GROUND-WATER SUPPLY EVALUATION AND DEVELOPMENT SKY RANCH (NORTH) WASHOE COUNTY, NEVADA

December 11, 1989

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December 11, 1989

Prepared for:

European Investment Management Services, Inc.
11999 San Vicente Blvd., Suite 440
Los Angeles, California 90049

HSI Project No. 2151-89

Prepared by:

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1.0 SUMMARY AND FINDINGS

1. A production water well (SS-1A), has been constructed, developed, and test pumped. SS-1A was completed to a total depth of 799 feet. The well is completed in valley fill alluvium to a depth of 600 feet. Between 600 feet and 799 feet, the well is completed in fractured consolidated rock. Hydrogeologic characteristics indicate that a considerable portion of the water yielding capability comes from fractured consolidated rock.

   An analysis of field water chemistry parameters, geologic log, drilling characteristics and geophysical log indicates that the major water production zones are in fractured rock. This may also indicate that local recharge to the upper alluvial aquifer from the Orr Ditch may have minimal effect on the consolidated rock aquifer yielding most of the water to SS-1A.

2. Analysis of step drawdown and constant-discharge pumping test data, result in a preproduction well rating of 425 gpm, 24-hours per day, or 575 gpm, 16-hours per day. The rating of 575 gpm is approximately the total water right permitted diversion rate of 595 gpm for the three permits (29261, 29262, and 29263).

3. Analysis of test pumping data from SS-1A and the nearby well SS-1, (used as an observation well during the pumping tests), indicates that no impervious hydrologic boundaries were encountered during the pumping tests.

4. Time and distance drawdown calculations indicate minimal pumping interference on the closest production well (SS-3), located 2,800 feet, southeast of SS-1A. This may be greatly influenced by completion differences between the two wells. SS-3 appears to be connected to the shallow alluvial aquifer, while SS-1A is tapping the consolidated rock aquifer. The interference outlined in detail on Table 1 indicates a potential production pumping effect of SS-1A on SS-3 of approximately 40 feet at ten years. The time and distance drawdown analysis does not take into consideration any recharge that occurs at SS-3 from the Orr Ditch.

5. During step-drawdown and constant-discharge pumping tests no entrained air or sand was produced from SS-1A. Development of a production well that does not produce air or sand was a primary concern. The well construction utilized at SS-1A appears to be appropriate for future wells.

2.0 RECOMMENDATIONS

1. Install a production pump in SS-1A capable of producing 575 gpm from a setting of 200 feet. This pump should be operated a maximum of 16-hours per day. The setting of 200 feet allows the pump to be placed totally within the blank casing portion of the well. This setting should allow for reasonable drawdown over time, and eliminate entrailed air and sand.

2. Prior to production use, the well and pumping system should be chlorinated. This will sterilize the well, aid in retarding iron bacteria, and reduce drawdown resulting from perforations being plugged by iron slimes. A 12-hour contact time should allow adequate oxidation of close-in bacteria colonies. A yearly chlorination program should also be undertaken to further retard iron bacteria growth and potential.

3. The production well will have to have a totalizing meter installed near the wellhead to satisfy Proof of Completion and Beneficial Use requirements of the Nevada State Engineer. Meter readings must be collected monthly (minimum one year) and included when the proof of beneficial use is submitted.

