

TWP	RGE	SEC	NE				NW				SW				SE				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
			The City of Kuna's Water Delivery Service Area																

3. **Delivery System Diagram:** Indicate all major components and distances between components. Indicate weir size / ditch size / pipe I.D. as applicable.

See attached sheets, appendices, and figures:

XX Copy of USGS Quadrangle Attached showing location(s) of point(s) of diversion and place(s) of use (Figure 1).

XX Aerial Photo Attached (required for irrigation of 10+ acres). (Figure 2).

XX Photos of Diversion and System Attached (Figures 3-8).

4.

Well or Diversion Identification No.*	Motor Make	HP	Motor Serial No.	Pump Make	Pump Serial No. or Discharge Size
Danskin Well # 1	CentriPro Model No. 8M1504	150	G2851402H	Goulds Pumps Model # 11-CLC	SN = not recorded 8-inch discharge head to 8-inch discharge piping
Danskin Well #2	Unknown	30 or 50 ??		ITT Goulds Pumps Model # 7-WALC	SN = not recorded 4-inch pit-less discharge to 4-inch discharge piping

*Code to correspond with No. on map and aerial photo

D. FLOW MEASUREMENTS

1.

Measurement Equipment	Type	Make	Model No.	Serial No.	Size	Calibration Date
Well #1 is a Fischer Porter Flow-meter (now ABB)	Magnetic Induction	MW500	10D – 3311SDE18P1A2BA1 132XJAAAC1	95W019484	8-inch	Factory Calibrated in 1995
Well #2 is a Fischer Porter Flow-meter (now ABB)	Magnetic Induction		10D – 1475HN14PL28AC11 C4112C1	00W020808	3-inch	Factory Calibrated in 2000

2. **Measurements:** Discharge measurements for this examination were made using the magnetic induction flow-meter listed above (Figures 3 and 4). The minimum piping installation recommendations of the manufacturer (Appendix A) are **not** completely met because an 80-inch length of straight-run pipe downstream of a control valve is not available upstream of the meter (Figure 5). The Danskin Well #1 flow-meter has 48½ -inches of straight-run pipe upstream to a control valve. Discussion with the manufacturer's technical support staff allowed that because the upstream valve was a globe-type valve there was likely to be less turbulent flow and because the instantaneous LED read-out was observed to be relatively steady at all discharge rates, because the observed flow-rates did match well with the pump performance curves, it is generally believed likely that the flow-meter was reading correctly (Figure 6).

E. NARRATIVE/REMARKS/COMMENTS

The field examination for this permit was carried out on January 25th, 2010 by me, Ed Squires, accompanied by Ms. Janice Yerton, Superintendant of the City of Kuna Water Department. Also present, were Loren Pearson (hydrogeologist with Hydro Logic, Inc.) and several City of Kuna water system operations personnel. Both of the City of Kuna's "Danskin" municipal wells are located on the same well lot (Figure 2) located on the SE corner of Columbia and S. Ten Mile Roads in north Kuna and are discussed separately below. **Well #1** is a 20-inch diameter, 418-foot deep well completed in 2000 (Figure 7). Well #1 is housed inside of a 16-foot by 32-foot stucco pump house (Figure 8) and is the larger capacity (main) well on the site. Well #1 is equipped with an ITT Goulds Pumps 2-stage, Model 11CLC deep well submersible turbine pump set on 200-feet of 8-inch pump column by Layne of Idaho (Figure 9). The design point of the pump is 1,344 gallons per minute (gpm) at 302-feet of total dynamic head (Figure 9). The pump is driven by a 150 hp, 460 volt, 3,600 rpm, CentriPro submersible motor (Figure 10). The 8-inch diameter discharge-piping is comprised of a series of 8-inch plumbing fittings and fixtures, including check-valve, tees, couplings, flow-meter, and control valve (Figure 5) prior to exiting through the pump-house floor where it joins with the City's 12-inch mainline running down Columbia Roads. The pumping plant is equipped with a variable speed drive unit (Figure 10) designed to pump directly to the pressurized water distribution system. The flow-meter on the 8-inch discharge records all discharge from the Danskin Well # 1 except for a flush-to-waste system for purging the well. The well pump is set to operate within a predetermined pressure range in the distribution system that varies with season and demand; typically 50-to-85 psi.. Of course the well produces more water against less system pressure compared to when system pressure is higher.

When we arrived on-site, the Well #1 pump was not operating and the line pressure was 86 psi (a reading we later found to be high using our own calibrated gages). Non-pumping water level in the well was measured at 80.05 feet below measuring point (bmp) which is 18 inches above pump house floor; almost identical to the measured non-pumping water level of ten years earlier (Appendix B). The totalizing read-out of the flow-meter on our arrival was 3,398,504,000 gallons (Figure 6). We had the system operators turn on the pump and we measured pumping water level and line pressure for about a half-hour when the water level was drawn down to 96.81 feet bmp at a discharge of 687 gpm-to-950 gpm, at system pressures around 80 psi, and a calculated speed of 3,100 rpm out of 3,540 rpm; an observed frequency of 50.1 Hertz (Hz) out of 60 Hz available. In other words, the pump was not running at full speed because the operators were concerned about the high system pressures that would be increased at full speed at this time of year. According to the Water Department personnel, the system pressure is higher in the winter months owing to lowered water demand and they were concerned about continuing to pump above these line pressures at the level of system demand during our examination without opening fire hydrants or flushing lines in the system which would not show actual operating conditions.. Water-level measurements are facilitated through a 1/2-inch diameter measuring port in the discharge plate of the well head (Figure 5).

Because we were not able to observe the Danskin Well #1 operating at full capacity, we did an analysis using our measured water level and pressure data with respect to the pump-performance curve. Owing to the Well #1 being equipped with a variable frequency drive unit that regulates the speed of the pump motor, one must use a special set of pump performance curves to evaluate discharge at a given total dynamic head versus speed of the pump (Figure 11). Plotting of the measured data shows that the pumping plant is operating according to specifications (see calculations section). We also reviewed the hydraulic testing data and hydrograph of the well upon completion by United Water Idaho (Appendix B) to find that the well was producing almost exactly according to

its measured specific capacity during hydraulic testing of the well ten years earlier. The field examination was conducted during the winter low-demand season when system pressures are typically higher. Finally, our review of the available production records for this well show an average pumping rate of 1,350 gpm over a 24 hour period in June of 2009 (Appendix C).

According to the pump performance curve (Figure 11), installed HP, and available discharge piping, it appears that Well #1 should easily be capable of the instantaneous discharge rate of Permit No. 63-12552 (3 cfs or 1,346 gpm) pumping against reasonable summertime system pressures in the range of 50-to- 70 psi. Conversely, if the well were pumped against a system pressure of 60 psi (a reasonable operating pressure 20 psi above the regulated minimum for public drinking water systems) the pumping plant should, according to the pump performance curve, produce about 1,500 gpm (see calculations section and Figure 11). The pumping water levels and calculated specific capacity measured during the field-licensing examination correspond almost exactly to those measured during the initial hydraulic testing of the new well in 2000. Therefore, the installed capacity (pumping plant) and the well itself are both capable of the instantaneous discharge rate requested. Indeed, the well would likely produce in excess of 1,800 gpm (maximum possible) pumping against a system pressure of ~ 40 psi or during flushing operations or a fire-flow situation (pumping against zero-to-20 psi) but these instances are not considered typical. Well #2 is a 12-inch diameter, 353-foot deep well completed in 2002. Well #2 is located approximately 35 feet southwest of a 16-foot by 32-foot stucco pump control house (Figures 2 and 8) and is the smaller capacity (back-up) well on the site. As part of the beneficial use licensing field exam, we did not activate the Well #2 pumping plant. The installed plant is not nearly as well documented as for Well #1 but we made a concerted effort to obtain all available records from the City of Kuna and from United Water Idaho; the previous owner and who apparently designed and equipped Well #2. Well #2 is equipped with a ITT Goulds Pumps 3-stage, Model 7WALC deep well submersible turbine pump (Figure 12) set on 140-feet of 4-inch pump column. The design point of the pump is 260 gallons per minute (gpm) at 260-feet of total dynamic head (Figure 12). This pump is driven by a 30 hp (or 50 HP with two conflicting records), 460 volt, 3,450 rpm, submersible motor. The 4-inch diameter discharge-piping is comprised of a series of 4-inch plumbing fittings and fixtures, including check-valve, tees, couplings, flow-meter, and control valve (Figure 13) prior to being joined to the 8-inch Well #1 well head plumbing just before it exits through the pump-house floor where it joins with the 12-inch mainline running down Columbia Road. The pumping plant is equipped with a variable speed drive unit (Figure 10) designed to pump directly to the pressurized water distribution system. The flow-meter on the 4-inch discharge records all discharge from the Danskin Well # 2. The well pump is set to operate within a predetermined pressure range in the distribution system that varies with demand; typically 50-to-85 psi.. Of course the well produces more water against less system pressure compared to when system pressure is higher.

When we arrived on-site, the Well #2 pump was not operating and Janice stated that Well #2 is not used as regularly as Well #1. We measured the non-pumping water level in the well at 84.45 feet below measuring point (bmp) which 1.9 feet above ground level (Figure 14); very close to the measured non-pumping water level of eight years earlier (Appendix B). The totalizing read-out of the flow-meter on our arrival was 93,400,000 gallons. Water-level measurements are facilitated through a ¾ -inch diameter pipe located under the well cap (Figure 14). Our review of the available production records for this well showed that the well was operated for 24-hour periods at ~300 gpm in the spring and summer months (Appendix C) and these records, in concert with the pump performance curve

and hydraulic test data, all tend to support one another.

Roger Dittus of United Water Idaho, Inc. conducted hydraulic testing of the Danskin Well #2 on May 2nd 2002 when the well was pumped at 460 gpm and he developed the data and hydrograph shown in Appendix B). According to the pump performance curve (Figure 12), installed HP, and available discharge piping, it appears that Well #2 should easily be capable of the instantaneous discharge rates up to 300 gpm against reasonable summertime distribution system pressures in the range of 50-to-80 psi.

According to Janice Yerton, she has observed the Well #1 producing in the 1,200-to-1,300 gpm range during the summer months without Well #2 running. Janice has also observed both wells running simultaneously pumping into the system when demand is high enough and system pressures are low (personal communication 2-25, 2010.

RECOMMENDATIONS:

With the installed pumping plant (design point of 1,344 gpm at 302 feet TDH) and well head plumbing configuration, the Well #1 appears to be capable of producing water at a variable range between 800-to-1,800 gpm depending on the system pressure and the speed at which the pump motor is operated. This is not surprising because the pumping plant and well construction were designed to that target yield and the measured conditions show that the individual elements comprising the TDH have not changed. Therefore, I recommend that the City of Kuna municipal water right No. 63-12552 be licensed for its requested diversion rate of 3 cfs (1,346 gpm).

Permit No. 63-12552 lists two (2) points of diversion at the same location. From the field licensing examination, both proposed wells have been drilled, constructed, and equipped (Appendix D and Figure 7).

Have conditions of permit approval been met? X yes ___ no

F. FLOW CALCULATIONS

X Additional Computation Sheets Attached

Measured Method:

Instantaneous flow rates are based on field-observed readings of a high-quality, calibrated, magnetic flow-meter installed close to manufacturer's specifications. These readings are supported by: 1) discussions with the pump operators responsible for upkeep of the well, 2) by the operating conditions and pump performance curve, and 3) by the well-documented capacity of the City's Danskin Well #1 during previous pumping tests. According to Ms. Yerton, the pump does not run continuously, especially during winter months, because it automatically shuts off during periods of lower demand and higher system pressures. Therefore, the requested, observed, calculated, and recommended maximum flow rates for the well appear to be justified.

G. VOLUME CALCULATIONS

1. Volume Calculations for Irrigation:

$$V_{I,R} = (\text{Acres Irrigated}) \times (\text{Irrigation Requirement}) =$$

$$V_{D,R} = [\text{Diversion Rate (cfs)}] \times (\text{Days in Irrigation Season}) \times 1.9835 =$$

$$V = \text{Smaller of } V_{I,R} \text{ and } V_{D,R} =$$

B

2. Volume Calculations for Other Uses:

Not applicable to a municipal water right.

