



JORDAN VALLEY WATER
CONSERVANCY DISTRICT

1590 E. 4670 S. WELL CLEANING PROJECT

TECHNICAL SPECIFICATIONS AND DRAWINGS

MARCH 2023

JORDAN VALLEY WATER CONSERVANCY DISTRICT

**1590 E. 4670 S. WELL
CLEANING PROJECT**

BIDDING DOCUMENTS



Project Engineer

**HANSEN, ALLEN, & LUCE, INC.
Consultants/Engineers
859 W. South Jordan Pkwy, Ste. 200
South Jordan, UT 84095
(801) 566-5599**

SECTION 01 11 00

SUMMARY OF WORK – WELL CLEANING

1.1 GENERAL

- A. The project will include cleaning the 1590 E. 4670 S. Well with chemicals and well redevelopment to remove biofouling and encrustation and to restore well yield.
- B. All work shall conform to the Utah Division of Drinking Water rules and these specifications.
- C. The work to be performed under this project shall consist of furnishing all labor, materials, and equipment necessary or required to complete the work in all respects as herein specified.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. The project includes the following major tasks for the CONTRACTOR to complete:
 - 1. Remove the existing line shaft pump & pump column from the well.
 - 2. Perform a video well log to document the condition of the well.
 - 3. Investigate options for waste chemical treatment water disposal. Contact the utility owner(s) to determine the feasibility, requirements, and details for waste water disposal from the well cleaning project. Report to the OWNER the arrangements that will be needed and any permits that the OWNER may need to apply for.
 - 4. Brush and bail the well to remove debris and accumulated material at the bottom of the well.
 - 5. Furnish and place well cleaning chemicals in the well, agitate and remove after the soak period is completed. Dispose of waste chemicals in accordance with arrangements made with disposal facilities and with the approval of the OWNER.
 - 6. Re-develop the screened zones in the well. Prepare daily reports of the zones being developed and the amount of sand and silt that is produced. The OWNER will determine when to terminate well development based on the amount of sand and silt brought out of the well during development.
 - 7. Monitor the gravel pack level in the gravel feed tube before, during and after well development and replenish as needed.
 - 8. Perform a final well video to document the post cleaning condition of the well.
 - 9. Bail sand/sediment down to the bottom of the well.
 - 10. Disinfect the well in accordance with Utah Administrative Rules for Well Drillers.
 - 11. Perform a complete teardown of the pump bowls assembly and inspect the line shaft and oil tube. Provide a written report to the OWNER.

12. The OWNER will make arrangements for rebuilt or new pump bowls and any other components that may need to be replaced or rebuilt.
13. Reinstall the pumping system in the well including all components of the pumping system including motor, discharge head, line shaft pump, column, monitoring tube, etc. The OWNER will provide the motor for the pumping system to be installed by OTHERS.
14. Perform startup of the pumping system.
15. Demobilize from the site, including site cleanup.
16. The forgoing list includes the major tasks required but is not intended to be comprehensive for all tasks that may be necessary to complete the project.

1.3 CONTRACT METHOD

- A. The work hereunder will be constructed under a unit price contract.

1.4 CONTRACTOR USE OF PROJECT SITE

- A. CONTRACTOR's use of the project site shall be limited to its operations, including on-site storage of materials.

1.5 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Owner.
- B. Contractor shall be responsible for all damage to streets, roads, highways, shoulders, property, structures, facilities, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or personnel to or from the Work or any part or site thereof, whether by him or his Subcontractors. Contractor shall make satisfactory and acceptable arrangements with the Owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement, or payment of costs incurred in connection with the damage.

1.6 PROJECT SECURITY

- A. CONTRACTOR shall make all necessary provisions to protect the project and CONTRACTOR's facilities from fire, theft, and vandalism, and the public from unnecessary exposure to injury.

1.7 CHANGES IN THE WORK

- A. It is mutually understood that it is inherent in well rehabilitation work that some changes in the specifications may be necessary during the work to adjust for unforeseen field conditions, and that it is of the essence of the Contract to recognize a normal and expected margin of change. OWNER shall have the right to make such changes, from time to time, in the character of the work, and in the scope of the project as may be necessary or desirable to ensure the completion of the work in the most satisfactory manner without invalidating the Contract.

– END OF SECTION –

SECTION 02 67 60

WELL DISINFECTION

PART 1- GENERAL

1.1 DESCRIPTION

- A. This section covers disinfection of the production well in order to remove bacteriological contamination that may cause the well water to be unsafe for human consumption.

1.2 REFERENCES

- A. The latest edition of the following publications form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
 1. American Water Works Association (AWWA)
AWWA C-654 - Disinfection of Wells.
 2. State of Utah Public Drinking Water Regulations, Division of Drinking Water, latest edition.
 3. State of Utah Administrative Rules for Water Well Drillers, as found in R655 of the Utah Administrative Code.

PART 2- MATERIALS

2.1 DISINFECTING MATERIALS

- A. Disinfecting products shall consist of a chlorine solution using a calcium or sodium hypochlorite compound that will easily dissolve or mix with the water in the well. The strength of the chlorine solution shall be such that the desired chlorine residual of at least 50 mg/L may be readily achieved through the entire length of the well. Documentation by the CONTRACTOR referencing this residual shall be submitted to the OWNER.
- B. If directed, pH-controlled chlorination products materials may be required to increase the effectiveness of the disinfecting process.
- C. All chemicals and other products used shall conform to NSF Standard 60 for use with public drinking water facilities.