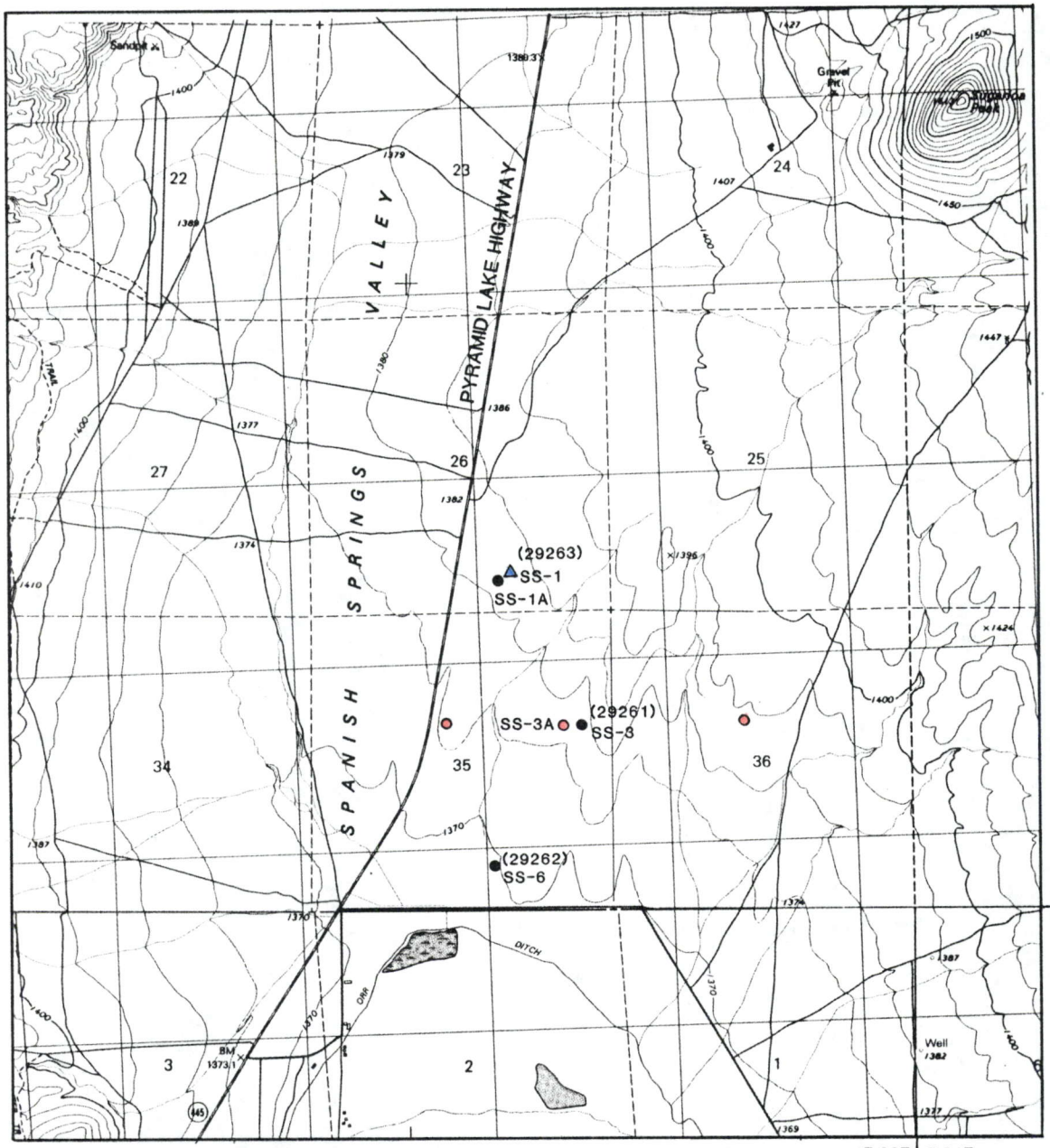
4. A monitoring program should be established, (weekly water level measurements, and cumulative discharge readings) as soon as the production pump is installed and tied into the system. After a few months of data review, the monitoring program may be adjusted to monthly readings. The data generated from the initial months of readings will be very important. This data will help to establish a data baseline (yield and drawdown) for reference with regard to the water bearing potential of the aquifer. This data base will also assist in the longterm drawdown projections made for this well. As these projections become better defined through data collection, the well rating may be adjusted.

5. Drill, complete, develop and test a production well located approximately 100 feet west of SS-3. The new production well (SS-3A) will serve as a replacement to SS-3 and a back-up to the existing production wells (SS-6 and SS-1A).

3.0 INTRODUCTION

This report presents the results of ground-water evaluation in the Sky Ranch Subdivision, and the drilling and testing of production well (SS-1A) for European Investment Management Services, Inc. in Spanish Springs Valley, near Sparks, Nevada (Figure 1). The work was performed by Hydro-Search, Inc. (HSI) as authorized by Ms. Julie A. Gilbert, European Investment Management Services, Inc.

Primary objectives of the work were to: 1) evaluate water supply potential in an area known as Sky Ranch (North) Subdivision, lying mostly within Section 25, 26, 35, and 36, Township 21 North, Range 20 East; 2) select locations for two potential water-supply wells; and 3) construct, develop, and conduct pumping tests on the water-supply wells. This report contains and summarizes data collected regarding the first of potentially two water-supply wells to be constructed.