H. RECOMMENDATIONS

1. Recommended Amounts

Beneficial Use	Period of Use From	To	Rate of Diversion Q (cfs)	Annual Volume (afa)
<u>Municipal</u>	<u>Jan 1.</u>	<u>Dec. 31</u>	<u>3.0 cfs</u>	<u>N/A</u>
Totals:			<u>3.0 cfs</u>	<u>N/A</u>

2. Recommended Amendments

☐ Change P.D. as reflected above ☐ Add P.D. as reflected above ☐ None
☐ Change P.U. as reflected above ☐ Add P.U. as reflected above ☒ Other (Change/Delete Conditions (see below))

- 1) **Condition No. 3:** I recommend that this condition be deleted from the License. Both wells are constructed and both comply with the drilling permit requirements of Section 42-235 of the Idaho Code (Appendix D).
- 2) **Condition No. 8:** I recommend that this condition be deleted from the License. United Water no longer owns the water right, land, wells, or other facilities. This water right, wells, and other facilities have been transferred to the City of Kuna who now uses the wells within its water service area. I further recommend that the PLACE(S) OF USE: be designated as "the City of Kuna water delivery service area".
- 3) **Condition No. 9:** I recommend that this condition be deleted from the license: The points of diversion for this water right are far down stream (down gradient) of the conjunctive management "200-foot line" of the Department's Application Processing Memorandum No. 59 where water-bearing zones are not being administered or listed on approved new applications.

I. AUTHENTICATION

Field Examiner's Name Edward Squires CWRE No. 10-125 Date February 26, 2010

Reviewer _____ Date _____

SEAL



System pressure of 79 psi $\times$ 2.31 ft/psi = 182.5 ft

+ $\frac{182.5 \text{ ft}}{97.5 \text{ ft}}$ drawdown at $\sim 800 \text{ gpm}$
280.0 ft TDH at 3100 rpm shaft speed at 51.1 Hz

For: 810 gpm / 97.5 ft dd / 79 psi / 51.1 Hz = measured

vfd $< \frac{51.1 \text{ Hz measured}}{60.0 \text{ Hz possible}} = 85\% \text{ full speed}$

.88 $\times$ 3600 rpm = $\sim$ 3,066 rpm at 51 Hz

3,066 rpm on vfd multi-speed performance curve fits well for 280 ft TDH at 810 gpm (Figure 11)

See also attached computer-generated calculations + conversions

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Temperature

0

- ☒ °C
- ☐ °F

Convert !

Length

1

- ☒ m
- ☐ km
- ☐ in
- ☐ ft
- ☐ yards
- ☐ miles

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Synchronous Speed of Electrical Motors

The speed at which an induction motor will operate depends on the input power frequency and the number of electrical magnetic poles in the motor

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Variable Frequency Drives

Expert Service and Support, 24/7.
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www.jolletttech.com

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Vertical Hollow Shaft Motors Used
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americanpumpco.com

The synchronous speed of an induction motor is based on the supply frequency and the number of poles in the motor winding and can be expressed as:

$$\omega = 2 \pi f / n \quad (1) \text{ or } RPM = \frac{120 * f}{n}$$

where

 ω = pump shaft rotational speed (rev/min, rpm) f = frequency (Hz, cycles/sec) n = number of poles

120 = constant

The rotational speed at different frequencies and number of poles can be listed as:

Pump shaft rotational speed - ω - (rev/min, rpm)						
Frequency - f - (Hz)	Number of poles - n					
	2	4	6	8	10	12
10	600	300	200	150	120	100
20	1200	600	400	300	240	200
30	1800	900	600	450	360	300
40	2400	1200	800	600	480	400
50 ¹⁾	3000	1500	1000	750	600	500
60 ²⁾	3600	1800	1200	900	720	600
70	4200	2100	1400	1050	840	700
80	4800	2400	1600	1200	960	800
90	5400	2700	1800	1350	1080	900
100	6000	3000	2000	1500	1200	1000

1. Motors designed for 50 Hz are common outside U.S
2. Motors designed for 60 Hz are common in U.S

Variable Frequency Drive

With a variable frequency drive its possible to modulate the speed of the motor by changing the frequency supplied to the synchronous motor. The relation between motor speed, frequency and number of poles in the motor can be found in the table above.

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Industry standards online:
ASM, ASME, IEEE, ISO, API

TECHSTREET

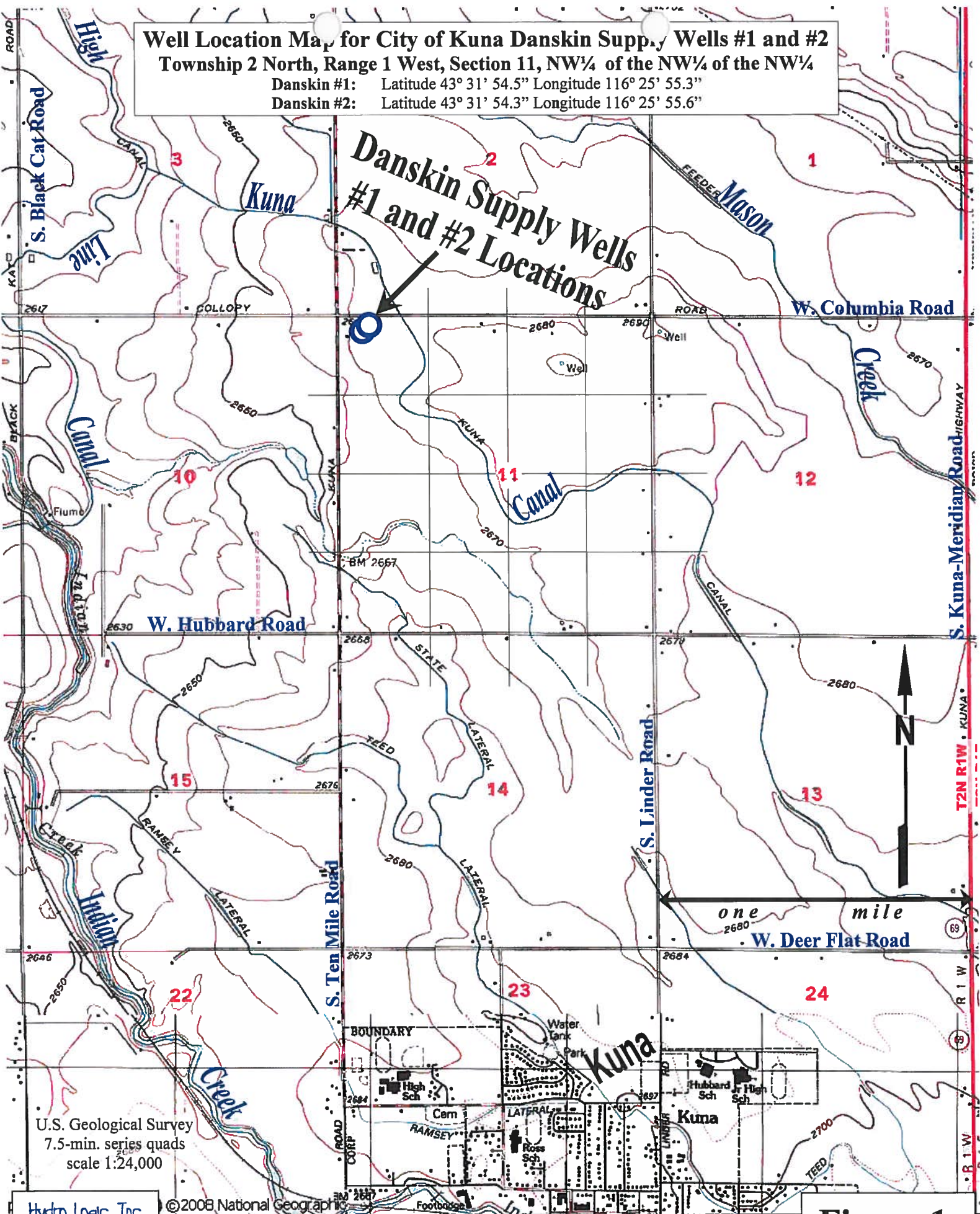
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Why Application Automation Should be Part of IT Infrastructure

Well Location Map for City of Kuna Danskin Supply Wells #1 and #2
Township 2 North, Range 1 West, Section 11, NW¼ of the NW¼ of the NW¼

Danskin #1: Latitude 43° 31' 54.5" Longitude 116° 25' 55.3"
 Danskin #2: Latitude 43° 31' 54.3" Longitude 116° 25' 55.6"

**Danskin Supply Wells
 #1 and #2 Locations**



U.S. Geological Survey
 7.5-min. series quads
 scale 1:24,000

Hydro Logic, Inc.
 Boise, Idaho

©2008 National Geographic

Figure 1.

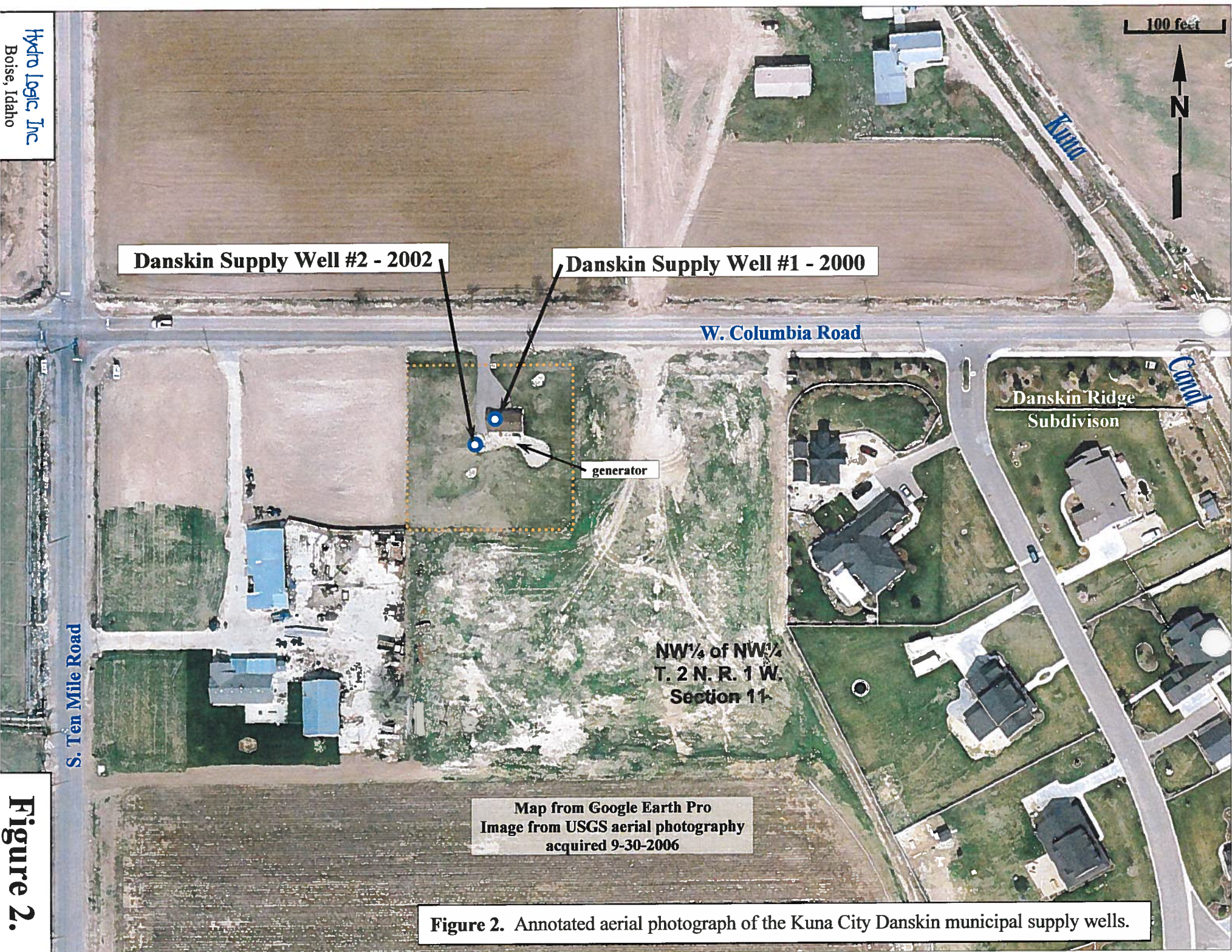


Figure 2. Annotated aerial photograph of the Kuna City Danskin municipal supply wells.