PART 3- EXECUTION

3.1 DISINFECTION

- A. The CONTRACTOR shall carry out adequate cleaning procedures immediately preceding disinfection where evidence indicates that normal well construction and development work have not adequately cleaned the well. All oil, grease, soil, and other materials, which could harbor and protect bacteria from disinfectants, shall be removed from the well.
1. The AWWA C-654 standard and the latest edition of the State of Utah Public Drinking Water Regulations will be used as a reference for the disinfection procedure.
 2. The well shall be disinfected with a chlorine solution using a calcium or sodium hypochlorite compound that will easily dissolve and mix with the water in the well. The strength of the chlorine solution shall be such that the desired chlorine residual of at least 50 mg/L may be readily achieved through the entire length of the well.
 3. Disinfected water shall be circulated throughout the well. Most of the flow should be returned to the well for recirculation. When returning water to the well, the flow should be directed to the well casing so as to completely wet that portion above the static water level. The solution shall remain in contact with the well casing above the static water level for at least 30 minutes.
 4. After the 30-minute recirculation period, the disinfecting solution shall be allowed to stand in the well for at least one hour and then pumped until a distinct chlorine odor is detected at the pump discharge. Then discontinue pumping for 24 hours after chlorine odor is detected before beginning pumping tests (see Section 02 67 10). If a chlorine odor is still detected at the end of the pumping tests, continue pumping until all traces of chlorine are removed.
 5. The CONTRACTOR shall neutralize disinfected water discharged from the well in accordance with all rules and regulations for the discharge location and facilities owner. The CONTRACTOR is responsible for preventing any damage to facilities, plant and animal life in the receiving stream, storm drain or other facility.
 6. When test pumping is approximately 2/3 completed, the CONTRACTOR shall make arrangements to collect water quality samples for bacteriological analysis.

- a. Two bacteriological samples will be obtained at a minimum time interval of 30 minutes. Both samples must pass.
 - b. In the event that the bacteriological test fails, the CONTRACTOR shall re-disinfect the well and retest the well at no additional cost to the OWNER.
- B. If applicable, the CONTRACTOR shall provide for the disinfection of the artificial well filter material and stabilization material in one of the following ways.
1. When placing the artificial well filter material or stabilization material with water, the water shall have a chlorine residual of at least 50 mg/L.
 2. Solid chlorine in the form of tablets shall be added to the artificial well filter material or stabilization material to obtain an equivalent chlorine residual of at least 50 mg/L.
 3. Other methods may be proposed by the CONTRACTOR for approval in advance by the OWNER.

– END OF SECTION –

SECTION 33 21 14

CHEMICAL WELL TREATMENT AND PUMPING SYSTEM INSPECTION

PART 1 GENERAL

1.01 DESCRIPTION

- A. This specification is for well cleaning treatment for Jordan Valley Water Conservancy District's 1590 E. 4670 S. Well.
- B. The CONTRACTOR shall provide all materials, labor, and equipment necessary to perform well cleaning & rehabilitation treatments as described in these specifications to restore the well to its original yield and efficiency to the highest extent possible.

1.02 SUBMITTALS

- A. The CONTRACTOR shall supply a listing of all chemicals that will be introduced into the well and used for neutralization. The list shall include the manufacturer, the supplier, the chemical name, and verification that the product is NSF 60 approved.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

- A. Water used in the chemical mix must be fresh drinking water from a municipal supply. The OWNER will provide a source of water on-site.
- B. Acids and other chemicals shall be mixed in the concentrations shown. All of the chemicals must be approved by the National Sanitation Foundation (NSF-60). No chemicals may be used without prior approval from the ENGINEER.
- C. Approved containers of sufficient size shall be used to safely mix the chemical solutions at the ground surface. Containers shall be clean and suitable for drinking water use. Mixing pumps or other approved means of mixing chemicals shall be constructed of acid-resistant materials. All chemicals shall be mixed at the surface. The CONTRACTOR shall not introduce any dry chemicals directly into the well.
- D. Acid-resistant pipe and fittings shall be used. No galvanized steel or aluminum pipe and fittings shall be used.
- E. A meter capable of accurately measuring pH between 1 and 10 units shall be provided. CONTRACTOR shall always have two methods of pH measurement on-site.

WELL TREATMENT CHEMICAL RECIPE

CHEMICAL	QUANTITY
Hydrochloric Acid, 35% NSF 60	970 Gallons
Phosphoric Acid, 75% NSF60	212 Gallons
Hydrogen Peroxide, 40% NSF 60	275 Gallons
KlearWell Catalyst or approved equal	110 Gallons
KlearWell MD Dispersant or approved equal	110 Gallons
KlearWell Non-Ionic Surfactant or approved equal	10 Gallons
Fresh Municipal Drinking Water	11,313 Gallons
TOTAL	13,000 GALLONS

- F. An Imhoff cone or Rossum Sand Tester shall be used to measure solids in waste acid solution and well development waste discharge.
- G. The CONTRACTOR shall supply and install temporary discharge piping from well development of sufficient size and length to conduct water to holding tanks and then to a discharge point approved by the ENGINEER.

2.02 DUAL SWAB CHEMICAL INJECTION AND WELL DEVELOPMENT EQUIPMENT

- A. Equipment for placing chemicals in the screened zones and for development with the cable tool rig shall include a dual swab assembly consisting of two (2) swabs approximately 10 feet apart on minimum 4-inch diameter pipe. The rubber swabs shall fit snugly in the well so as to minimize leakage around the swabs.
- B. The dual swab tool shall be used for placing chemicals in the screened zones of the well. A list of the amount of chemical mixture for each of the screened zones will be provided to the CONTRACTOR for use in placing the chemicals.
- C. The dual swab tool shall be used for removing the spent chemicals and for development of the well. An airlift or submersible electric pumping system capable of producing a minimum of approximately 200 gallons per minute under conditions existing at the site shall be used to remove the spent chemicals, development water and solids from the well. Development equipment must be employed with a cable tool drilling rig which imparts the "spudding" action to the development so as to simultaneously surge and pump the intake zone between the two swabs.

PART 3 EXECUTION

3.01 PROCEDURES

A. SAFETY

1. CONTRACTOR and his subcontractors shall be solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury, or loss to:
 - a. All persons on the Site who may be affected by the Work;
 - b. All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Site; and
 - c. Other property at the Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and underground facilities.
2. These specifications do not include safety standards, guidelines or instructions. Competent safety guidelines, practices and equipment should be obtained by the Contractor before commencing work.

B. WELL BRUSHING AND BAILING

1. The well shall be cleaned physically using a steel wire brush tool followed by bailing the well to remove as much scale and debris from the well as possible.
2. The brush shall be designed to be strong enough to help dislodge debris from the well casing and screens but not so strong that damage to the screens or well casing occurs.
3. The CONTRACTOR shall dispose of waste material off-site at an approved disposal facility.

