mobilization of work crews;
- The establishment of temporary utilities and facilities;
- Removal of all equipment and demobilization of work crews at the

completion of all work;

- Decontamination of all drilling, downhole equipment and pumping equipment between well sites, prior to arriving at site and prior to demobilization;
- Removal of temporary utilities and facilities, and;
- Final cleanup of the jobsite.

A single lump sum payment shall be made for mobilization to the site and demobilization from the site at the rate specified on the bid form for the item: MOBILIZATION AND DEMOBILIZATION. Approval for Payment will be authorized by the ENGINEER after the CONTRACTOR has arrived on-site with all specified materials and initiated drilling.

15.3 Payment for Drilling

15.3.1 Drill 8-Inch Diameter Boring

Drilling shall include all costs of drilling equipment, bits, maintenance, air compressors, fuel, crew and other related materials and equipment to drill the boring as specified in this document. Payment shall be at the footage rate specified on the bid form for the items: (DRILL 8-INCH BORING). All costs of drilling the 8-inch diameter boring to its prescribed depth, install, advance, and remove temporary casing, bentonite seal and other related materials shall be included in these footage rates. Measurement shall be the footage of the hole specified to be drilled for each method, provided that the total length of boring is capable of having specified lengths of screen and casing installed in the specified interval. In the event that installation of the specified length of the screen is not possible due to unstable conditions in the boring, only the length of boring into

which screen and casing can be installed will be the length of measure for payment.

15.3.2 Drill 10-Inch Diameter Boring

Drilling shall include all costs of drilling equipment, bits, maintenance, air compressors, fuel, crew and other related materials and equipment to drill the boring as specified in this document. Payment shall be at the footage rate specified on the bid form for the items: (DRILL 10-INCH BORING). All costs of drilling the 10-inch diameter boring to its prescribed depth, install, advance, and remove temporary casing, bentonite seal and other related materials shall be included in these footage rates. Measurement shall be the footage of the hole specified to be drilled for each method, provided that the total length of boring is capable of having specified lengths of screen and casing installed in the specified interval. In the event that installation of the specified length of the screen is not possible due to unstable conditions in the boring, only the length of boring into which screen and casing can be installed will be the length of measure for payment.

15.4 Payment for Ground Water Sampling During Drilling

Payment shall be made at the hourly rates specified in the Schedule of Charges. The measurement will be the time from which ENGINEER informs CONTRACTOR that a ground water sample is to be collected until CONTRACTOR can reasonably resume his drilling operation. The time shall include the time required for the CONTRACTOR to remove his drilling tools, bail the water, collect the ground water sample, and reinstall his drilling tools.

15.5 Payment to Furnish and Install Grout to Grout Back Boring

15.5.1 Grout Back 8-Inch Boring

Payment shall include all costs to provide and install the grout-back as described in this document including all costs to drill through grout and grout-back interval. Payment shall be made at the appropriate footage rates specified on the bid form for the item: GROUT TO GROUT BACK 8-Inch BORING. The measurement shall be the number of linear feet of grout installed.

15.5.2 Grout Back 10-Inch Boring

Payment shall include all costs to provide and install the grout-back as described in this document including all costs to drill through grout and grout-back interval. Payment shall be made at the appropriate footage rates specified on the bid form for the item: GROUT TO GROUT BACK 10-Inch BORING. The measurement shall be the number of linear feet of grout installed.

15.6 Payment to Provide and Install PVC Screen

15.6.1 Provide and Install 4-Inch PVC Screen

Payment shall include all costs to provide and install the PVC screen including costs to clean the screen if ENGINEER finds it to be contaminated. Payment shall be made at the appropriate footage rate specified on the bid form for the item: PROVIDE AND INSTALL 4 INCH MONITORING WELL SCREEN. Measurement shall be the length of screen specified by the ENGINEER.

15.6.2 Provide and Install 6-Inch PVC Screen

Payment shall include all costs to provide and install the PVC screen including costs to clean the screen if ENGINEER finds it to be contaminated. Payment shall be made at the appropriate footage rate specified on the bid form for the item: PROVIDE AND INSTALL 6-INCH PVC MONITORING WELL SCREEN. Measurement shall be the length of screen specified by the ENGINEER.