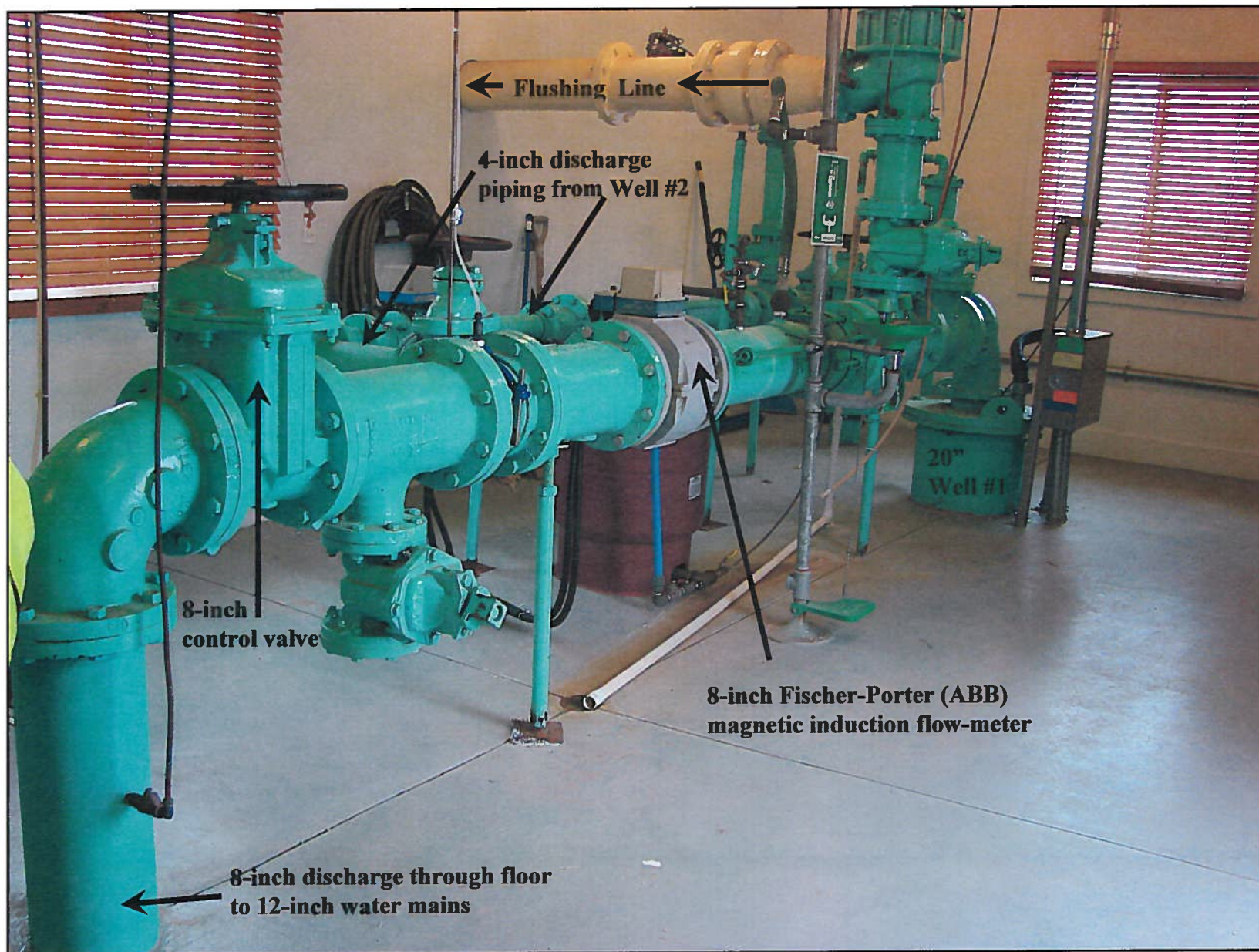
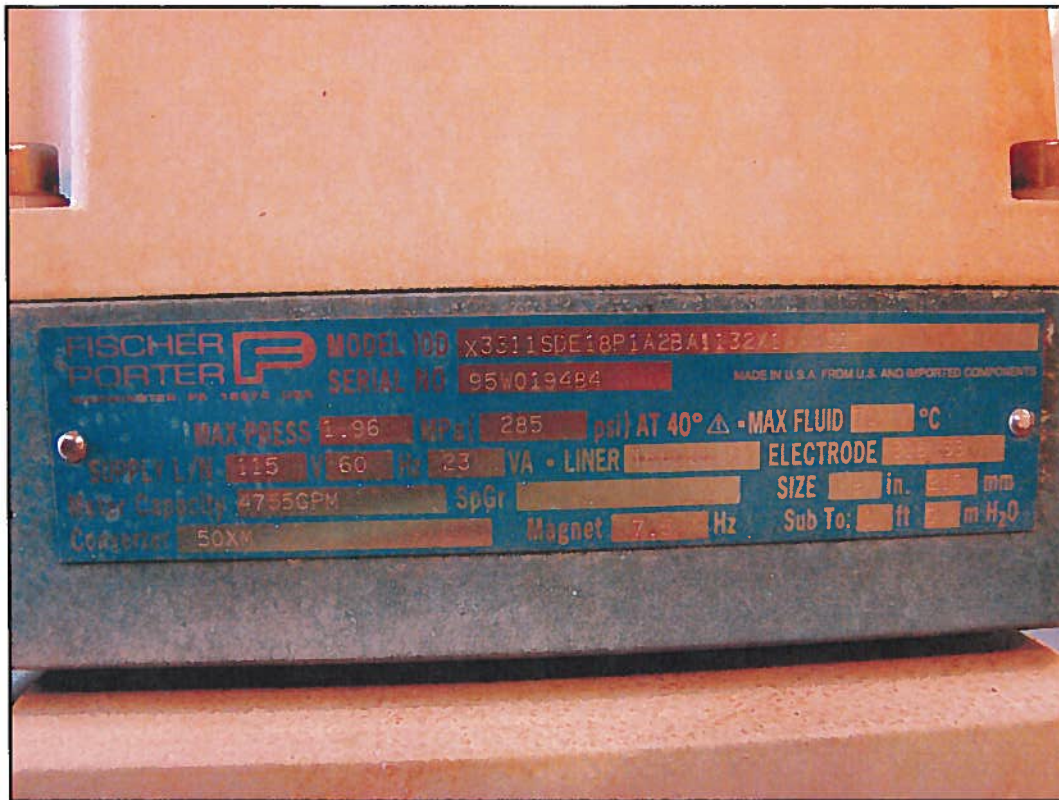
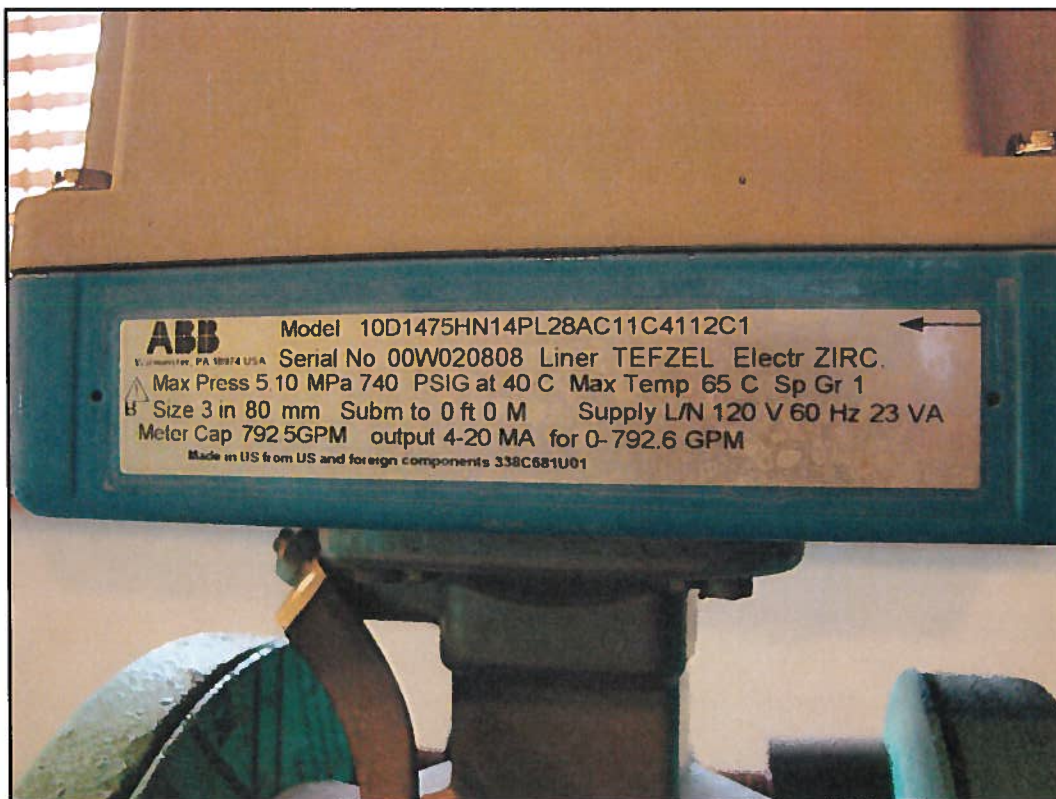


Figure 3. Photograph looking west inside the Danskin control house showing the discharge plumbing from the Danskin wells.

Figure 3.



Specification plate for the 8-inch diameter magnetic induction flow-meter installed in the discharge plumbing of Kuna Danskin Well #1



Specification plate for the 4-inch diameter magnetic induction flow-meter installed in the discharge plumbing of Kuna Danskin Well #2

Figure 4.

Figure 5. Photos of the Well Heads and Discharge Piping for Kuna City Danskin Supply Wells

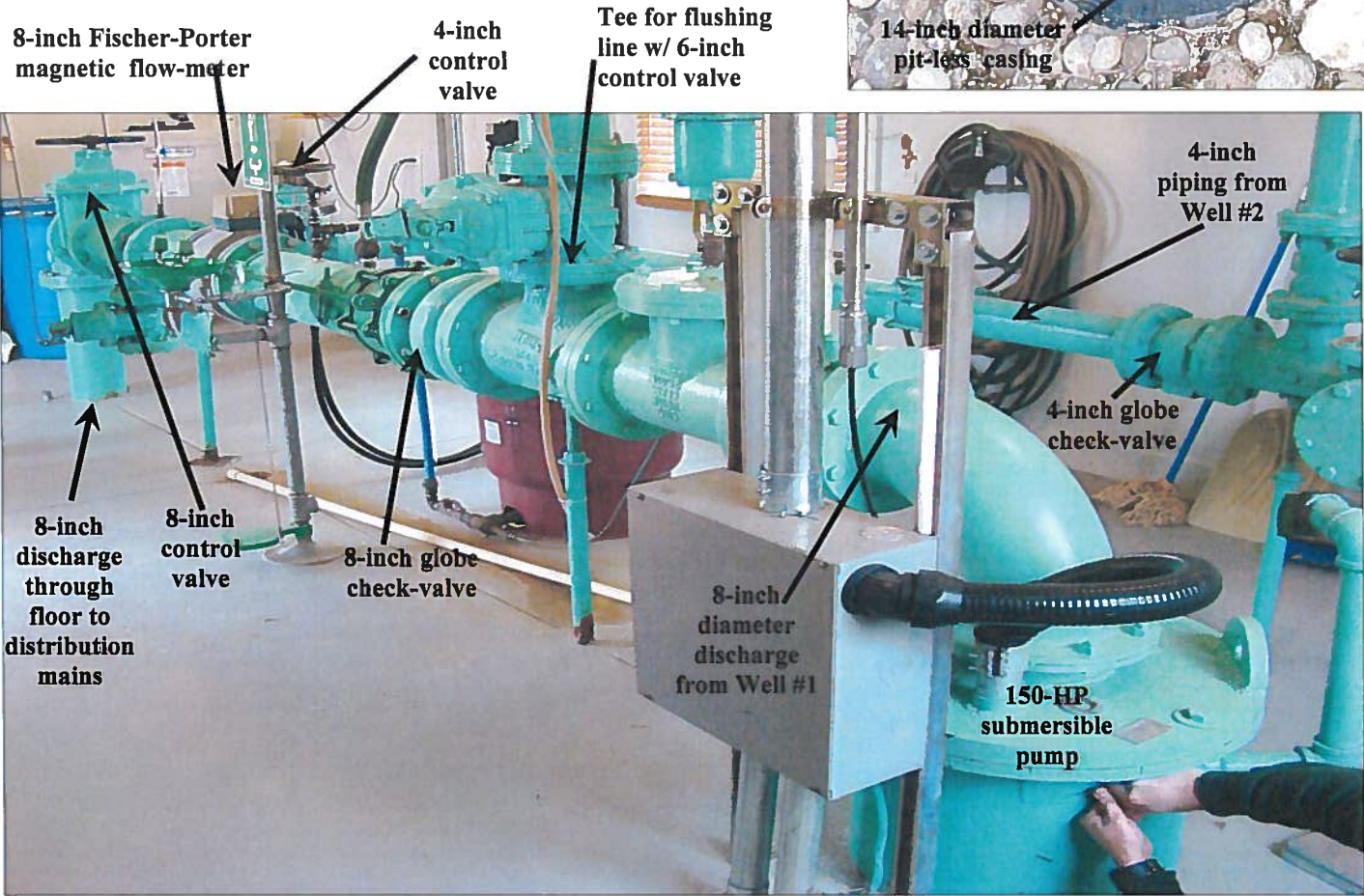
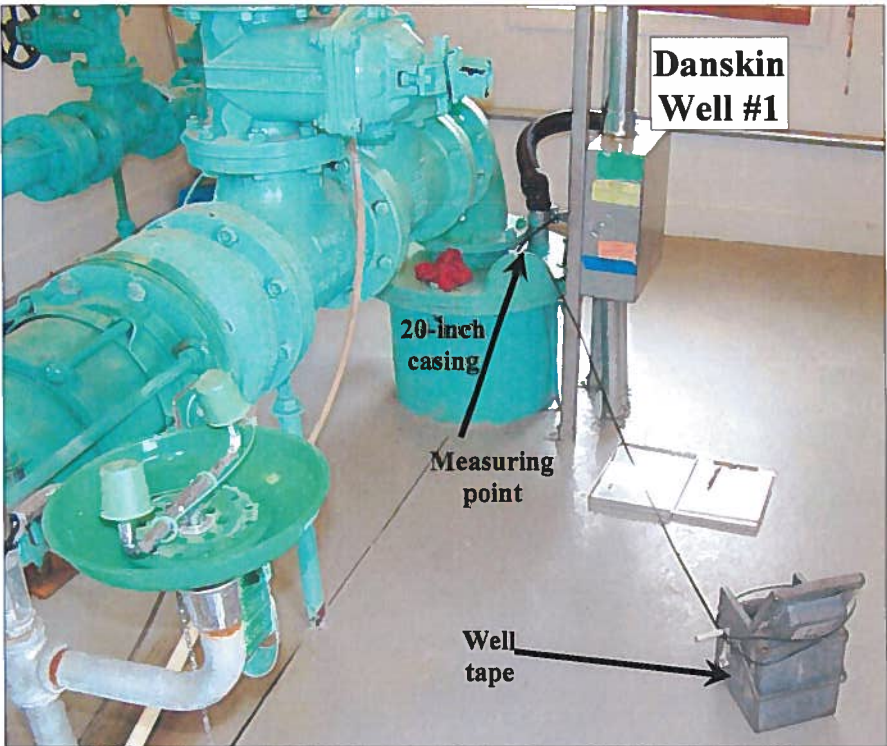