BASE MAP: U.S.G.S. 7.5 MINUTE GRIFFITH CANYON, NEVADA

EXPLANATION

SS-1A ● PRODUCTION WELL (PERMIT NUMBER)

○ PROSPECTIVE WELL SITE

△ PRODUCTION WELL TO BE ABANDONED

N

SCALE

0 .5 1 mile

WATER SUPPLY
SKY RANCH (NORTH)
EUROPEAN INVESTMENT
MANAGEMENT SERVICES, INC.

PROJECT	2151-89	REVISIONS
DATE	NOV. 1989	

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FIGURE 1

4.0 GROUND WATER HYDROLOGY

4.1 GROUND WATER YIELDING CHARACTERISTICS OF GEOLOGIC UNITS

4.1.1 Alluvium

The alluvial material which covers the entire project area, is composed of Quaternary age sedimentary fill deposits which contain a substantial quantity of ground water. The alluvium is made up of gravel, sand, and clay/silt size material and appears to be sorted into distinct layers. The sand and gravel layers tend to be low in clay and silt content and, therefore, are permeable and can produce significant quantities of ground water. Estimated thickness of the alluvium in the vicinity of Sky Ranch is approximately 600 feet based on geologic data collected during the drilling of SS-1A and other area well logs. While there is some recharge to the shallow ground water system from rain and snow, most of the recharge comes from Orr Ditch water. This ditch contributes up to an estimated 2,200 acre-feet per year to the shallow alluvial ground-water system (Hadiaris, 1988).

4.1.2 Consolidated Rocks

The consolidated rocks which underly the alluvial material in the project area are Mesozoic age intrusive rocks, composed of granodiorite (Hadiaris, 1988). The granodiorite appears to have a low primary permeability, however, the secondary permeability associated with fractures appear to be quite extensive. During drilling, quite a bit of drilling fluid was lost to the formation after encountering the fractured rock. No or very little drilling fluid was lost to the formation during the drilling of the alluvial material.

5.0 PRODUCTION WELL (SS-1A)

5.1 Construction

SS-1A is located within the SW 1/4 SE 1/4, Section 26, T.21N., R.20E., M.D.B.&M. The State of Nevada water permit for this location is 29263. This permit allows a diversion rate of 1.33 cfs (595 gpm). SS-1A was drilled, constructed, and pump tested by Humboldt Drilling and Pump Co., Winnemucca, Nevada. Construction began on October 10, 1989 and was completed on October 24, 1989. At completion of drilling the pilot hole, (October 13, 1989) downhole geophysical logs were run. A copy of the logs are included in the attached pocket. Based on review of the geologic, hydrologic and geophysical information collected, a decision was made to ream the pilot hole and complete it as a production well. Casing schedule was designed and successfully installed to total depth of 799 feet on October 23, 1989. Drilling and geologic conditions encountered are summarized on the Log of Borehole (Appendix A). Details of well construction are summarized on the Well Construction Summary Sheet (Appendix A).

5.2 Development and Pumping Tests

The well air-lift development program consisted of airlifting and removal of drilling fluid (bentonite and polymers) from the well, borehole annular space, and the borehole wall. The well was airlifted for a total of seven hours. A test pump was installed to a depth of 300 feet. The pumping development program included, pumping and surging the well with rates from 300 gpm to 1,200 gpm for a total duration of four hours. At the completion of pumping development, the water was clear and contained no sand. The pumping development program further aided in well development and results indicated that the

drilling fluid used during the drilling operations had been sufficiently removed from the well to allow a pumping test program to commence.

The aquifer pumping test program consisted of a 9-hour step-drawdown and an approximate 44-hour constant-discharge pumping test. Pumping and recovery data plots are summarized on Figures 2-6.

Step-Drawdown Test

The step-drawdown test was conducted on October 30, 1989, and consisted of three steps (400, 600, and 800 gpm). Pretesting water level was 66.40 feet. The results are summarized as follows:

Step	Time (minutes)	Discharge (gpm)	Drawdown (feet)	Specific Cap. (gpm/ft.dd)	Efficiency (%)
1	180	400	54.65	7.32	54.3
2	180	600	100.70	5.96	44.2
3	180	800	145.60	5.49	40.7

The step drawdown test indicates the well is very productive, but that significant drawdown occurs in the vicinity of the wellbore, thereby reducing efficiency. The relatively low efficiencies appears to be a result of well design which required blocking off the upper alluvial aquifer.