C. CHEMICALS PLACEMENT AND AGITATION WITH DUAL SWAB TOOL

1. Prepare the chemical mix tank(s). The tank(s) shall be cleaned of all debris, chlorinated for disinfection, and rinsed thoroughly to remove all chlorine. Prepare the chemical solution in the proportions outlined above in the chemical mix tank(s).
2. Introduce the chemicals with the dual swab tool into the screened zones in the well. The chemicals shall be worked into the screen at a rate of at least 1 minute/foot. No water production from the well should be allowed during chemical placement.
3. The specified amount of chemicals shall be placed per foot of each screened zone according to the volumes provided to the CONTRACTOR by the ENGINEER.
4. Approximately 50 gallons of chemical solution shall be pumped into the gravel makeup tube, if possible, with regards to conditions at the site.

5. Allow the chemical mixture to remain in the well for the number of hours recommended by the chemical manufacturer/suppliers for soak time before removal.

D. CHEMICALS REMOVAL AND DISPOSAL

1. Removal of the chemicals from the well shall be accomplished with the dual swab tool. The acid shall be removed from the screened zones as well as the well sump (bottom portion of the well) and other potentially isolated zones.
2. Surge the well's screened zones with the dual swab tool with pumping to fully remove the chemicals and any loosened debris from behind the screens.
3. All solids shall be settled in the holding tanks. No solids may be released into the point of disposal. The quantity of solution, and quality and type of solids removed from the well shall be recorded. The suspended solids content of the solution shall be measured and recorded at 10- or 15-minute intervals. All of the water removed from the well shall be placed into the surface holding tank(s) for settling prior to disposal.
4. Neutralize the acid solution, in the surface holding tank, to a stable pH of approximately 7.0 to 8.0 units. A pH meter shall be used to determine the pH. The CONTRACTOR shall be responsible for monitoring pH level, treating, testing, and disposing of treated water to the designated disposal location approved by the ENGINEER. Water shall not be neutralized in the well.
5. Discharge neutralized and settled acid solution into the approved point of disposal. The discharge flow rate to the point of disposal sewer will be determined by the utility owners or the ENGINEER. The CONTRACTOR shall comply with the requirements of permits from the sewer and treatment utilities.

E. WELL DEVELOPMENT WITH DUAL SWAB TOOL WITH PUMPING

1. The CONTRACTOR shall develop the well by using a dual swab tool on a cable tool rig. Development shall consist of spudding the dual swab tool with the cable tool rig while simultaneously pumping 200 gpm from the dual swab tool to a surface settling tank. Development shall occur in the well's screened zones and shall be a minimum of approximately 10 minutes per foot (or as allowed by the approved budget).
2. Settle all solids in the holding tank.
3. Discharge the settled water to a location approved by the ENGINEER.
4. The CONTRACTOR shall record the nature and quantity of solids being produced from the well during well development at a frequency not to exceed 1 hour.

F. WELL DISINFECTION AND BAC-T TEST

1. The CONTRACTOR shall disinfect the well in accordance with the Utah Division of Drinking Water requirements in preparation for the OWNER to obtain a bacteriological sample.
2. Disinfection chemicals shall be pH controlled with chemicals and doses as follows:

PH CONTROLLED DISINFECTION CHEMICAL RECIPE

CHEMICAL	QUANTITY
KlearWell 440 Chlorine Enhancer or approved equal	80 Gallons
Chlorine, 12.5 % Liquid	48 Gallons
Fresh Municipal Drinking Water	19,872 Gallons
TOTAL	20,000 GALLONS

3.02 WELL VIDEO LOG

- A. The CONTRACTOR shall perform a video survey of the well after all chemicals have been removed from the well. The video shall commence at the top of the well head and continue to the bottom of the well. The video shall show the camera depth at 1 foot or smaller increments. The video shall be in color and shall include the down hole view and the sideways views. When in side-view mode, the camera shall be capable of rotating the view 360-degrees. The CONTRACTOR shall provide the OWNER with three copies of the video in electronic format.

3.03 PUMP INSPECTION

- A. The existing pumping system inspection shall include the following services:
 1. The existing pump bowls, pump column, oil tube and shaft shall be thoroughly pressure washed to remove all sand, dirt, and debris. The existing column, oil tube and shaft shall be inspected for any defects. If any defects are found, notify the OWNER.
 2. Remove the bowls suction assembly and measure the bottom impeller clearance with the bowls.
 3. Rotate the bowls shaft by hand and report any excessive play or obvious bearing issues.
 4. Perform Complete Teardown of the Existing Pump Bowls.
 5. Inspect Line Shaft, Impellers, Bearings, Tube, and Column for wear and damage.
 6. The Contractor shall report findings of the pumping system inspection to the District in writing.

3.04 CLEAN UP

- A. Upon completion of well cleaning operations all material, equipment and waste shall be removed from the site.
- B. The buildings and site shall be left clean and free and clear of any material, equipment, or debris, to the satisfaction of the ENGINEER.
- C. All equipment and connections shall be properly re-established.

- END OF SECTION -

APPENDIX

<u>Name</u>	<u>Pages</u>
Pump Data	8
Well Drillers Report	4

Turbine 60 Hz

Selection list: ---

Search Criteria:

Flow: 1700 US gpm
 Head: 610 ft
 Tolerance: --- % of head

Fluid: Water

Temperature: 60 °F
 SG: 1
 Viscosity: 1.105 cP
 Vapor pressure: 0.2563 psi a
 Atm pressure: 14.7 psi a

NPSHa: --- ft

Advanced Criteria:

Preferred Operating Area: ---
 Secondary Operating Point: ---
 Max temperature: --- °F
 Max suction pressure: --- psi g
 Max sphere size: --- in
 Max power: --- bhp
 Max suction specific speed: --- (Nss)
 Min trim: --- % of max diameter
 Min head rise: --- % to shutoff

Warnings: See the second page for a description of the warnings associated with this pump.