Figure 6. Photos of the Pressure and Flow Rate During Beneficial Use Exam of Danskin Well #1

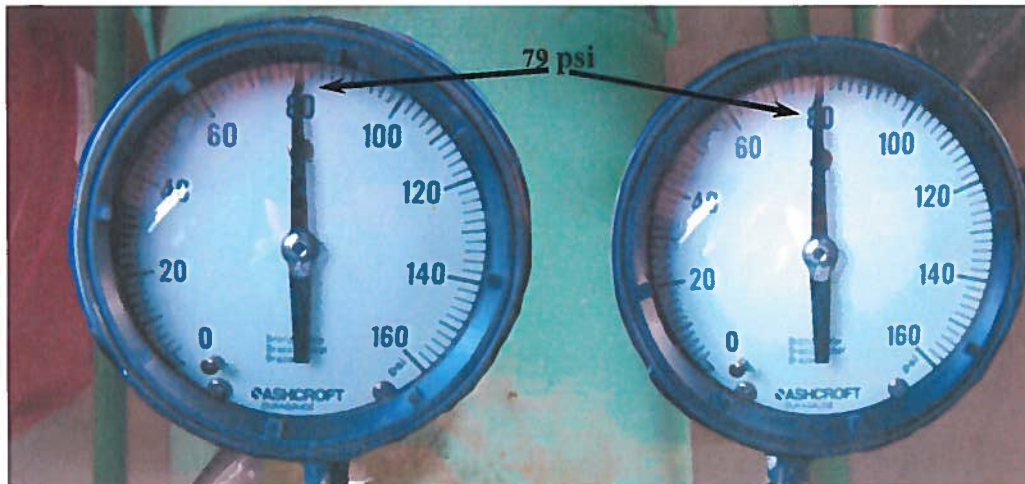


Figure 6. January 21, 2010 photographs of the Kuna Danskin Well #1 flow-meter's digital readout showing 822 gallons per minute at a line pressure of 79 psi during the proof of beneficial use field examination. Line pressure measured with a brace of high-quality gages supplied by Hydro Logic, Inc.

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City of Kuna – Danskin Supply Wells #1 and #2

Township 2 North, Range 1 West, Section 11, NW¼, NW¼, NW¼

Well #1: Latitude 43° 38' 7.20" Longitude 116° 22' 16.98" (Completed May 2000)

Well #2: Latitude 43° 38' 7.20" Longitude 116° 22' 16.98" (Completed May 2002)

Hydro Logic, Inc.

Danskin Supply Well #1 As-Built Well Construction

(horizontal scale 0.1"=1'; vertical scale 1"=100')
all measurements to ground level

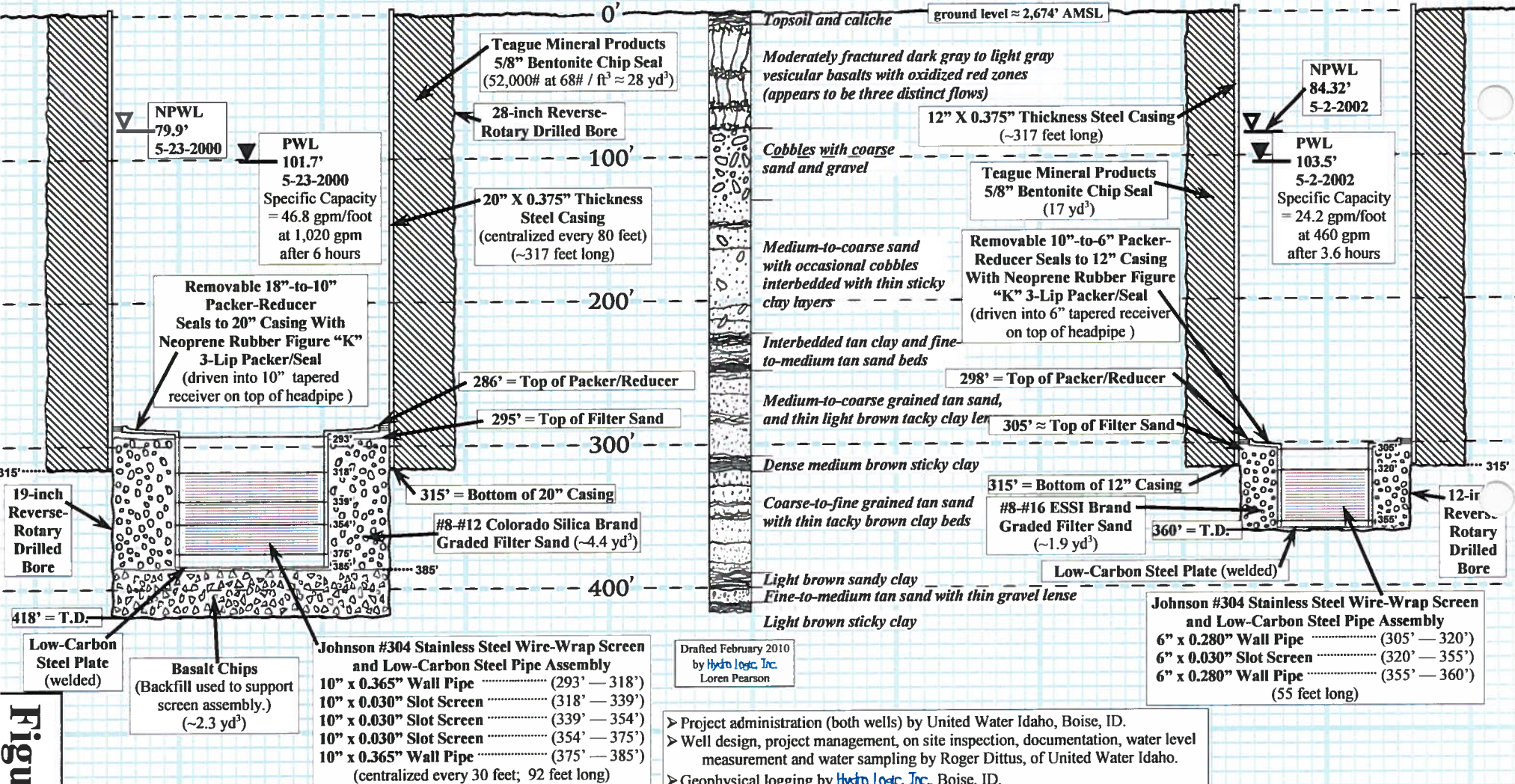
Danskin Supply Well #2 As-Built Well Construction

(horizontal scale 0.1"=1'; vertical scale 1"=100')
all measurements to ground level

Depth
(feet below ground level)

Lithology

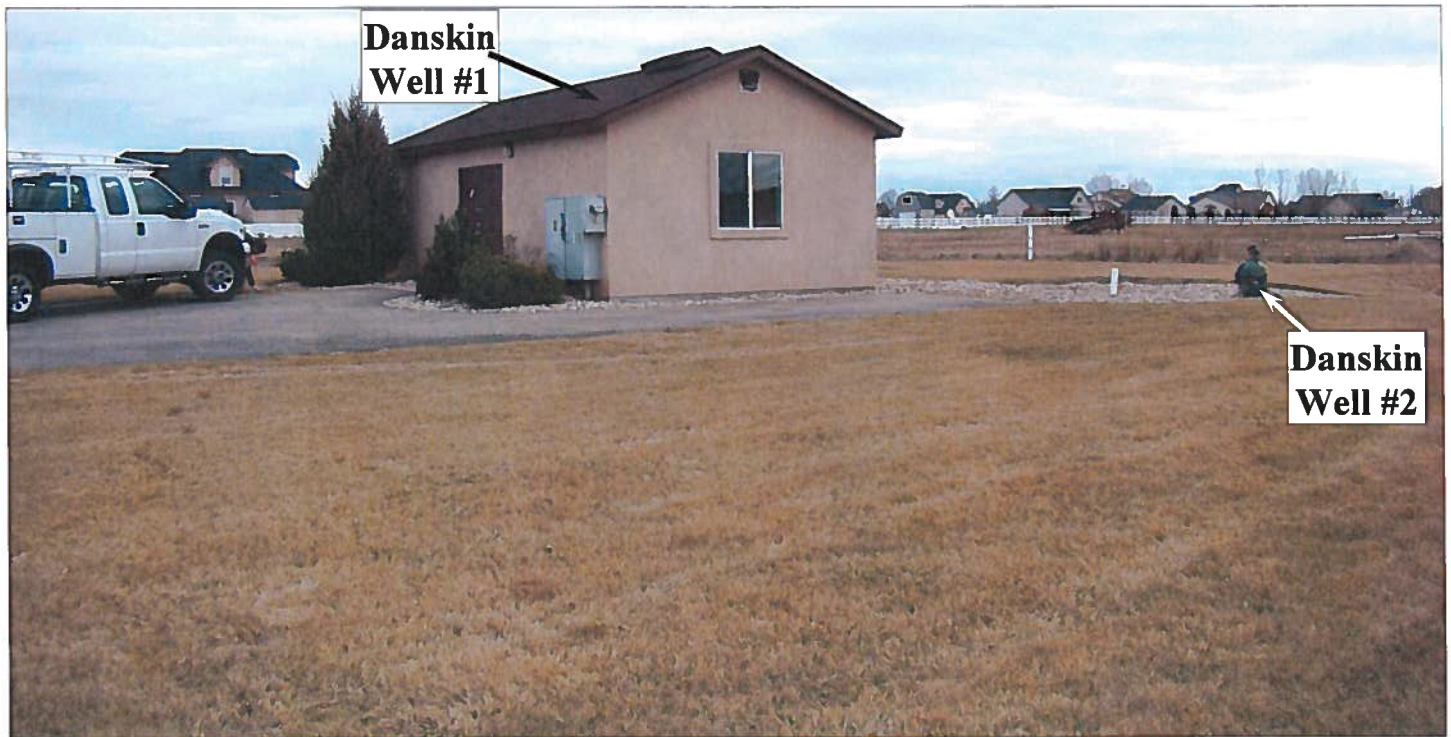
Hydro Logic, Inc. lithologic log is interpreted and drawn from geophysical logs and analysis of drill cuttings from the borehole.