15.7 Payment to Provide and Install PVC Casing

15.7.1 Provide and Install 4-Inch PVC Casing

Payment shall include all costs to provide and install the PVC casing including costs to clean the casing if the ENGINEER finds it to be contaminated. Payment shall be made at the appropriate footage rate specified on the bid form for the item: PROVIDE AND INSTALL 4-INCH PVC MONITORING WELL CASING. Measurement shall be the length of casing installed in the monitoring well and specified by the ENGINEER.

15.7.2 Provide and Install 6-Inch PVC Casing

Payment shall include all costs to provide and install the PVC casing including costs to clean the casing if the ENGINEER finds it to be contaminated. Payment shall be made at the appropriate footage rate specified on the bid form for the item: PROVIDE AND INSTALL 6-INCH PVC MONITORING WELL CASING. Measurement shall be the length of casing installed in the monitoring well and specified by the ENGINEER.

15.8 Payment to Provide and Install Steel Casing

Payment shall include all costs to provide and install the steel casing, and shall include costs to clean the casing if the ENGINEER finds it to be contaminated. Payment shall be made at the appropriate footage rate specified on the bid form for the item: PROVIDE AND INSTALL 6-INCH STEEL MONITORING WELL CASING. Measurement shall be the length of casing installed in the monitoring well and specified by the ENGINEER.

15.9 Payment to Provide and Install Sand pack

15.9.1 Provide and Install Sand pack in 4-Inch Well

Payment shall include all costs to provide and install sand pack, and the 5-foot bentonite pellet seal. Payment shall be made at the appropriate rate specified on the bid form for the item: PROVIDE AND INSTALL SAND PACK IN 4-INCH WELL. Measurement shall be the number of linear feet of sand pack specified by the ENGINEER, and a measured 5 feet of bentonite pellets in the annular space above the top of the sand pack.

15.9.2 Provide and Install Sand pack in 6-Inch Well

Payment shall include all costs to provide and install sand pack, and the 5-foot bentonite pellet seal. Payment shall be made at the appropriate rate specified on the bid form for the item: PROVIDE AND INSTALL SAND PACK IN 6-INCH WELL. Measurement shall be the number of linear feet of sand pack specified by the ENGINEER, and a measured 5 feet of bentonite pellets in the annular space above the top of the sand pack.

15.10 Payment to Provide and Install Grout Seal

15.10.1 Provide and Install Grout Seal 4-Inch Wells

Payment shall include all costs to provide and install the BENTONITE grout seal as described in this document for the 4-inch diameter monitoring well construction. Payment shall be made at the appropriate rate per linear foot specified on the bid form for the item: PROVIDE AND INSTALL BENTONITE GROUT SEAL IN 4-INCH WELLS. Measurement shall be the number of linear feet specified by the ENGINEER.

15.10.2 Provide and Install Grout Seal 6-Inch Wells

Payment shall include all costs to provide and install the BENTONITE grout seal as described in this document for the 6-inch diameter monitoring well construction. Payment shall be made at the appropriate rate per linear foot specified on the bid form for the item: PROVIDE AND INSTALL BENTONITE GROUT SEAL IN 6-INCH WELLS. Measurement shall be the number of linear feet specified by the ENGINEER.

15.11 Payment to Provide and Install Neat-Cement Grout Seal

15.11.1 Provide and Install Neat-Cement Grout Seal 4-Inch Well

Payment shall include all costs to provide and install the neat cement grout seal as described in this document for the 4-inch diameter monitoring well construction. Payment shall be made at the appropriate rate per linear foot specified on the bid form for the item: PROVIDE AND INSTALL NEAT CEMENT GROUT SEAL IN 4-INCH WELL. Measurement shall be the number of linear feet specified by the ENGINEER.

15.11.2 Provide and Install Neat-Cement Grout Seal 6-Inch Well

Payment shall include all costs to provide and install the neat cement grout seal as described in this document for the 6-inch diameter monitoring well construction. Payment shall be made at the appropriate rate per linear foot specified on the bid form for the item: PROVIDE AND INSTALL NEAT CEMENT GROUT SEAL IN 6-INCH WELL. Measurement shall be the number of linear feet specified by the ENGINEER.

15.12 Payment to Provide and Install Bridging Materials

Payment shall include all costs to provide and install bridging materials. Payment shall be made at the appropriate rate per cubic foot (or per 5-gallon bucket for bentonite pellets) as specified on the bid form in for the items: PROVIDE AND INSTALL GRANULAR BENTONITE; PROVIDE AND INSTALL BENTONITE PELLETS; PROVIDE AND INSTALL BANK-RUN SAND, PROVIDE AND INSTALL PEA SIZED GRAVEL. Measurement shall be the number or portion of cubic feet (or 5-gallon bucket for bentonite pellets) as specified by the ENGINEER.