Curve Corrections: none

Catalog: Goulds Lineshaft 60HZ vers 2.37

Pump: 14RJMC (8 stages)

Type: Lineshaft
 Synch speed: 1800 rpm
 Speed: 1770 rpm
 Dia: 9.375 in
 Curve no.: 3126-1

Specific Speeds

Ns: 2990 Nss: ---

Dimensions:

Suction: --- in Discharge: --- in

Vertical Turbine:

Bowl size: 13.63 in
 Max lateral: 1 in
 Thrust K factor: 10 lb/ft

Pump Limits:

Temperature: 120 °F
 Pressure: 340 psi g
 Sphere size: 0.98 in
 Power: --- bhp

Motor: 350 hp

Speed: 1800
 Frame: 447
 Standard: NEMA
 Enclosure: TEFC
 Sizing criteria: Max Power on Design Curve

1590
 EAST

--- Data Point ---

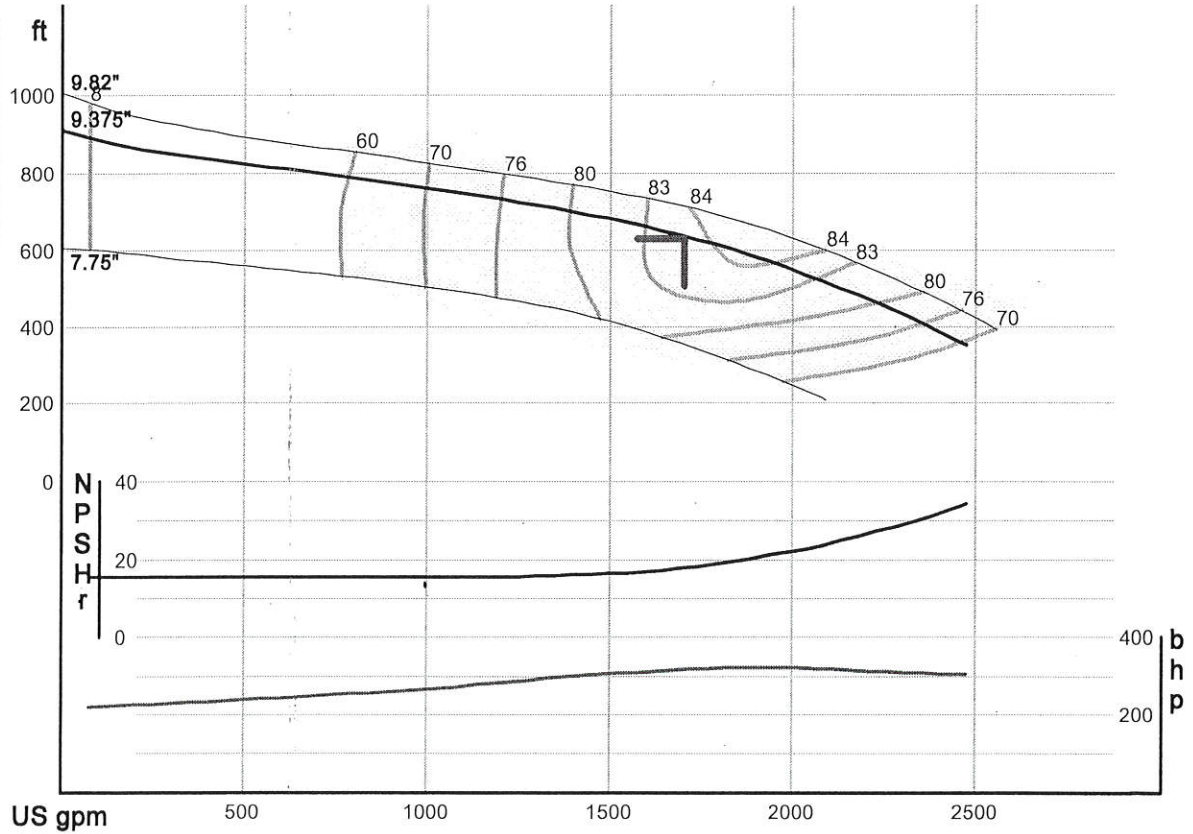
Flow: 1700 US gpm
 Head: 615 ft
 Eff: 83.6%
 Power: 315 bhp
 NPSHr: 17.5 ft

-- Design Curve --

Shutoff Head: 890 ft
 Shutoff dP: 385 psi
 Min Flow: --- US gpm
 BEP: 84.3% eff
 @ 1875 US gpm
 NOL Pwr: 320 bhp
 @ 1942 US gpm

-- Max Curve --

Max Pwr: 364 bhp
 @ 2086 US gpm



Pump note: Suction Size-10" Discharge Sizes-8",10",12"

Turbine 60 Hz

Selection list: ---

Catalog: Goulds Lineshaft 60HZ vers 2.37

Pump: 14RJMC (8 stages)

g List:

Pump shutoff dP exceeds limit for the pump.

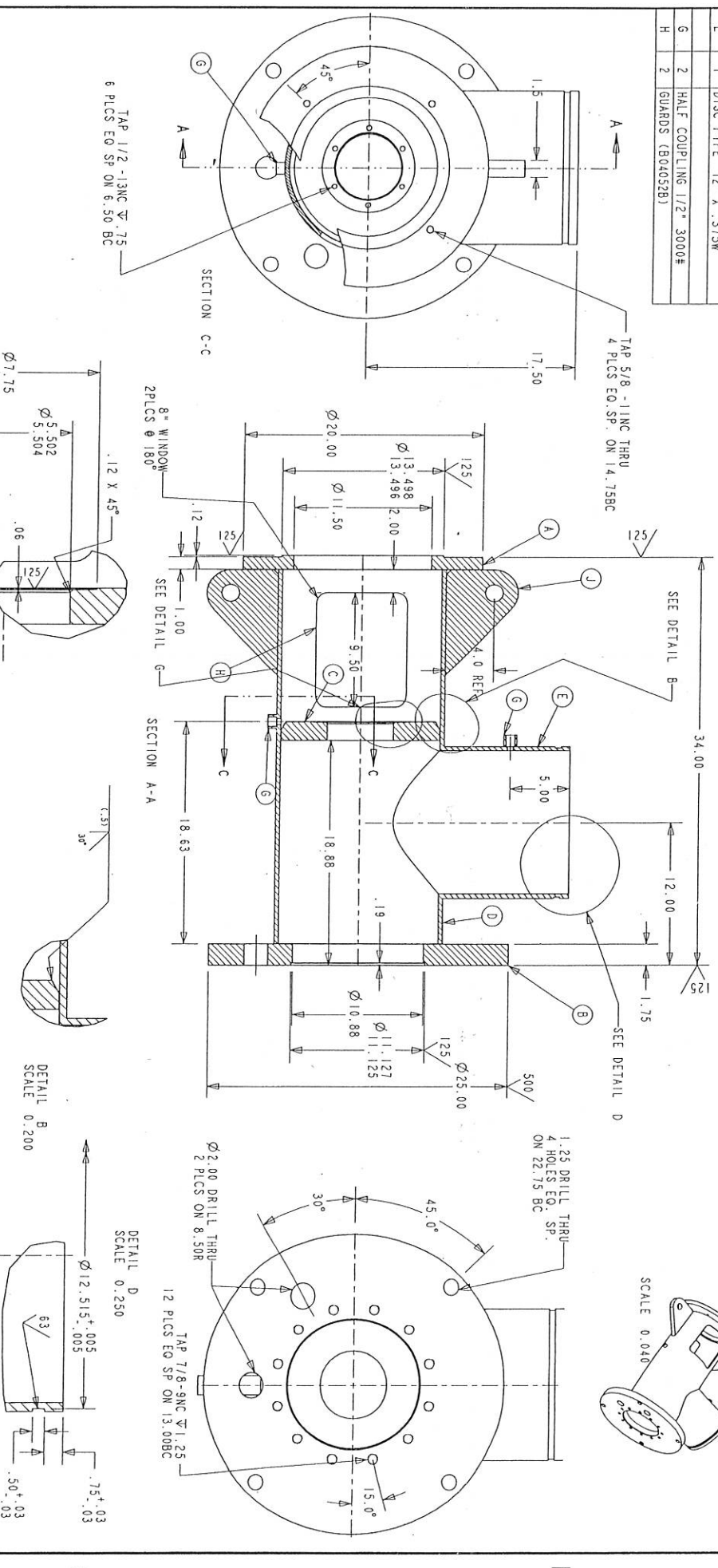
Performance Evaluation:

Flow	Speed	Head	Pump	Power	NPSHr	Motor	Motor	Hrs/yr	Cost
US gpm	rpm	ft	%eff	bhp	ft	%eff	kW		/kWh
2040	1770	514	83.1	318	22.2				
1700	1770	615	83.6	315	17.5				
1360	1770	685	79.4	295	15.4				
1020	1770	737	70.7	267	15				
680	1770	784	52.4	248	15				

ITEM	QTY	DESCRIPTION
A	1	TOP PLATE- 1.12
B	1	BOTTOM PLATE- 1.75
C	1	SEAL PLATE- 1.50
D	1	BODY PIPE 14" x .375W
E	1	DISC PIPE 12" x .375W
G	2	HALF COUPLING 1/2" 3000#
H	2	GUARDS (B04052B)

ITEM	QTY	DESCRIPTION
J	2	LIFTING LUGS 4.0" X 1.5 (B04309B02)

1. FILLET WELD ALL JOINTS, ONE SIDE, ALL AROUND WITH FILLET SIZE 75% OF MINIMUM WALL THICKNESS
2. TIR .005 BETWEEN ALL REGISTERS AND PARALLEL .003



REV	DATE	DESCRIPTION	DESIGNED BY	CHECKED BY

TT Industries
Engineered for life

NOTE: DO NOT SCALE DIMENSIONS. TOLERANCE FOR FINISH DIMS NOT OTHERWISE SPECIFIED INCHES

X.X ± 0.060
 X.XX ± 0.030
 X.XXX ± 0.010
 ANGLES ± 1.5°

[Symbol] = DATUM SYMBOL
 [Symbol] = DATUM TARGET
 [Symbol] = PROFILE
 [Symbol] = PARALLEL
 [Symbol] = PERPENDICULAR
 [Symbol] = TRUE POSITION
 [Symbol] = TIR
 [Symbol] = CONCENTRIC

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MODEL: DISC HEAD F-12-150 X 20 VICTAULIC
DATE: TURB
DATE: LAH 07-OCT-2005
DESIGNER: JORDAN VALLEY
GOULDS PUMPS-TEXAS DIVISION
 an IIT Industries Company
DATE: 9645
DATE: 484 LB
DATE: 1590EAST
DATE: 1
DATE: 1
DATE: 1

DISCHARGE HEAD REED FREQUENCY ANALYSIS

HEDVYB ver. 4.00.0002, Nov. 1999

Job Number : 1590 East

Date : 11-22-2005

OUTPUT PARAMETERS

MOMENTS of INERTIA (In⁴)

Section	X Direction	Y Direction
Driver Stand Solid area	372.7602	372.7602
Window Area	9.1943	129.203
Head Body	372.7602	372.7602

NATURAL FREQUENCIES

Direction	Frequency (CPM)	Ratio to Driver Speed
X (No Base)	606	0.3405
Y (No Base)	1164	0.6537
X (With Base)	602	0.338
Y (With Base)	1132	0.636

NOTE: Maximum Allowable Thrust = 13218

WARNING: Window Arc Length Exceeds 8.5.

DISCHARGE HEAD REED FREQUENCY ANALYSIS

HEDVYB ver. 4.00.0002, Nov. 1999

Job Number : 1590 East

Date : 11-22-2005

INPUT PARAMETERS

BasePlate

Thickness (In.)	1.75	Bolt Circle Dia (In.)	22.75
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Head Body

Nominal Diameter (In.)	14.0	Outside Diameter (In.)	14.0
Wall Thickness (In.)	0.375	Young's Modulus (psi)	29.5E+6
Height to Stuffing Box Plate (or Head Height) (In.)		19.125	

No Ribs on Head

Driver Stand

Nominal Diameter (In.)	14.0	Outside Diameter (In.)	14.0
Wall Thickness (In.)	0.375	Young's Modulus (psi)	29.5E+6
Height from Stuff.Box Plate to Driver Base (or Driver Stand Height) (In.)		14.875	

No Ribs on Stand

2 Windows, On Centerline

Arc Length, Ea. Window (In.)	8.0		
Total Window Height (In.)		10.5	
Bott. of Window to Stuff. Box Plate (In.)	1.375	Top of Window to Driver Base (In.)	3.0