Constant Discharge Test

An approximate 44-hour constant-discharge pumping test was conducted from 0800 hours,

October 31, 1989 to 0345 hours, November 2, 1989. The pumping test, which had been scheduled for 72-hours, was terminated early due to excessive water flowing over a nearby highway. Pretesting water level was 68.75 feet. The pumping rate was 700 gpm. Drawdown at the end of testing was 143.60 feet. Specific capacity was calculated to be 4.87 gpm/ft.dd. The semilogarithmic recovery curve (Figure 5) projects to zero residual drawdown, indicating favorable ground-water replenishment characteristics to the aquifer in the vicinity of the well. An observation well (SS-1), located 122 feet northeast of SS-1A was monitored during the testing program.

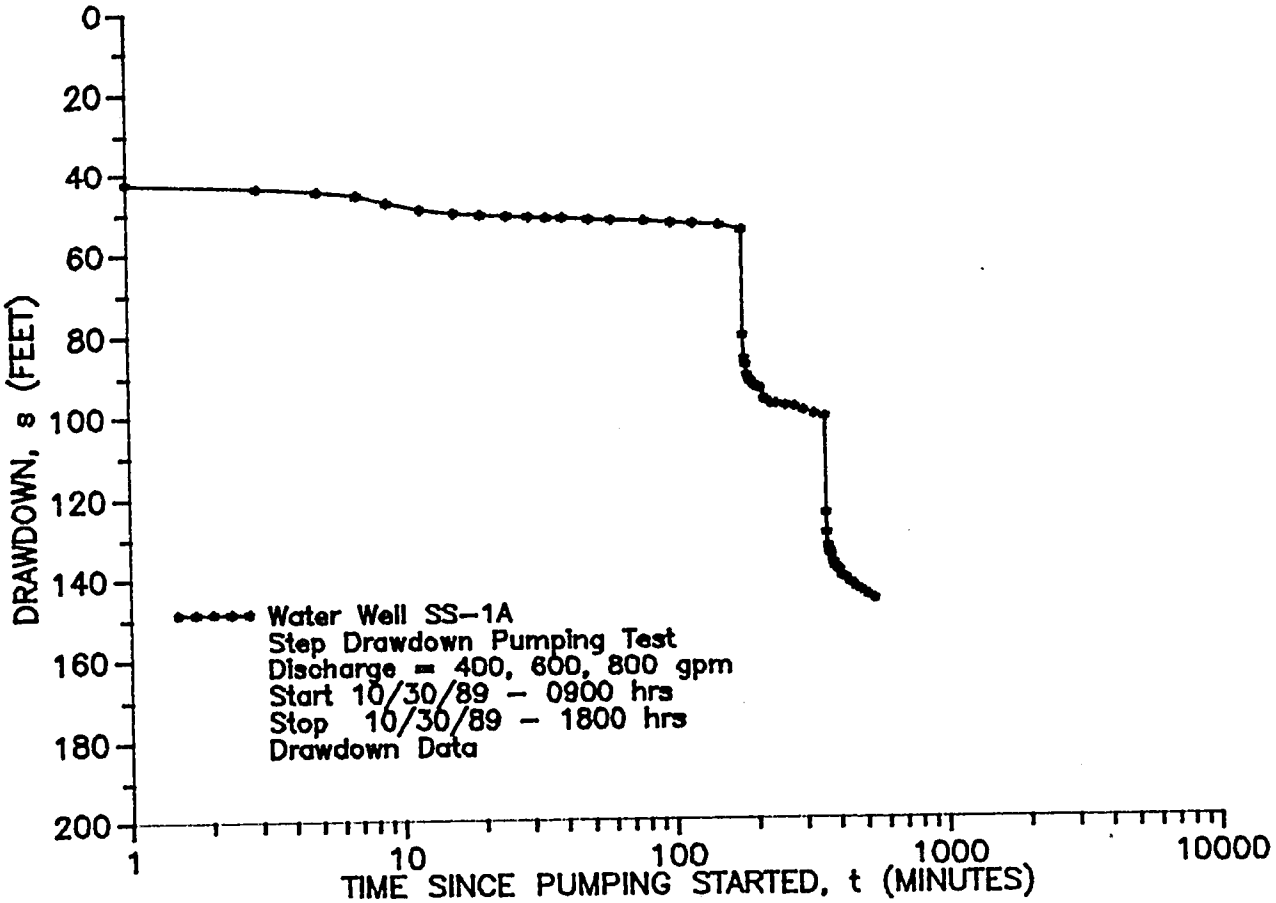

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FIGURE 2

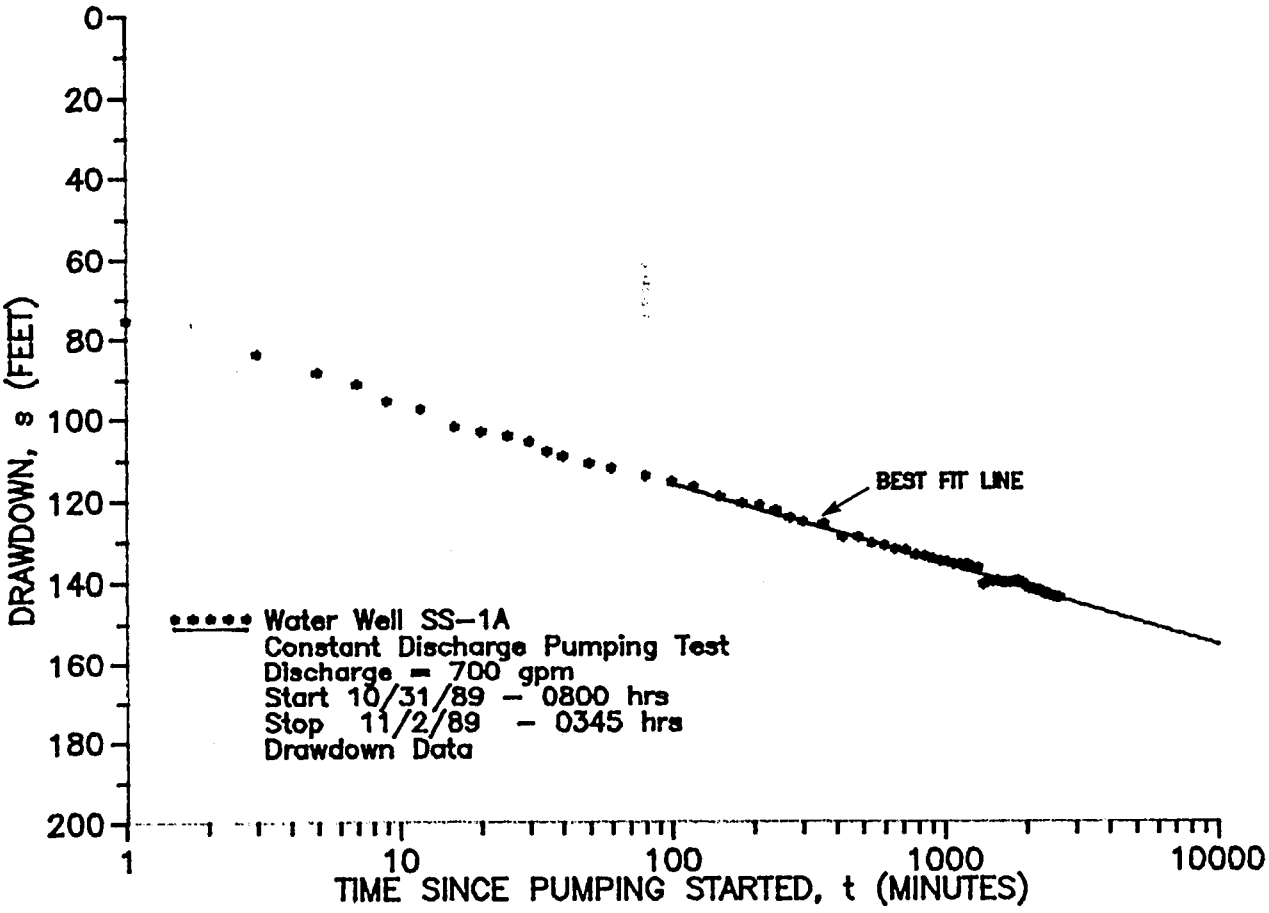

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FIGURE 3

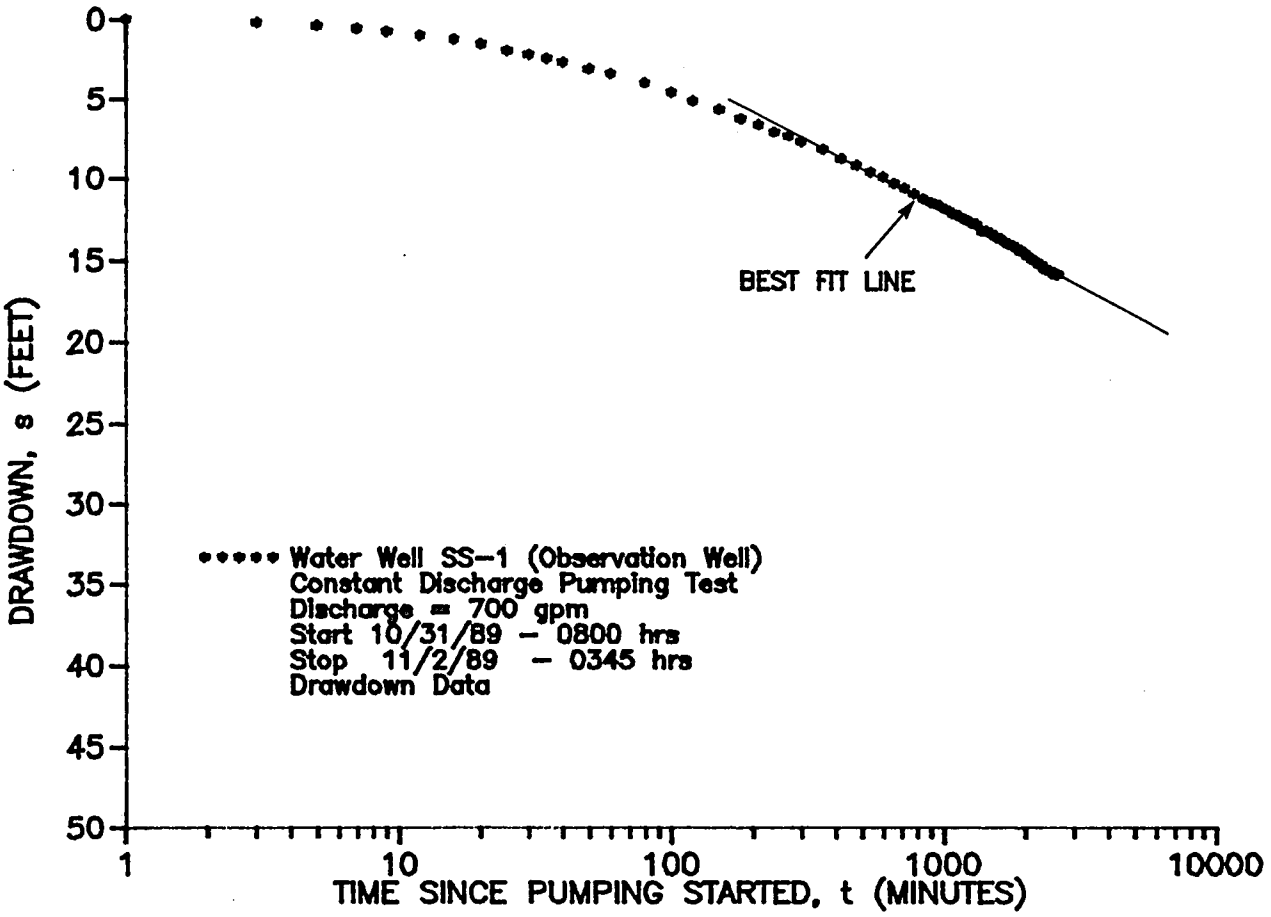

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FIGURE 4

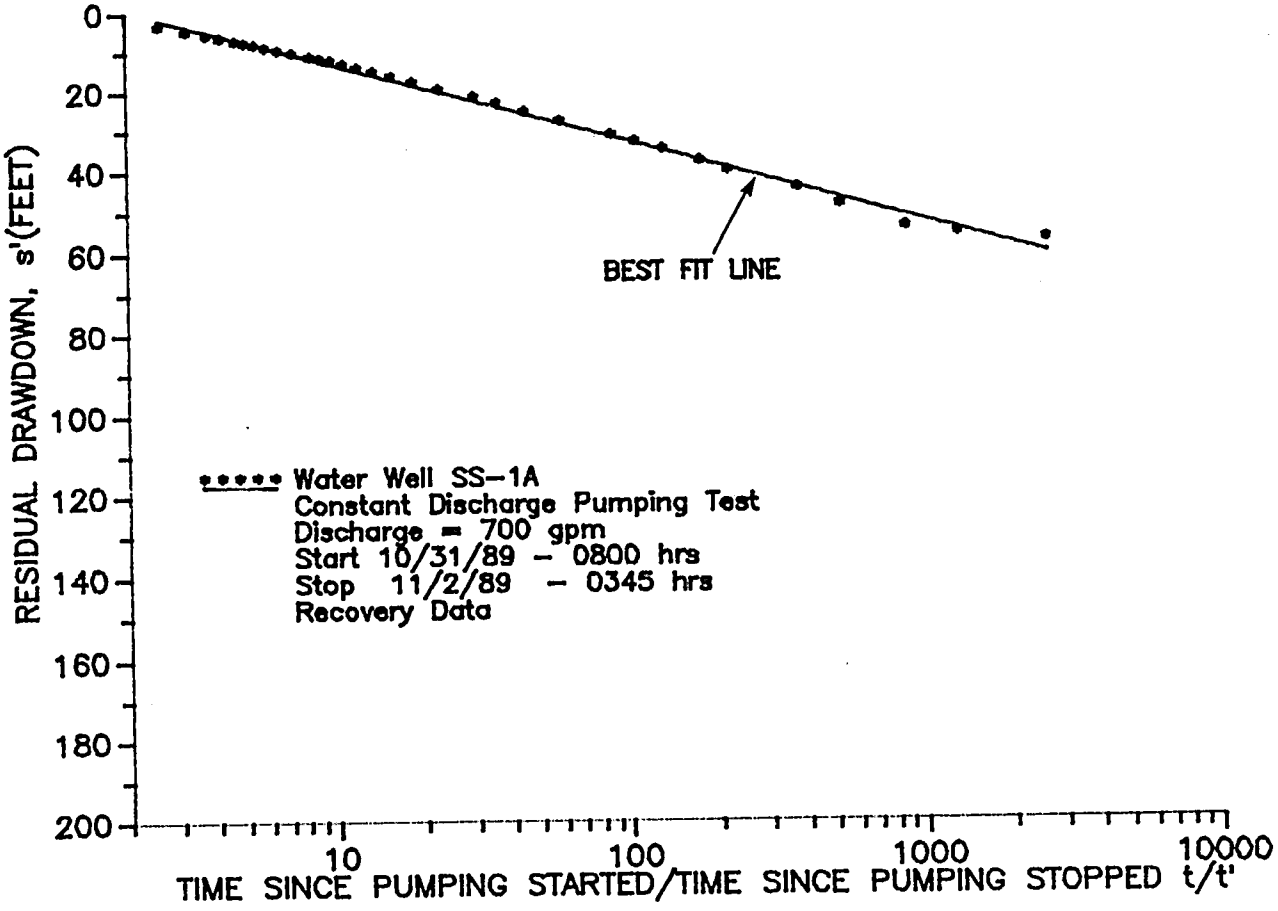

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FIGURE 5

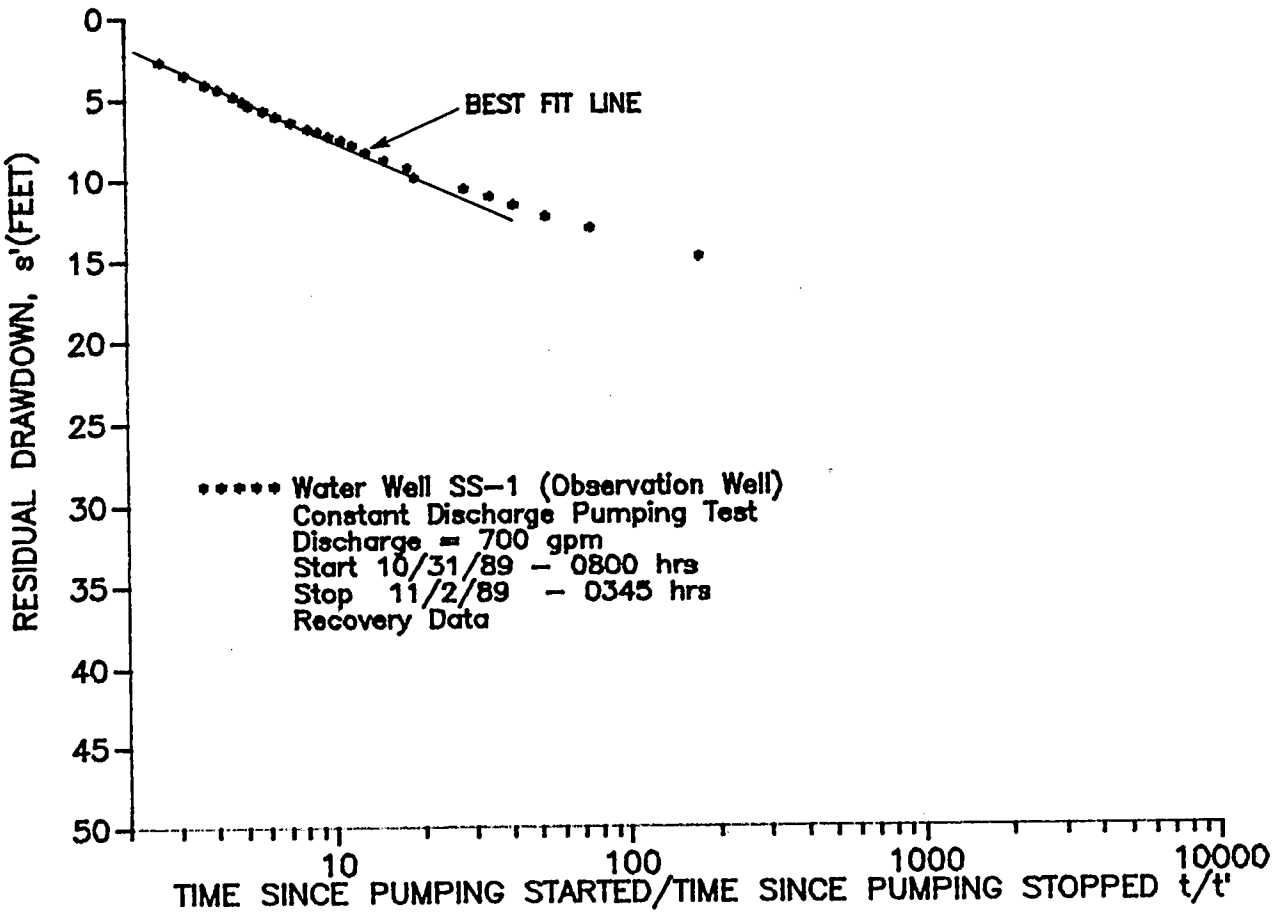

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FIGURE 6

Analysis of step-drawdown and the constant-discharge pumping tests data in conjunction with chemistry and well construction details, indicates that SS-1A is deriving its