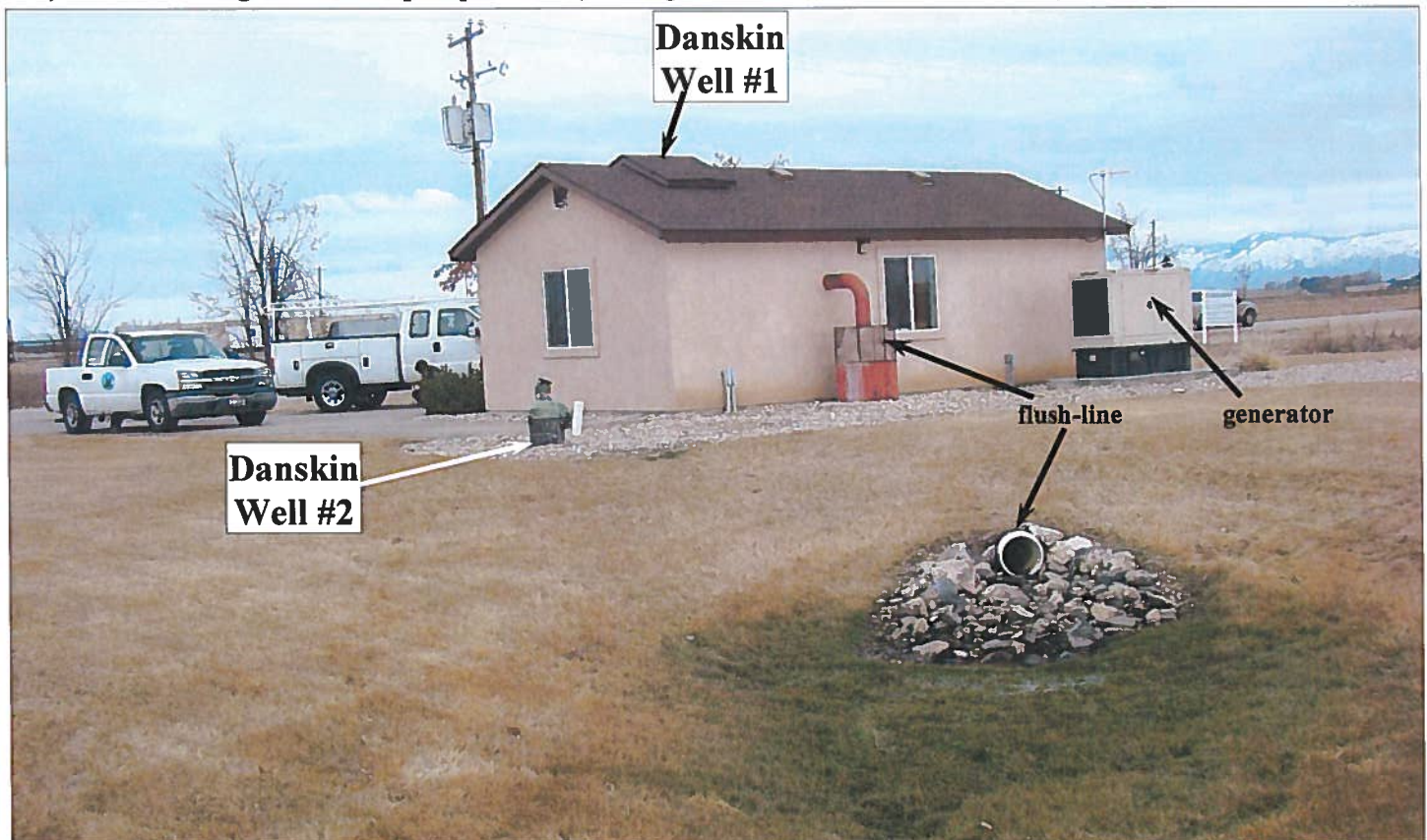
Drafted February 2010
by Hydro Logic, Inc.
Loren Pearson

Figure 7.

Figure 8. January 25, 2010 Photographs of Kuna Danskin Wells Pump/Control House



a) Views looking at Danskin pump house. (looking E on the left and SE on the right)



b) Photo looking northeast at flush-line exiting back of building to screened "flushing-cone" which then discharges under gravity flow to catch-basin.

07/30/2008 08:59 2084655078

LAYNE

PAGE 04/04

Company: Layne of Idaho, Inc.

Customer:

Name:

Date: 07/29/08

Order No:

**Pump:**

Size: 11CLC (2 stages)

Type: Submersible

Synch speed: 3500 rpm

Curve: E3142-2

Specific Speed:

Speed: 3500 rpm

Dia: 0.9375 in

No: 2230

Pump Notes for Standard Sizes:

Discharge Sizes 6", 8". Curves are certified for water at 60°F only. Consult factory for performance with any other fluid.

Vertical Turbine:

Bowl size: 11 in

Max lateral: 0.75 in

Thrust K factor: 7 lb/ft

Search Criteria:

Flow: 1348 US gpm

Head: 300 ft

Fluid:

Water

SG: 1

Viscosity: 1.105 cP

NPSHa: — ft

Temperature: 60 °F

Vapor pressure: 0.2563 psi a

Atm pressure: 14.7 psi a

Motor:

Standard: NEMA

Size: 125 hp

Speed: 3500

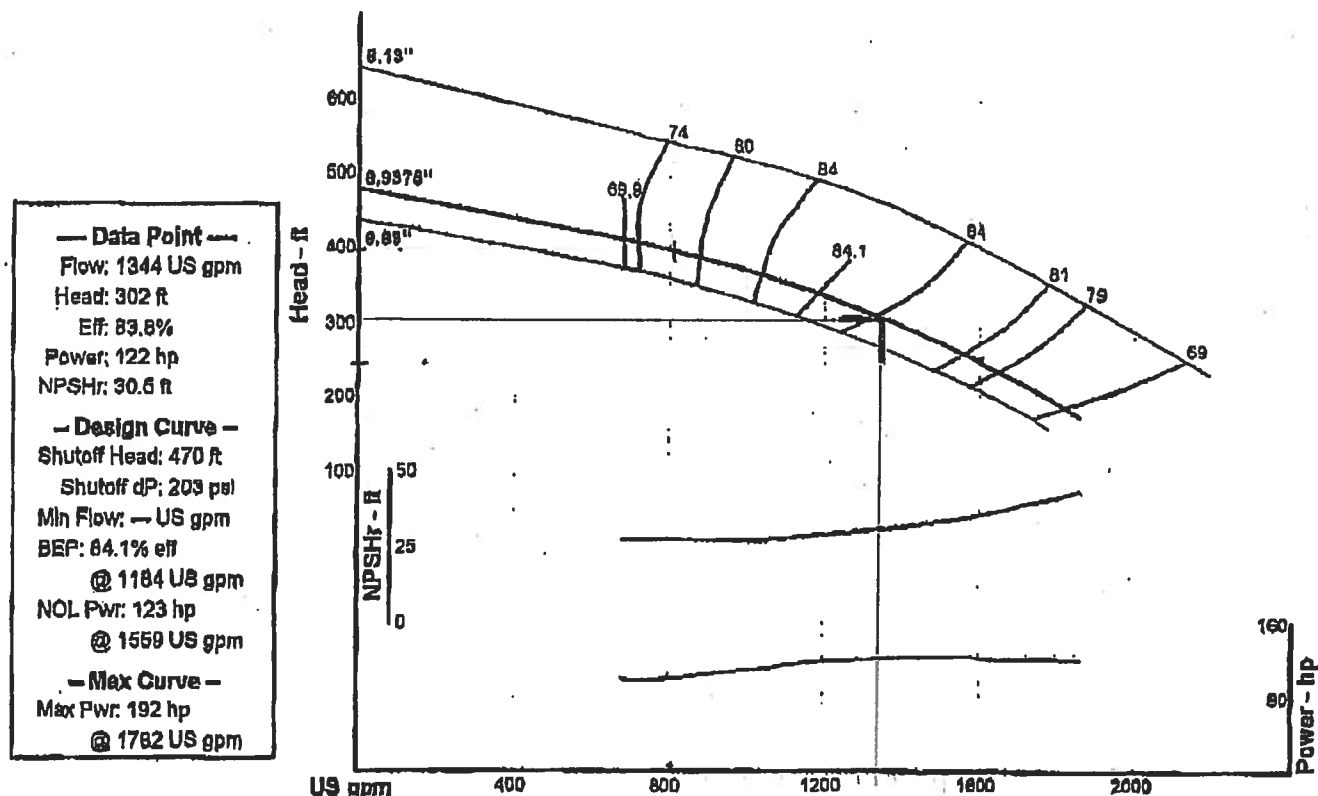
Sizing criteria: Max Power on Design Curve

Pump Limits for Standard Construction:

Temperature: 120 °F

Pressure: 380 psi g

Sphere size: 0.68 in

**Performance Evaluation:**

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
1818	3500	239	79.7	122	35.8
1348	3500	301	83.8	122	30.6
1078	3500	352	84	114	27.4
809	3500	389	77.4	102	27
539	3500	—	—	—	—

Figure 9.

Figure 10. Photos of the VFD drives for the Danskin Supply Wells and Danskin #1 150-HP Motor Tag



CentriPro

Submersible Motor

MODEL 8M1504
PHASE 3
POLES 2
INS.CLASS Y
TEMP.RISE 65°C
MAX AMB.TEMP. 25°C
DATE 01 07 00

H P
VOLTS
HERTZ
R P M
AMPS
KVA CODE
S.F.
S.F.A.
MFG. No.
IP68

150	150	150	150
460	380	400	415
60	50	50	50
3510	2870	2880	2890
197	235	235	240
H	F	G	H
1.15	1.0	1.0	1.0
220			

120514020

CentriPro

ITT Industries

MADE IN JAPAN

ND202520

Danskin #1 150-HP
Installed Motor Tag



Multi-Speed Performance Curve

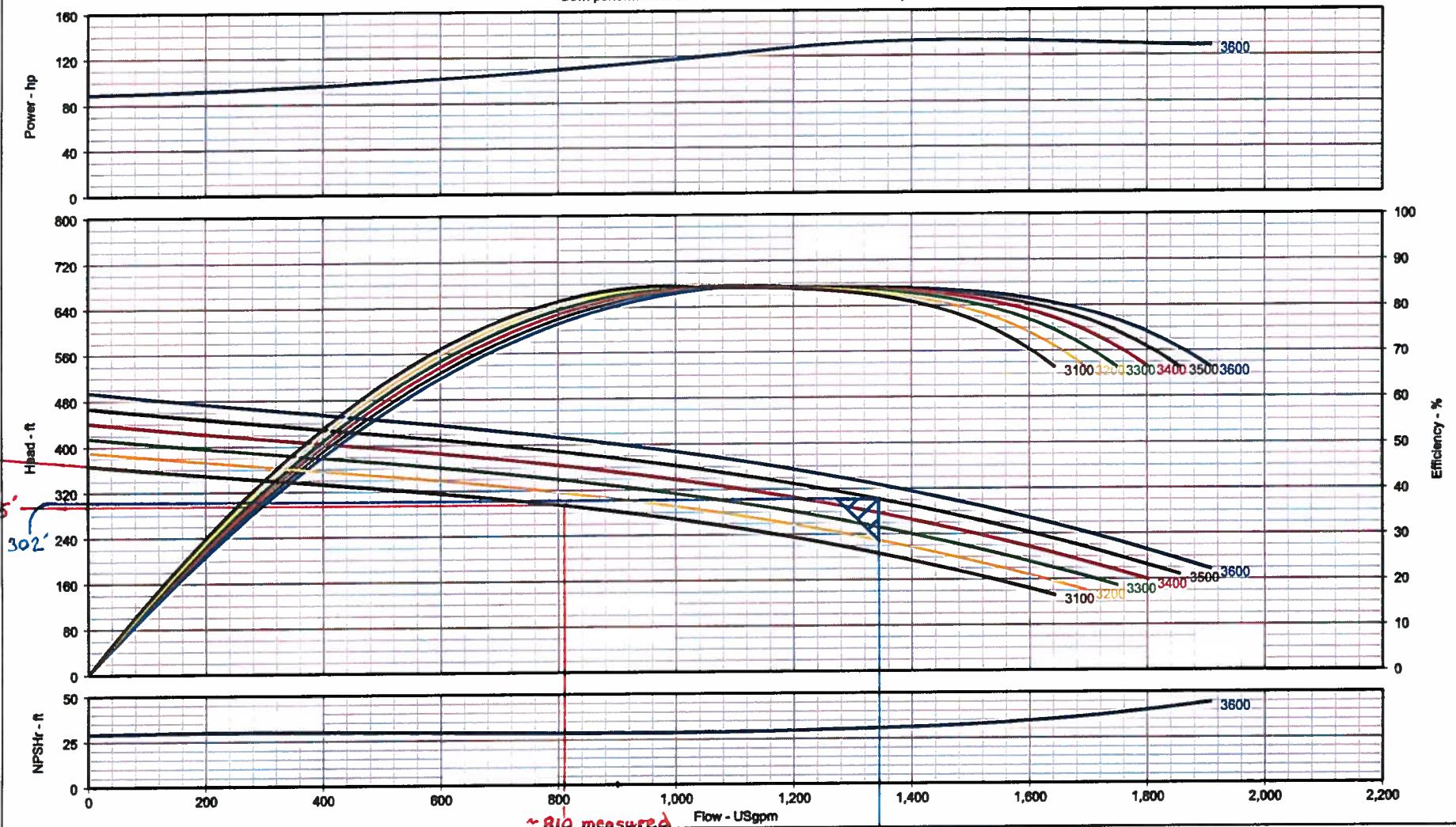
Bowl performance. Corrected for construction and viscosity.