Driver

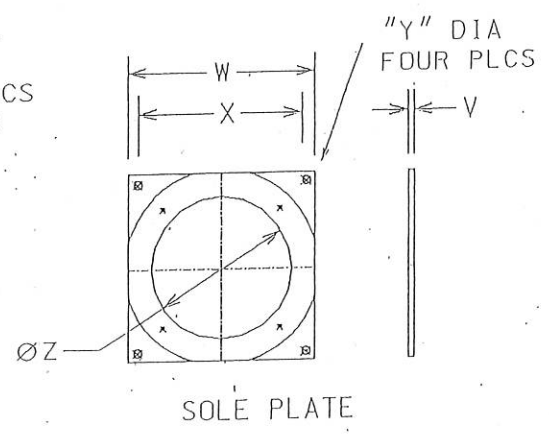
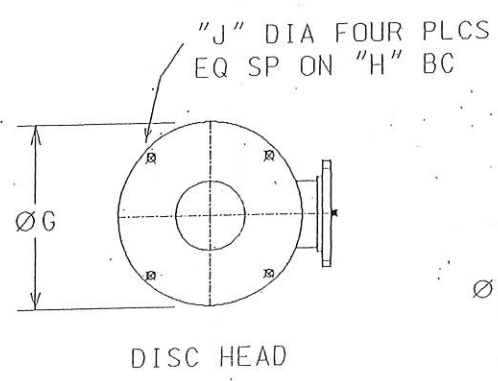
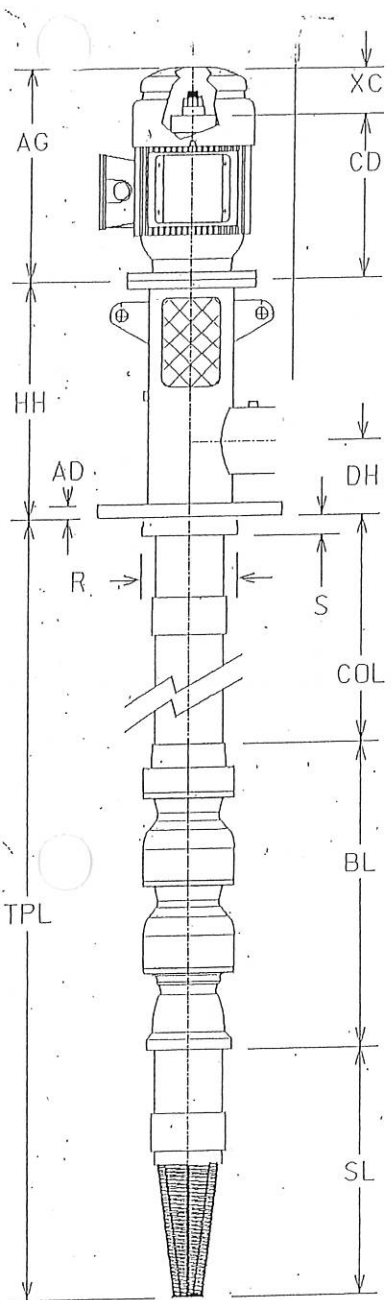
Weight (Lb.)	2100	Center of Gravity (In.)	22.0
Frequency (cpm)	1713	Deflection (In.)	0.012
Operating Speed (rpm)		1780	



REFER TO DISCHARGE HEAD
 DRAWINGS FOR DIMENSIONS

Pump Data

AD:	1.75	Size:	14RJMC
AG:	47.81	Stages:	8
BD:	20.0		
BL:	141.13		
	N/A		
CD:	42.66	BowlShaft:	1.94"
CL:	N/A	LineShaft:	1.94"
COL:	450.0'	LineShaft Type:	Enclosed-O/L
		Column:	Standard
DH:	12.00	Column:	12" Threaded
G:	32.00	Bearing Spacing:	5 feet
H:	29.50	Section Length:	10 feet
HH:	34.00	Head:	F:VIT
J:	1.38	Flange (Disch.):	
R:	19.00	Inlet:	
S:	4.13		
SL:	29.75	Seal:	O-Ring
TPL:	461.8'	Strainer:	Cone
UG:	N/A	SubBase:	Yes
V:	1.00		
W:	32.00		
X:	29.00		
XC:	5.13		
Y:	1.00		
Z:	26.00		
MAX:	13.63		



Hydraulic Data

Flow (gpm):	1700
Net Head (ft):	608.1
Total Head (ft):	615.0
Speed (rpm):	1770
Fluid:	Water
Temperature (F):	60
Viscosity (cP):	1.105
Specific Gravity:	1

Miscellaneous

Thrust At Design (lb):	10965
Thrust At Shutoff (lb):	13715
Min Water Level (in):	12

Weight

Pump (lb):	33166
Motor (lb):	2300
Total (lb):	35466

Motor Data

Model:	VHS
Make:	US
HP:	350
RPM:	1800
Type:	RUI
Efficiency:	94.0
Frame:	447TP
Ratchet:	NRR

Date: 09-13-2005



Overall Pump Parameters

Model:	14RJMC	Pump Operating Speed, RPM:	1770
Capacity, GPM:	1700	Total Dynamic Head, Ft.:	615.0
Total Pump Length, In.:	5541.1	Impeller Trim, In.:	9.4
Pump Type:	Well	Head Type:	F:VIT
Pump K-Factor:	10	Number of Stages:	8
		Pumping Level, In.:	12.0

LineShaft-Related Data

Shaft Diameter, In.:	1.94	Shaft Limit, HP:	586
Shaft Material:	416SS	Matl Correction Fact:	1.18
LineShaft Length, In.:	5400.00	Shaft Elongation, w/o Adder:	0.39
LineShaft Type:	Enclosed-O/L	Impeller Running Clearance:	0.13
Enclosing Tube Diameter:	3.00		

Bowl Data

Total Bowl Length, In.:	141.13	Bowl Diameter, In.:	13.625
Bowl Shaft Dia, In.:	1.94	Bowl Shaft Limit, HP:	587
		Bowl Shaft Material:	416SS

Column Data

Column Diameter, In.:	12	Column Load, Lb.:	20008.0
Wall Thickness, In.:	0.375	Column Elongation, In.:	0.23

HorsePower Data

Shaft Friction Loss, Hp.:	8.15	Thrust Load Loss, Hp.:	1.46
Bowl HP At Design, Hp.:	315	Motor HorsePower, Hp.:	350