15.13 Payment to Provide and Install Surface Completion

Payment shall include all costs to provide and install the surface completion and shall be made at the appropriate per monitor well rate as specified on the bid form for the item: PROVIDE AND INSTALL SURFACE COMPLETION. Measurement will be the number of monitor wells which have had surface completions installed. Surface completions include the casing, the concrete pad, the lock, slip cap, the protective posts, and labor.

15.14 Payment for Well Development

Payment for well development shall be made as a lump sum payment at the rates specified on the Schedule of Charges. This shall include all costs for completing the development of the well as specified at the appropriate per monitor well rate as specified on the bid form for the item: DEVELOP MONITOR WELL. Measurement shall be the number of wells in which the development and testing has been completed.

15.15 Payment for Well Specific Capacity Test

Payment for well specific capacity testing shall be made as a lump sum payment at the rates specified on the bid form for the item: SPECIFIC CAPACITY TESTING. This shall include all costs for completing the testing of the well as specified. Measurement shall be the number of wells in which the testing has been completed.

15.16 Payment for Standby Time

Payment for standby time shall be at the hourly rates specified on the bid form for the item: STANDBY TIME. Measurement shall be the number of hours for which the drilling rig and crew are available and on standby as authorized by the ENGINEER. A maximum of eight hours per working day of standby time will be allowed.

15.17 Payment for Extra Work Requiring Drilling Rig with Crew

Payment shall include all costs to provide and operate drilling rig with crew and includes rig, all tools, all equipment, fuel, and crew normally used to install the monitoring wells as prescribed in this document. Payment shall be made at the hourly rate specified on the bid form for the item: DRILLING RIG WITH CREW. Measurement shall be the number of hours the drilling rig with crew is used for extra work authorized, in writing, by the ENGINEER.

15.18 Payment for Extra Work Requiring Pump Rig with Crew

Payment shall include all costs to provide and operate pump rig with crew and includes rig, all tools, all equipment, fuel, and crew normally used to install and remove pump and discharge pipe assemblies. Payment shall be made at the hourly rate specified on the bid form for the item: PUMP RIG WITH CREW. Measurement shall be the number of hours the pump rig with crew is used for extra work authorized, in writing, by the ENGINEER.

15.19 Payment for Extra Work Requiring Crew

Payment shall include all costs of providing one person to perform labor not requiring drilling rig or pump rig. Payment shall be made at the hourly rate specified on the bid form for the item: CREW (one-person labor). Measurement shall be the number of hours worked by crew multiplied by the number of persons for extra work authorized in writing by the ENGINEER.

15.20 Payment for Extra Materials and Equipment

All costs for extra materials and/or leased equipment (not already required in these specifications) shall be furnished on a cost-plus basis, at cost plus 10 percent. CONTRACTOR shall submit to ENGINEER proper documentation of purchase price and quantity of all extra materials and rental rate and quantity of days rented for all leased equipment. Proper documentation includes copies of all appropriate receipts, shipping documents, lease agreements, etc. All extra materials and equipment must be authorized by ENGINEER in writing before they can be purchased or leased.