Downstream 241.5'

302'

~810 measured

1344gpm
design point



Customer	: City of Kuna	Item description	: 11CLC	Flow, rated	: 1,344.0 USgpm
Customer reference	: Danskin #1	Stages	: 2	Head, rated	: 302.0 ft
Item number	:	Pump speed, rated	: 3,500 rpm	Fluid density, rated / max	: 0.998 / 0.998 SG
Service	:	Based on curve number	: 11CLC-1770	Viscosity	: 1.10 cP
Quantity of pumps	: 1	Efficiency (bowl / pump)	: 83.88 / 82.45 %	Cq/Ch/Ce [ANSI/HI 9.6.7-2004]	: 1.00 / 1.00 / 1.00
Quote number	:	Power (bowl / pump)	: 122 / 123 hp	Impeller diameter, rated	: 6.94 in
Date last saved	: 26 Feb 2010 9:40 AM	NPSH required	: 29.23 ft	-	-

Figure 11.

Figure 11.

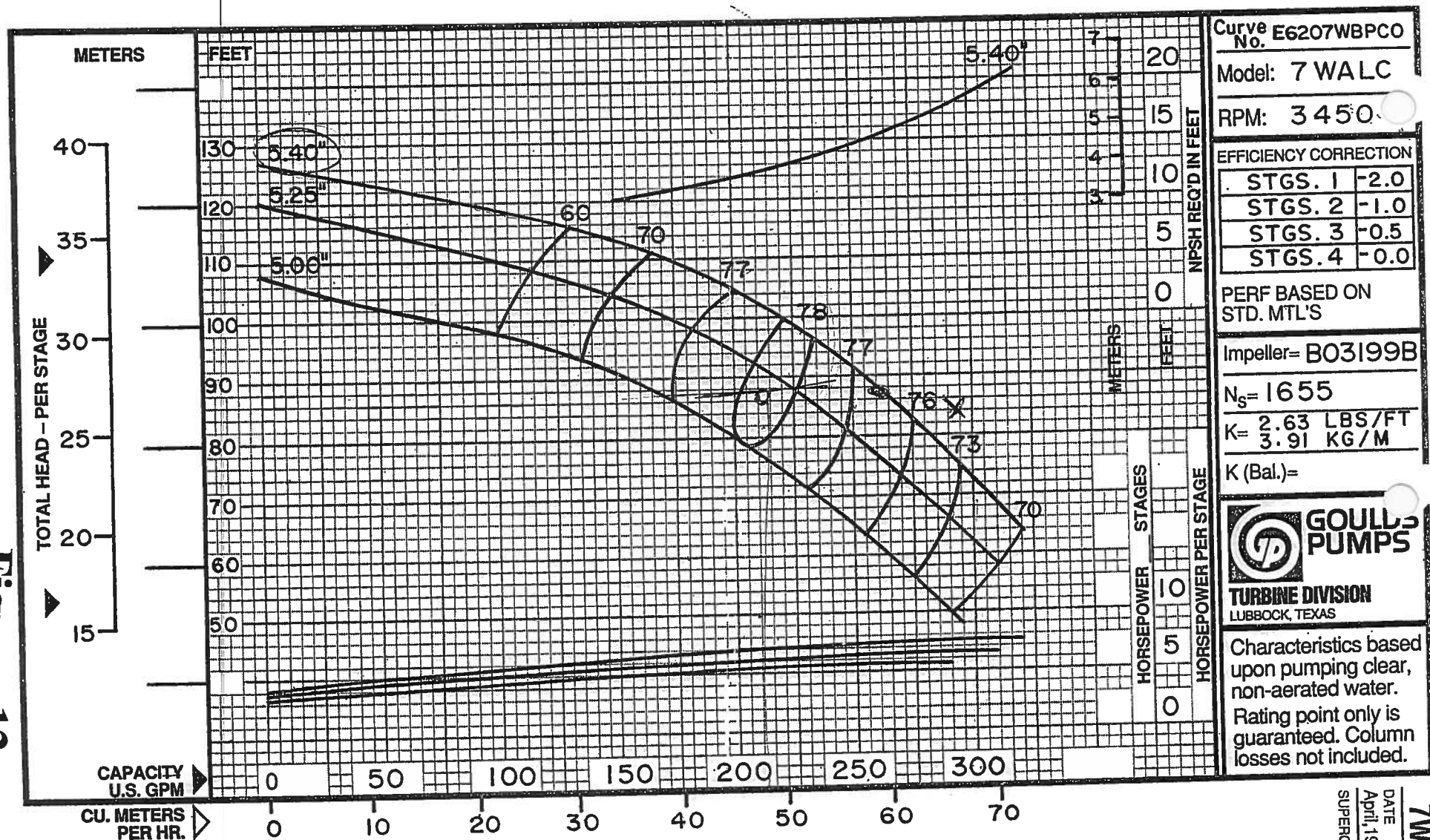
Design
 TDH 260 ft (87'/stg)
 Setting 140'
 3-stage S
 3-stages
 SWL ≈ 80'

300 gpm

VFD Danskin.

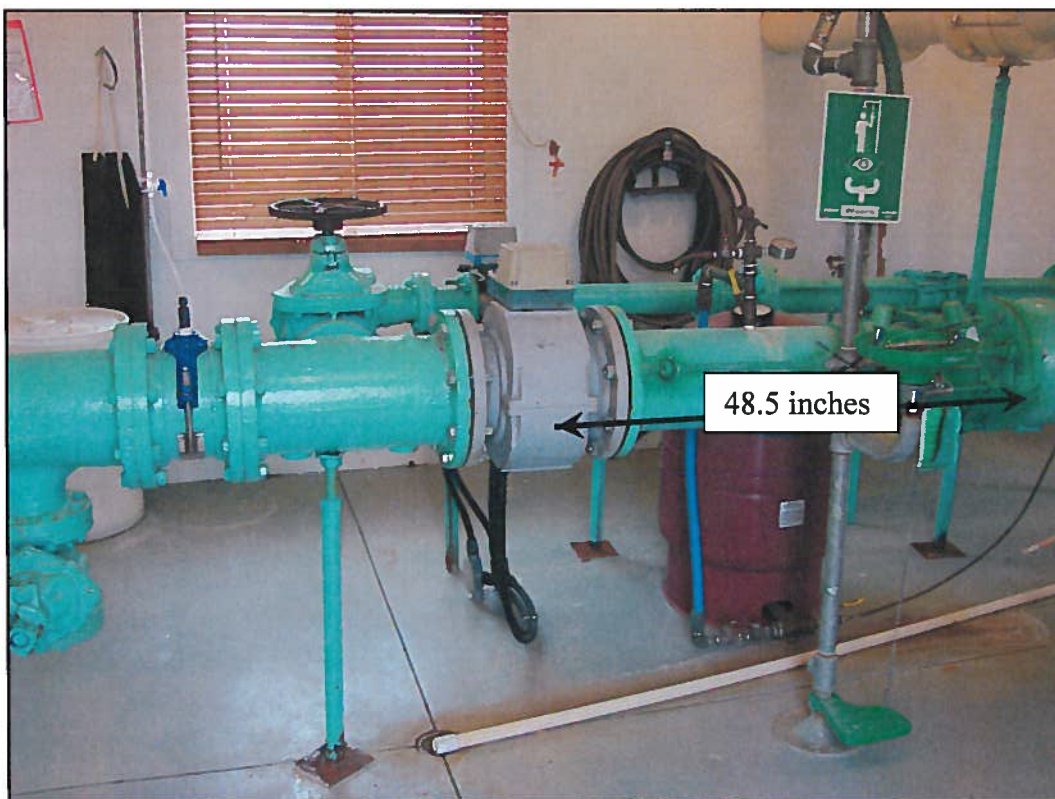
GOULDS PROPOSAL NO.	GOULDS S.O. NO.	INQUIRY NO.	CUSTOMER P.O. NO.	P.O. DATE	ITEM NO.	CUSTOMER
PROJECT Danskin #2			SERVICE		GPM CAPACITY	F.T. TDH
					% EFFICIENCY	RPM

Figure 12.





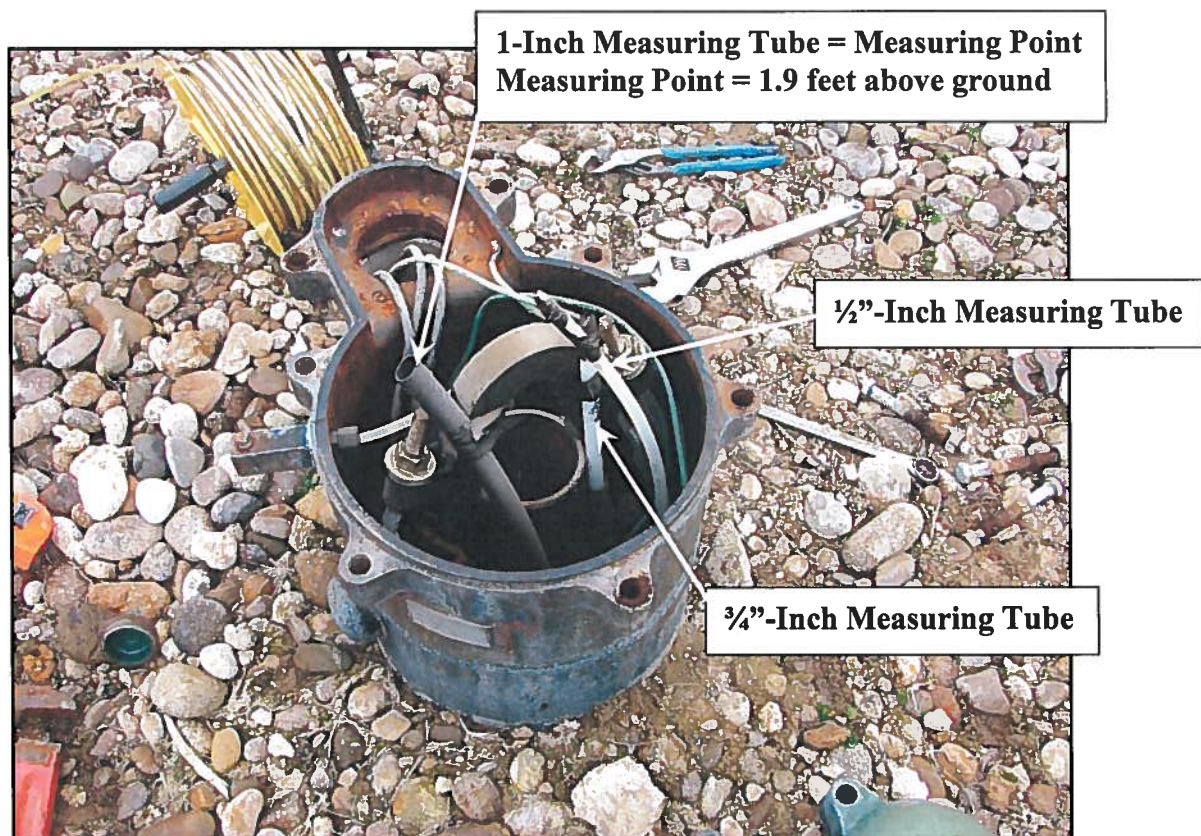
January 25, 2010 photograph taken inside the Kuna Danskin well house showing the discharge piping from the Danskin Well #2 located outside the building



Danskin Well #1 magnetic induction flow-meter in discharge piping showing upstream distance to globe-type control valve.