Head Data

Column Loss, Ft.:	5.48	Head Loss, Ft.:	0.46
		Total Loss, Ft.:	5.94

Other Data

Hydraulic Thrust, Lb.:	6150.0	Thrust at Design, Lb.:	10965.0
Thrust at Shutoff, Lb.:	13715.2	Design NPSH, Ft.:	17.5
Available Lateral, In.:	1.00	Design Lateral, In.:	0.29
Shutoff Lateral, In.:	0.36	Actual Head above Grade, Ft.:	608.06

Efficiency Data (Efficiencies estimated not guaranteed)

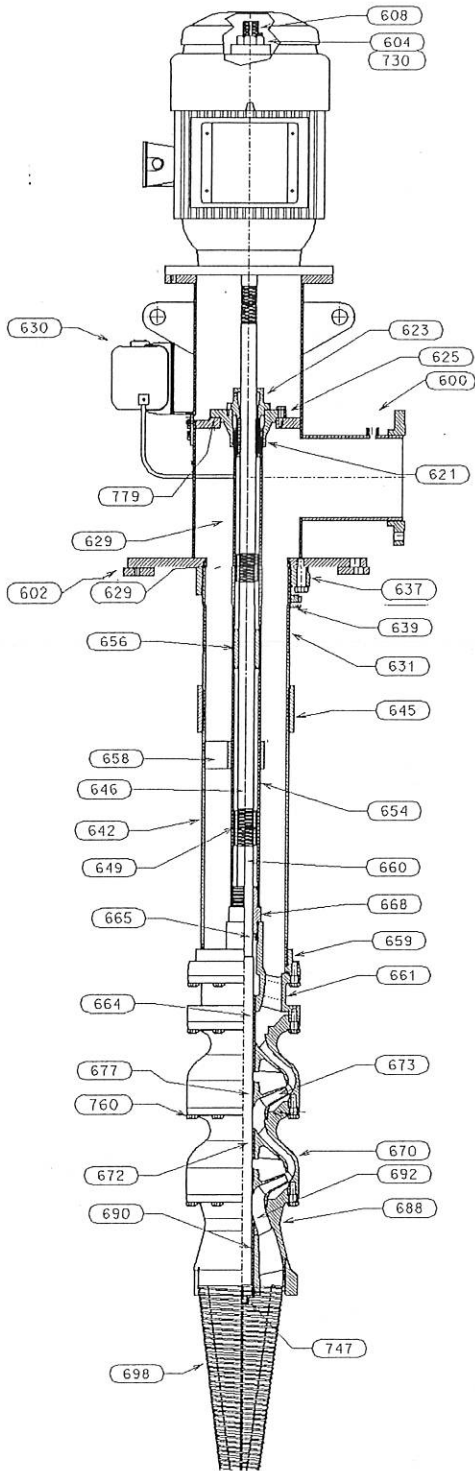
Bowl Efficiency:	83.60	Pump Efficiency:	80.35
Motor Efficiency:	94.00	Overall Efficiency:	75.53
		KWH/1000 gallons:	2.56

Component Weights

Bowl Weight, Lbs.:	1605	Column Weight, Lbs.:	30600
Impeller Weight, Lbs.:	961	Can Weight, Lbs.:	0
Motor Weight, Lbs.:	2300	Total Pump Weight, Lbs.:	35466



SECTIONAL
DWT-FFTM
 8 Stage 12x14RJMC



DISCHARGE HEAD ASSEMBLY

ITEM	NAME	Code	MATERIAL	ASTM
600	HEAD- DISCHARGE	8546	SCOTCHKOTE 134 12MIL ON STEEL	A53
602	SOLEPLATE	3201	CARBON STEEL	A36M-00a
604	NUT- ADJUSTING	2130	BRASS C36000	B16M-00
608	HEADSHAFT	2227	SST 416	A582M-95b
621	O'RING	5302	NITRILE BUNA N	D4322-96
623	NUT- TENSION	1187	SEMI-RED BRASS C84400	B584-00
625	PLATE- TENSION	1003	CAST IRON CL30	A48-94ae1
630	RESERVOIR- OIL	1425	ALUMINUM 319	B179-96
637	COLUMN FLANGE	8546	SCOTCHKOTE 134 12MIL ON STEEL	A53
730	KEY- MOTOR GIB	2242	CARBON STEEL 1018	A108-99
779	GASKET- HOUSING	5136	ACRYLIC/NITRILE	5136 REV 4

COLUMN AND LINESHAFT ASSEMBLY

629	NIPPLE- TUBE	6518	BLACK PIPE	A 53-98
631	COLUMN PIPE NIPPLE	6501	BLACK PIPE	A 53-98
639	COLUMN LOCK RING	1003	CAST IRON CL30	A48-94ae1
642	COLUMN PIPE	6501	BLACK PIPE	A 53-98
645	COLUMN COUPLING	6501	BLACK PIPE	A 53-98
646	LINESHAFT	2218	SST 416	A582M-95b
649	LINESHAFT COUPLING	2218	SST 416	A582M-95b
654	TUBE- ENCLOSING	6518	BLACK PIPE	A 53-98
656	LINESHAFT BEARING	1109	BRONZE, "G" - MODIFIED	B584-00
658	RETAINER- TUBE	5121	RUBBER EPDM	D3568-98

BOWL ASSEMBLY

659	ADAPTER- COLUMN TO BOWL	1003	CAST IRON CL30	A48-94ae1
660	SHAFT- BOWL	2218	SST 416	A582M-95b
661	BOWL- DISCHARGE	8545	SCOTCHKOTE 134 12MIL ON DUCTIL	A536-84(1999)e1
664	BEARING- DISC BOWL	1109	BRONZE, "G" - MODIFIED	B584-00
665	SEAL- OIL	0000	VENDOR STANDARD	x
668	BEARING- TUBE ADAPTER	1109	BRONZE, "G" - MODIFIED	B584-00
670	BOWL- INTERMEDIATE	8545	SCOTCHKOTE 134 12MIL ON DUCTIL	A536-84(1999)e1
672	BEARING- INT BOWL	1109	BRONZE, "G" - MODIFIED	B584-00
673	IMPELLER	1102	SILICON BRONZE C87600	B584-00
677	COLLET- IMPELLER	2218	SST 416	A582M-95b
688	BOWL/BELL- SUCTION	8545	SCOTCHKOTE 134 12MIL ON DUCTIL	A536-84(1999)e1
690	BEARING- SUCTION	1109	BRONZE, "G" - MODIFIED	B584-00
692	SANDCOLLAR	1109	BRONZE, "G" - MODIFIED	B584-00
698	STRAINER- SUCTION	6952	CARBON STEEL GALV	A123M-00
747	PLUG- PIPE	1046	MALLEABLE IRON	A197
760	CAPSCREW- HEX	2229	SST 316	A276-00a