Base map from GOOGLE June 21, 2015



-  Existing Monitoring Well
-  New Monitoring Well

MONITOR WELL LOCATION MAP
Figure 1

48-INCH DIAMETER CONCRETE PAD
MINIMUM 6-INCH THICKNESS TO 2 FEET
BELOW GRADE

4-INCH DIAMETER SCHEDULE
40 PVC FEMALE SLIP CAP

WEEPHOLE

12-INCH DIAMETER GALVANIZED PAINTED STEEL LOCKING
SURFACE CASING WITH TIGHTLY FITTING COVER

8 FOOT 2-INCH DIAMETER STEEL MARKER POST IN CONCRETE TO 2 FEET BELOW GRADE

4-INCH SCHEDULE 40 PVC CASING
TO 30 INCHES ABOVE GRADE

NOTE:NOT TO SCALE

NEAT CEMENT OR BENTONITE GROUT TO 2 FEET BELOW GRADE

4-INCH DIAMETER SCHEDULE 40
PVC CASING, FLUSH COUPLED

5-FOOT HYDRATED BENTONITE PELLET SEAL
TREMIED TO LOCATION SPECIFIED BY SITE
ENGINEER

16-40 GRADED COLORADO SILICA SAND
TREMIED TO WITHIN 5 FEET SANDPACK
AT ALL TIMES AND SURGED DURING INSTALLATION

10-FOOT LENGTH OF FLUSH COUPLED
4-INCH DIAMETER SCHEDULE 40 PVC 0.010 SLOTTED
SCREEN WITH THREADED END CAP CLOSURE

NOTE:NOT TO SCALE

WATER
TABLE
SURFACE

GROUT SEAL
5-FOOT BENTONITE PELLET SEAL
TREMIE SAND PACK TO 3-FEET
ABOVE TOP OF SCREEN SETTING

TOTAL DEPTH 40 TO 60 FEET

10-FOOT SCREEN SECTION

8-INCH DIAMETER AIR HAMMER,
REVERSE CIRCULATION, OR
CONVENTIONAL AIR ROTARY
BORING WITH TEMPORARY
CASING TO BEDROCK

ALLUVIUM

ALLUVIUM

BEDROCK

FLUSH COUPLED 4-INCH
DIAMETER SCHEDULE 40 PVC
THREADED END CAP CLOSURE

NOTE:
ALL DRILLING AND WELL CONSTRUCTION
TO BE COMPLETED BY STATE OF UTAH
LICENSED WATER WELL DRILLER AND PUMP
INSTALLER. ALL WORK SHALL BE IN
ACCORDANCE WITH UTAH ADMINISTRATIVE
CODE (UAC) RULE R655-4 ADMINISTRATIVE
RULES FOR WELL DRILLERS; UTAH DEQ
DIVISION OF WATER QUALITY ACT 19-5-107
(1); AND THESE TECHNICAL SPECIFICATIONS.

TITLE

SCHEMATIC DIAGRAM OF 4-INCH DIAMETER
MONITORING WELL CONSTRUCTION
BONANZA POWER PLANT

SIZE

A

CAGE CODE

DWG NO

REV

0

DRAWN BY J.S.BROWN, P.G.

DATE: 03/14/2016

SCALE

SHEET

FIGURE 2

48-INCH DIAMETER CONCRETE PAD
MINIMUM 6-INCH THICKNESS TO 2 FEET
BELOW GRADE

6-INCH DIAMETER STEEL OR
ALUMINUM WELL SEAL CAP

WEEPHOLE

12-INCH DIAMETER GALVANIZED PAINTED STEEL LOCKING
SURFACE CASING WITH TIGHTLY FITTING COVER

8 FOOT 2-INCH DIAMETER STEEL MARKER POST IN CONCRETE TO 2 FEET BELOW GRADE

6-INCH STEEL CASING TO
30 INCHES ABOVE GRADE

NOTE: NOT TO SCALE

6-INCH DIAMETER STEEL CASING FLUSH COUPLED
TO PVC CASING AT 5 FEET BELOW GRADE

NEAT CEMENT OR BENTONITE GROUT TO 2 FEET BELOW GRADE

6-INCH DIAMETER SCHEDULE 40
PVC CASING, FLUSH COUPLED

5-FOOT HYDRATED BENTONITE PELLET SEAL
TREMIED TO LOCATION SPECIFIED BY SITE
ENGINEER

16-40 GRADED COLORADO SILICA SAND
TREMIED TO WITHIN 5 FEET SANDPACK
AT ALL TIMES AND SURGED DURING INSTALLATION

10-FOOT LENGTH OF FLUSH COUPLED
6-INCH DIAMETER SCHEDULE 40 PVC 0.010 SLOTTED
SCREEN WITH THREADED END CAP CLOSURE

NOTE: NOT TO SCALE

WATER
TABLE
SURFACE

GROUT SEAL
5-FOOT BENTONITE PELLET SEAL
TREMIE SAND PACK TO 3-FEET
ABOVE TOP OF SCREEN SETTING

TOTAL DEPTH 40 TO 60 FEET

10-FOOT SCREEN SECTION

ALLUVIUM

10-INCH DIAMETER AIR HAMMER,
REVERSE CIRCULATION, OR
CONVENTIONAL AIR ROTARY
BORING WITH TEMPORARY
CASING TO BEDROCK

ALLUVIUM

BEDROCK

FLUSH COUPLED 6-INCH
DIAMETER SCHEDULE 40 PVC
THREADED END CAP CLOSURE

NOTE:
ALL DRILLING AND WELL CONSTRUCTION
TO BE COMPLETED BY STATE OF UTAH
LICENSED WATER WELL DRILLER AND PUMP
INSTALLER. ALL WORK SHALL BE IN
ACCORDANCE WITH UTAH ADMINISTRATIVE
CODE (UAC) RULE R655-4 ADMINISTRATIVE
RULES FOR WELL DRILLERS; UTAH DEQ
DIVISION OF WATER QUALITY ACT 19-5-107
(1); AND THESE TECHNICAL SPECIFICATIONS.