Figure 13

Figure 14. Photos of Danskin Well #2 Pitless Unit and Measuring Tubes



APPENDICES

FIGURES

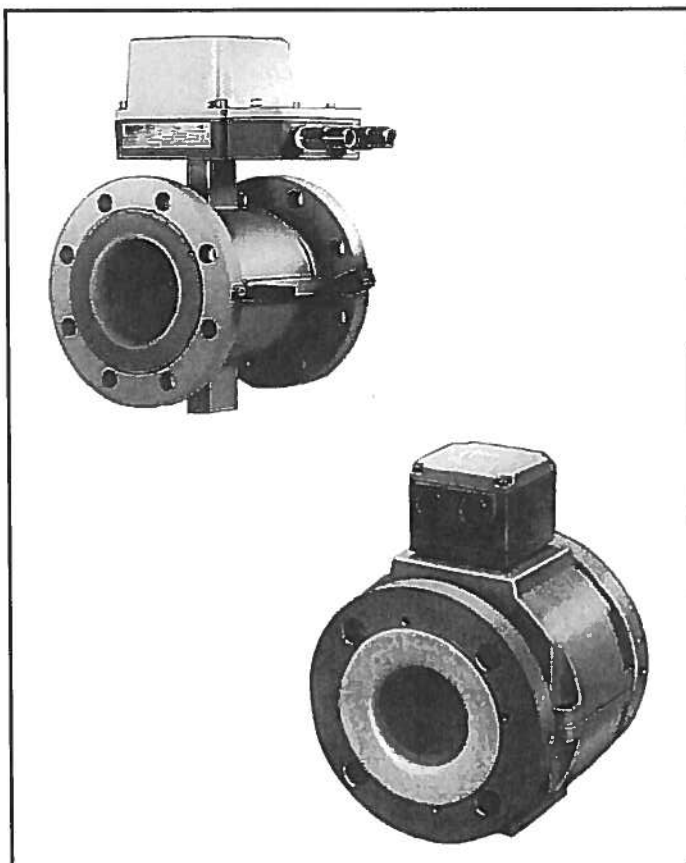
Appendix A.

**Manufacturer's recommended installation clearances for the
Fischer-Porter (ABB) magnetic induction flow-meters install
in the discharge piping of the Kuna Danskin Wells #1 and #2**

Instruction Manual

PN25013 Rev.1

Electro-Magnetic Flowmeters 10DX3111/3311 Design Level E Sizes 1/2 through 12 Inches



ABB

2.4 MOUNTING

2.4.1 Orientation

The Series 3000 Magnetic Flowmeter may be installed in horizontal, vertical or sloping pipe runs. However, precautions must be taken to assure that the metering tube is filled at all times during measurement. A vertical installation, with the pipe line carrying liquid upwards assures a filled hydraulic line under low flow rate conditions and also minimizes wear on the meter lining by abrasive grit. Horizontal installations should be made with the meter in the lower section of a pipeline to assure a filled meter condition.

For horizontal or sloping installations the meter should be placed so that the electronic housing of the meter is on top. This will align the meter electrodes in a lateral plane. Positioning the meter in this way eliminates the possibility of entrained air acting as an electrode insulator.

The Magnetic Flowmeter must be oriented in accordance with the direction of process flow, as indicated by the FLOW arrow on the meter body. For accurate metering, a straight pipe run equivalent to a minimum of three straight pipe diameters are required upstream of the magmeter for elbows and tees, measured from the center of the meter (refer to Figure 2-17).

If a control valve is required, it is recommended that it be placed downstream of the meter. Upstream valves can create turbulence that result in air pockets and may affect the meter's accuracy or cause its output to be noisy. A minimum of ten pipe diameters of straight pipe are required upstream between the magmeter and a control valve or pump (refer to Figure 2-17).

2.4.2 Meter Handling

The liner of the Flowmeter must be protected at all times. The liner can be damaged by sharp objects or cut by undue pressure. The protective covers provide protection for the liner. Keep the covers in place until the Primary is actually ready for installation. Once the protective covers are removed during installation, be careful not to damage the liner with the mating flanges in order to avoid potential process leaks. Do not pass any rope or wire sling through the meter liner (Refer to Figure 2-2 for proper hoisting method).

NOTE

Leave metal protector plates or plywood lining protectors in place on the meter until the meter is ready to be installed, otherwise the Teflon meter liner will have a tendency to "flare" away from the meter face and may make meter installation difficult.

Appendix B.

**Hydraulic testing data and draw down plots from the constant discharge testing of
the Danskin municipal supply wells by United Water Idaho, Inc.**

Danskin Well: Completion Testing

1,000 GPM Constant Discharge Test, 5/23/2000

Datum for water-level measurements = 3.2 feet AGL (ground level at time of testing)

8" by 6" orifice weir (40" head = 1000 gpm) Test pump set by Riverside, Inc.

C. Brown, UWID Production Dept. collected water quality samples

Test conducted by R. Dittus, UWID Eng. Dept., water-level measured with electric sounder

Time	Time Elapsed (minutes)	Water-Level (feet bmp)	ORIFICE HEAD (inches)	T° F	Cs (uS)	Comments
8:05	-55	83.01				
8:45	-15	83.05				
9:00	0					Pump on – start test
9:00:30	0.5	96.80				
9:01	1	97.95				
9:01:30	1.5	98.65				
9:03	3		37			Pinch sand per 6 gal
9:04	4		41			
9:10	10	97.80				
9:15	15	100.00		65.25	665	Water is degassing
9:20	20		39 ½			990 gpm
9:30	30	100.24				v. small pinch sand/6 gal
9:31	31		29			Generator amps low
9:33	33		44			Re-adjusting Q
9:34	34		41			small pinch sand/6 gal
9:40	40					Trace v. fine sand
9:43	43	100.78	40 ½			Trace = 'few' grains
9:45	45			65.50	660	Fine degassing bubbles
9:56	56		43 ½			Trace v. fine sand
10:00	60	99.21				Generator reostat touchy
10:07	67		45			1050 gpm
10:17	77	102.05	45 ¼			Trace v. fine sand
10:20	80					Adjusting Q down
10:22	82		41			1010 gpm
10:29	89					
10:30	90	101.15	41	65.75	672	
10:35	95					
10:43	103		41			Trace v. fine sand
10:50	110					
11:10	130		25			Discharge just dropped
11:11	131		41 ½			Adjusted Q up again
11:15	135	100.82		66.0	670	
11:17	137	100.89				
11:24	144		39 ¾			Much fluctuation: 30"-50"
11:29	149		41			
11:35	155	100.87				Trace v. fine sand
11:40	160		40			6 grains sand per 6 gal.
11:55	175	101.40	41 ½			
12:17	197	101.50	41 ¼			1015 gpm
13:00	240	101.31	40 ¼			
13:15	255		41			1010 gpm

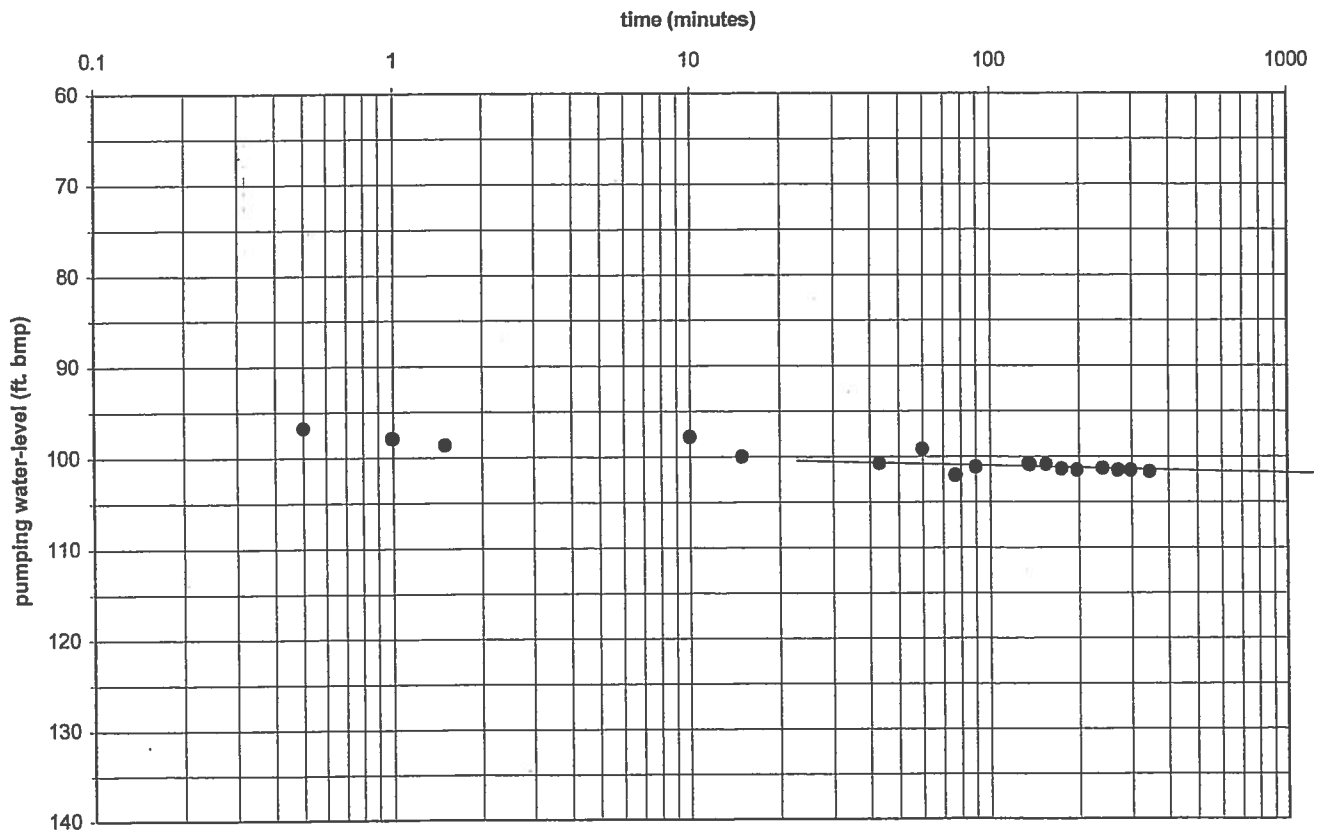
13:30	270	101.49	41			Trace v. fine sand/ 6 gal
13:58	298	101.53		66.5	665	
14:02	302					
14:20	320					
14:40	340					Trace v. fine sand/ 6 gal
14:45	345	101.70	42 ½			1030 gpm
15:00	360					Specific cap. = 53 gpm/ft.

Anticipated Pumping Water-Levels (based on 6-hour pumping test)

Apparent drawdown per log cycle at 1000 gpm = approx. 1 ft.

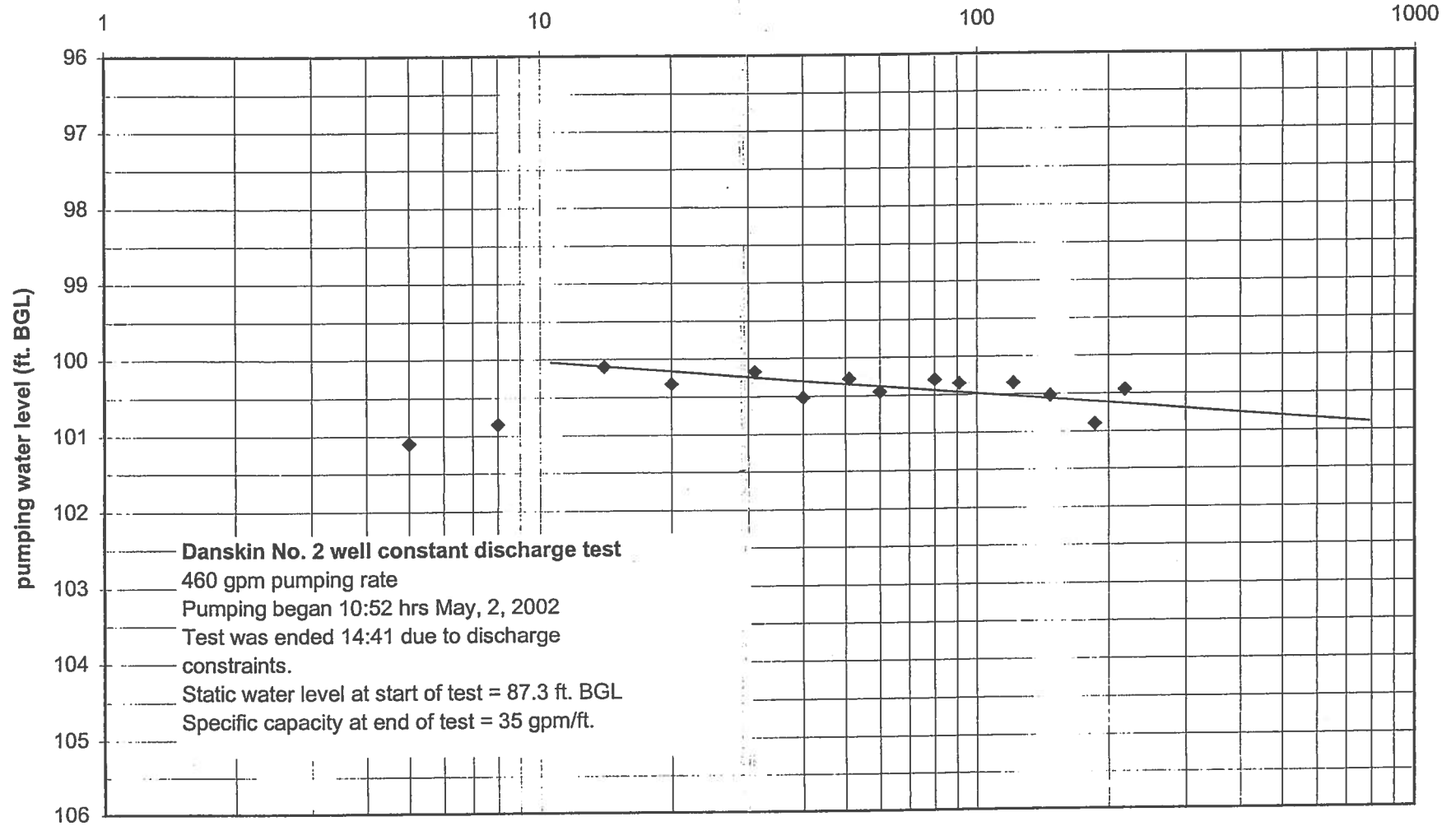
Discharge rate	Pumping level (depth below datum)
500 gpm	95 feet
750gpm	100 feet
1000gpm	105 feet
1250 gpm	110 feet