WELL DRILLER'S REPORT

State of Utah

Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

B.S.
12-22-04

Well Identification

Change Application: a19835 (57-2552)

WIN: 29841

Owner

Note any changes

Jordan Valley Water Conservancy District
P.O. Box 70
West Jordan UT 84084-0070

Contact Person/Engineer: David Hansen / Hansen Allen + Luce

Well Location

Note any changes

S 2390 E 1150 from the N4 corner of section 05, Township 2S, Range 1E, SL B&M

1590 E. 4670 South, Murray UT

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Drillers Activity

Start Date: 8-23-04 Completion Date: 9-7-04

Check all that apply: New Repair Deepen Clean Replace Public Nature of Use: _____
If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0 50'	4 1/2"	Auger	Water + Bentonite
50' 830'	2 1/2"	Reverse Rotary	Water only

Well Log

DEPTH (feet) FROM TO	WATER	PERMEABLE High Low	UNCONSOLIDATED							CONSOLIDATED		DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
			CLAY	SAND	GRAVEL	COBBLES	Boulders	Other	ROCK TYPE	COLOR		
0 60			X	X								
60 95			X									
95 105			X								Black + grey	<div style="border: 2px solid black; padding: 10px; font-weight: bold; font-size: 1.2em;">RECEIVED</div> <div style="font-weight: bold; font-size: 1.1em;">DEC 22 2004</div> <div style="font-weight: bold; font-size: 1.1em;">WATER RIGHTS SALT LAKE</div>
105 185				X	X							
185 205			X									
205 260			X	X	X							
260 275			X								Red	
275 380					X	X						
380 390			X									
390 435				X	X	X						

Static Water Level

Date 11-12 Water Level 28' feet Flowing? Yes No
 Method of Water Level Measurement M Slope Electric Sensor If Flowing, Capped Pressure _____ PSI
 Point to Which Water Level Measurement was Referenced _____ Elevation _____
 Height of Water Level reference point above ground surface _____ feet Temperature _____ degrees C F

WELL DRILLER'S REPORT ADDITIONAL DATA FORM

State of Utah
Division of Water Rights

Well Identification

Change Application: a19835 (57-2552)

Owner

Note any changes

Jordan Valley Water Conservancy District
P.O. Box 70
West Jordan UT 84084-0070

Contact Person/Engineer: _____

Well Location

Note any changes

S 2390 E 1150 from the N4 corner of section 05, Township 2S, Range 1E, SL B&M

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

Well Log

DEPTH (feet) FROM TO		WATER	PERMEABLE		UNCONSOLIDATED					CONSOLIDATED	ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
			High	Low	CLAY	SAND	GRAVEL	COBBLES	BOULDER	OTHER			
435	530				X							Gray	
530	545						X	X	X				
545	565				X								
565	595						X	X					
575	635				X								
635	655				X		X	X					
655	665				X		X						
665	685						X	X					
685	715				X							Gray	
715	745						X	X					
745	785				X	X							
785	800					X	X	X					
800	815				X							Brown	
815	830				X	X							
830	850					X	X						
850	860				X	X							

Construction Information

DEPTH (feet)		CASING			DEPTH (feet)		<input type="checkbox"/> SCREEN <input type="checkbox"/> PERFORATIONS <input type="checkbox"/> OPEN BOTTOM		
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per foot/interval)
0	50'	Conductor Casing	.375	36"	275	295	.040	20"	Continuous wire wrap
0	295	Well Casing	.375	20"	335	395	.040	20"	C.W.W.
295	335	Well Casing	.375	20"	415	435	.040	20"	C.W.W.
435	530	Well Casing	.375	20"	530	550	.040	20"	C.W.W.
550	565	Well Casing	.375	20"	565	580	.040	20"	C.W.W.

Well Head Configuration: _____ Access Port Provided? Yes No
 Casing Joint Type: Collared Welded Joints Perforator Used: No
 Was a Surface Seal Installed? Yes No Depth of Surface Seal: _____ feet Drive Shoe? Yes No
 Surface Seal Material Placement Method: Grout Pump through tremie pipe.

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION		
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One		DRAWDOWN (ft)	TIME PUMPED (hrs & min)
			GPM	CFS		
11-12	Turbine Pump	6.42	2352		366.3	97 hrs

Pump (Permanent)

Pump Description: _____ Horsepower: _____ Pump Intake Depth: _____ feet
 Approximate Maximum Pumping Rate: _____ Well Disinfected upon Completion? Yes No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary Circumstances, abandonment procedures. Use additional well data form for more space.

Well Driller Statement

This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name BEYLIK DRILLING I & PUMP SERVICE INC. License No. 471
 Signature R.S. Beylik Date 12-17-04
(Licensed Well Driller)

Construction Information (con't)

DEPTH (feet)		CASING			DEPTH (feet)		<input type="checkbox"/> SCREEN	<input type="checkbox"/> PERFORATIONS	<input type="checkbox"/> OPEN BOTTOM
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
580	635	Well casing	.375	20"	635	650	.040	20"	C.W.W
650	660	Well casing	.375	20"	660	680	.040	20"	C.W.W
680	715	Well casing	.375	20"	715	735	.040	20"	C.W.W
735	785	Well casing	.375	20"	785	795	.040	20"	C.W.W
795	815	Well casing	.375	20"					
0	130	Gravel Feed line	sch 40	3"					

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION			
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)	
0	100'	Neat Cement 23.5 sac	18 yds	16.7 lbs/gallon	
100'	820'	8-12 Colorado Silice	1620 cu ft		

Comments (con't)

Well Driller Statement This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name BEYLIK DRILLING I & PUMP SERVICE INC. License No. 471
(Person, Firm, or Corporation - Print or Type)

Signature RS. Beylik Date 12-17-04
(Licensed Well Driller)