DRAWN BY J.S.BROWN, P.G.

DATE: 03/15/2016

TITLE
**SCHEMATIC DIAGRAM OF 6-INCH DIAMETER
MONITORING WELL CONSTRUCTION
BONANZA POWER PLANT**

SIZE A	CAGE CODE	DWG NO	REV 0
SCALE	SHEET		FIGURE 3

BID SHEET - PROPOSED COSTS FOR
COAL COMBUSTION RESIDUAL MONITORING WELL INSTALLATION, DEVELOPMENT
AND TESTING BONANZA POWER PLANT NEAR VERNAL, UTAH

Item	Description	Estimated Quantity	Units	Unit Price	Total Item Price
1	Mobilization-demobilization	1	lump	\$	\$
2	Drill 8-inch Boring (for 4-inch well)	200	ft	\$	\$
3	Drill 10-inch Boring (for 6-inch well)	80	ft	\$	\$
4	Payment for Ground Water Sampling During Drilling	0	hr	\$	\$
5	Payment to Provide and Install Grout to Grout Back Boring 8-inch Boring	0	ft	\$	\$
6	Payment to Provide and Install Grout to Grout Back Boring 10-inch Boring	0	ft	\$	\$
7	Provide and Install 4-inch Sch 40 PVC Well Screen	40	ft	\$	\$
8	Provide and Install 6-inch Sch 40 PVC Well Screen	20	ft	\$	\$
9	Provide and Install 4-inch Sch 40 PVC Well Casing	170	ft	\$	\$
10	Provide and Install 6-inch Sch 40 PVC Well Casing	45	ft	\$	\$
11	Provide and Install 6-inch Steel Well Casing	16	ft	\$	\$
12	Provide and Install Sand Pack for 4-inch well (INCLUDES 5-FOOT BENTONITE PELLET SEAL)	72	ft	\$	\$
13	Provide and Install Sand Pack for 6-inch well (INCLUDES 5-FOOT BENTONITE PELLET SEAL)	36	ft	\$	\$
14	Provide and Install Grout Seal 4-Inch Wells	120	ft	\$	\$
15	Provide and Install Grout Seal 6-Inch Wells	40	ft	\$	\$
16	Provide and Install Neat-Cement Grout Seal 4-Inch Well	0	ft	\$	\$
17	Provide and Install Neat-Cement Grout Seal 6-Inch Well	0	ft	\$	\$
18	Payment to Provide and Install Bridging Materials - PROVIDE AND INSTALL GRANULAR BENTONITE	0	ft ³	\$	\$

BID SHEET - PROPOSED COSTS FOR
COAL COMBUSTION RESIDUAL MONITORING WELL INSTALLATION, DEVELOPMENT
AND TESTING BONANZA POWER PLANT NEAR VERNAL, UTAH

Item	Description	Estimated Quantity	Units	Unit Price	Total Item Price
19	Payment to Provide and Install Bridging Materials PROVIDE AND INSTALL BENTONITE PELLETS	0	5-gallon bucket	\$	\$
20	Payment to Provide and Install Bridging Materials PROVIDE AND INSTALL BANK-RUN SAND	0	ft ³	\$	\$
21	Payment to Provide and Install Bridging Materials PROVIDE AND INSTALL PEA SIZED GRAVEL	0	ft ³	\$	\$
22	Payment to Provide and Install Surface Completion	6	ea	\$	\$
23	Payment for Well Development	6	ea	\$	\$
24	Payment for Well Specific Capacity Test	8	ea	\$	\$
25	Standby time	0	hr	\$	\$
26	Extra Work- Drilling Rig with Crew	0	hr	\$	\$
27	Extra Work- Pump Rig with Crew	0	hr	\$	\$
28	Extra Work- drilling crew (per man)	0	hr	\$	\$
	TOTAL ESTIMATED PRICE			\$	\$

Signature and Title

Company

Date