Danskin Constant Discharge Test 5-23-00



Danskin No. 2 well - 5/2/02

elapsed time (minutes)



Danskin Subdivision Well No. 2 Constant Discharge Test Data May 2, 2002

Data collected by United Water Idaho

Time	Elapsed Time (min.)	W.L. (ft. B.G.L.)	Temp, Specific cond.	Comments
8:40		87.32		Static W.L.
10:15		87.30		Static W.L.
10:52	0			Pump on
10:54	2			Over-pumping (approx 700 gpm)
10:55	3			Valving back flow (approx. 550 gpm)
10:57	5	101.10		460 gpm (22" orifice head)
11:00	8	100.85		Flow rate stabilized at 460 gpm
11:06	14	100.10		Trace fine sand
11:12	20	100.33	65.1°F, 501 μ S	No sand, odor, gas
11:23	31	100.18		
11:32	40	100.52	65.0°F, 509 μ S	
11:43	51	100.28		
11:52	60	100.45		
12:06	74		65.2°F, 526 μ S	No sand, odor, gas
12:12	80	100.30		
12:23	91	100.35		
12:30	98		65.2°F, 526 μ S	No sand, odor, gas
12:53	121	100.35		
13:03	131		65.2°F, 533 μ S	
13:19	147	100.52		
13:46	174		65.0°F, 550 μ S	
13:58	186	100.90		
14:32	216		65.3°F, 536 μ S	No sand, odor, gas
14:35	218	100.45		pH=7.26 @20.3
14:41	224	100.45		78 bore volumes pumped

Appendix C.

Pump house charts from the Kuna Danskin well house showing 24-hour readings of production from both wells during the months of May and June 2009.

Month/Year May 2009City of Kuna
Water DepartmentWell # Panskin

Well

VFD

Well

	92140 Meter	#2 Production	Hr. Meter	Total	Hours	Total	3289217 Flow Meter	#1 Production	CL.2	Intl	Remarks Generator	Hrs
1	92140	-					3289612	395		DCCA		
2												
3												
4	92310	170					3293076	10464		DACT		
5	92310	-					3290307	231		DACT		
6	92310	0					3290547	240		DACT		
7	92310	-					3290799	252		DACT		
8	92310	-					3291069	270		DACT		
9												
10												
11	92310	0					3292618	1549		DACT		
12	92310	0					3293315	697		DCCIC		
13	92310	0					3293733	418		DACT		
14	92310	0					3294454	721		DCCIC		
15	92310	0					3294923	469		DC		
16												
17												
18	92310	0					3297555	2632		DACT		
19	92310	0					3298358	803		DACT		
20	92310	0					3299040	682		DACT		
21	92310	0					3299545	505		DACT		
22	92310	0					3300292	747		DA		
23												
24												
25												
26	92310	477					3303044	2752				
27	92310	0					3303815	771		DA		
28	92310	0					3304503	688		DACT		
29	92310	170					3305806	1307		DACT		
30	92310						3308417	2611		CACT		
31												
Total		170.000						29200.000				

Month/Year June 2008City of Kuna
Water DepartmentWell # DonnersteinWell
2

VFD

Well
1Remarks
Generator

Hrs

	Meter	Production	Hr. Meter	Total	Hours	Total	Flow Meter	Production	CL.2	Intl		
1	92310	0					2308417	2611		740		
2	92310	0					3309362	1945		BA		
3	92310	0					3310196	1834		ODL		
4	92310	0					3310881	685		WKA		
5	92310	0					3311510	629		LAFA		
6												
7												
8	92310	0					3313300	1790		LAKE		
9	92310	0					3314111	811		RECA		
10	92310	0					3314558	447		DC		
11	92310	0					3314927	369		WKA		
12	92310	0					3315300	372		LAKE		
13												
14												
15	92310	0					3316101	801		DC		
16	92310	0					3316200	124		ODL		
17	92310	0					3316511	295		WKA		
18	92310	0					3316738	227		LAKE		
19	92310	0					3317107	400		RECA		
20												
21												
22	92310	0					3317963	956		WKA		
23	92310	0					3318310	372		DC RE		
24	92310	0					3318851	541		RECA		
25	92310	0					3319496	465		DC		
26	92310	0					3320085	599		RECA		
27												
28												
29	92240	530					3320919	834		WKA		
30	92850	10					3321519	600		DC		
31												
Total		540,000						17,828,000				

Appendix D.

Well Driller's Reports for the City of Kuna Danskin Municipal Supply Wells

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

RECEIVED
JUN 12 2000

Office Use Only
Inspected by _____
Twp _____ Rge _____ Sec _____
1/4 1/4 1/4
Lat: : : Long: : :
☒ Pump ☐ Bailor ☐ Air ☐ Flowing Artesian

1. WELL TAG NO. D 12855
DRILLING PERMIT NO. 63-99W-1010-000
Other IDWR No. _____

2. OWNER: Danskin #1 Well
Name United Water Fluido
Address 8248 W. Victory Rd
City Boise State ID Zip 83709

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N
W
S
Twp. 2 North ☒ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 11 NW 1/4 NW 1/4 NW 1/4
Gov't Lot _____ County Ada 10 acres 40 acres 160 acres
Lat: : : Long: : :
Address of Well Site South West of
Termilo & Columbia Rd City Boise
(Give at least name of road + Distance to Road or Landmark)

Lt. _____ Blk. _____ Sub. Name _____

4. USE:

☐ Domestic ☒ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)

☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD

☐ Air Rotary ☐ Cable ☐ Mud Rotary ☒ Other Reverse

7. SEALING PROCEDURES

SEAL/FILTER PACK			AMOUNT		METHOD
Material	From	To	Sacks or	Coupons	
5/8 Benbrite	0	35	5200		Over bore
#8 #12	295	380	1800		Over bore

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____
Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
20"	12	315	375	Steel	☒	☐	☒	☐
10"	295	324	345	Steel	☒	☐	☒	☐
10"	379	389	345	Steel	☒	☐	☒	☐

Length of Headpipe 29' Length of Tailpipe 10'

9. PERFORATIONS/SCREENS

Perforations

Method

Screens

Screen Type Wire Wrap Johnson

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
324	379	.030		10"	SS	☒	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

83 ft. below ground Artesian pressure _____ lb.
Depth flow encountered _____ ft. Describe access port or control devices: 2" access

11. RECOMMENDED Water Resources

Yield gal./min.	Drawdown	Pumping Level	Time
1000	17'	100' 6"	4 HRS

Water Temp. 66.5° Bottom hole temp. _____

Water Quality test or comments: _____

Depth first Water Encounter _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Y	N
20"	0	1	top soil		
	1	8	clay & Hard Clay		
	8	54	Gray Basalt		
	54	61	Red Basalt		
	61	90	DARK Gray Basalt		
	90	124	Gravel Sand River Rock		
	124	146	Light Brown Clay & Sand		
	146	185	fine to med Sand		
	185	220	fine to med Sand		
	220	235	Brown Clay		
	235	245	fine Golden Sand		
	245	249	Light Brown Clay		
	249	284	fine to coarse Sand		
	284	340	Brown Clay w/ fine to med Sand		
	340	342	Brown Clay w/ coarse Sand		
	342	388	Brown Clay w/ Sand		
	388	390	Light Brown Clay		
	390	391	fine Sand		
	391	393	Yellow & Light Brown Clay		
	393	400	Light Brown Clay		
	400	402	coarse Sand & Clay mix		
	402	410	fine to med Sand		
	410	418	Brown Clay		

Completed _____ Depth _____ (Measurable)
Date: Started 3-30-00 Completed 5-9-00

13. DRILLER'S CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Riverside, Inc. Firm No. 333

Firm Official _____ Date _____

and _____
Driller or Operator _____ Date 6-8-00

(Sign once if Firm Official & Operator)

WELL DRILLER'S REPORT

DANSKIN #2 Well

Office Use Only		
Inspected by		
Twp	Rge	Sec
1/4	1/4	1/4
Lat	Long	

1. WELL TAG NO. D 18214
DRILLING PERMIT NO. _____
Other IDWR No. 63-12932

2. OWNER:

Name UNITED WATER IDAHO
Address 8248 W. VICTORY ROAD
City BOISE State ID Zip 83709

3. LOCATION OF WELL by legal description:

Sketch map location must agree with written location.

N			
	X		
S			

Twp. 2 North ☒ or South ☐
Rge. 1 East ☐ or West ☒
Sec. 11 NW 1/4 NW 1/4 NW 1/4
Gov't Lot _____ County ADA
Lat: _____ Long: _____

Address of Well Site 3001 W COLUMBIARD (INT FENCE)

City _____

(Give at least name of road & distance to (road or landmark))

Lt. _____ Blk. _____ Sub. Name DANSKIN WELL #2

4. USE:

☐ Domestic ☒ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other _____

5. TYPE OF WORK check all that apply (Replacement etc.)

☒ New Well ☐ Modify ☐ Abandonment ☐ Other _____

6. DRILL METHOD

☐ Air Rotary ☐ Cable ☐ Mud Rotary ☒ Other REVERSE

7. SEALING PROCEDURES

SEAL/FILTER PACK		AMOUNT		METHOD
Material	From To	From To	Sacks or Pounds	
BENTONITE SLURRY	0 315	50 600		DRY POUR
8-16 SAND	300 360	51 30		DRY POUR

Was drive shoe used? ☐ Y ☒ N Shoe Depth(s) _____Was drive shoe seal tested? ☐ Y ☐ N How? _____

8. CASING/LINER:

Diameter	From To	Gauge	Material	Casing	Liner	Welded	Threaded
12" + 2	315 325		Steel	☒	☐	☒	☐
6"	300 318	.250	Steel	☒	☐	☒	☐
				☐	☐	☐	☐

Length of Headpipe _____ Length of Tailpipe 5'

9. PERFORATIONS/SCREENS

Perforations

Method

(Screens)Screen Type JOHNSON WIRE WRAP

From To	Slot Size	Number	Diameter	Material	Casing	Liner
318 353	.030		6"	S.S.	☒	☐
					☐	☐
					☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:

30 ft. below ground Artesian pressure _____ lb.

Depth flow encountered _____ ft. Describe access port or

control devices: 1 1/2" pipe

11. WELL TESTS:

☐ Pump ☐ Baller ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
500 gpm	23'	103'	4 hrs

Water Temp. 65° Bottom hole temp. _____Water Quality test or comments: CLEAR / GOOD

Depth first Water Encounter _____

12. LITHOLOGIC LOG: (Describe repairs or abandonment) Water

Bore Dia.	From To	Remarks: Lithology, Water Quality & Temperature	Y	N
20"	0 9	CALICHE		
	9 50	BLACK BASALT		
	50 58	RED BASALT CINDERS		
	58 55	CHALK		
	55 86	BLACK BASALT		
	86 90	BROWN CLAY		
	90 125	SAND GRASSES COBBLES		
	125 131	FINE-COARSE SAND		
	131 141	BROWN CLAY		
	141 160	MED SAND		
	160 308	MED. SAND 1/5M. GRAVEL		
	308 230	MED. SAND		
	230 241	BROWN CLAY		
	241 252	FINE SAND		
	252 268	BROWN CLAY		
	268 261	MED. SAND		
	261 270	BROWN CLAY		
	270 289	FINE-COARSE YELLOW SAND		
	289 329	BROWN CLAY		
	329 313	FINE-COARSE SAND		
	313 318	BROWN CLAY		
	318 360	FINE-COARSE SAND GRAVEL		

Completed _____ Depth 358' (Measurable)
Date: Started 3-26-02 Completed 5-17-02

13. DRILLER'S CERTIFICATION

We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name RIVERSIDE, INC. Firm No. 333

Firm Official _____ Date _____

and _____

Driller or Operator _____ Date 5-21-02

(Sign once if Firm Official & Operator)