water primarily from consolidated rock, verses SS-1, which appears to derive its water from the upper alluvial zone (less than 200 feet to ground surface). A summary of data in support of this conclusion are summarized as follows:

Items	SS-1A	SS-1/Shallow Type Wells
Static water level	66.4 ft.	68 ft.
Start of perforations	200 ft.	37 ft.
Specific Capacity	4.87	17.38
Water Temperature	72°F	57°F
pH	7.2	7.7
Electric Conductivity	450	510
Storage Coefficient	0.00034	0.14

Of the above items and corresponding data, the following stand out as the most supportive evidence for different zones of water contribution; 1) specific capacity, 4.87 verses 17.38; 2) water temperature, 72° F verses 57° F; and storage coefficient, 0.00034 verses 0.14. In addition, during well design and construction SS-1A, blank casing was placed to a depth of 200 feet. This design, as required by Washoe County, essentially blocks off all of the shallow aquifer, which probably receives most of the Orr Ditch recharge water. The alluvial materials penetrated also exhibited stratification, which would tend to restrict vertical movement while enhancing horizontal movement of ground water recharge from the Orr Ditch. SS-1 is open to this shallow zone, and pumping test results exhibit more

alluvial (unconfined aquifer) characteristics (greater specific capacity and storage coefficient) than SS-1A, which exhibits more consolidated rock (confined aquifer) characteristics.

Results of the constant-discharge pumping test are summarized as follows:

Well	Data	Method	Transmissivity (gpd/ft)	Storage Coefficient
SS-1A	Drawdown	Cooper-Jacob	9,477	----
SS-1	Drawdown	Cooper-Jacob	18,857	----
SS-1A	Recovery	Theis-recovery	9,150	----
SS-1	Recovery	Theis-recovery	24,156	0.00037

6.0 YIELD RATING

A preproduction pumping yield rating for SS-1A has been established as 575 gpm, if use is limited to a maximum of 16 hours a day. The rating is 425 gpm if 24-hour use is required. These ratings may change as production pumping usage and water level data become available.

Data from the constant-discharge pumping test conducted on SS-1A and observation well SS-1, have been analyzed to assist in determining aquifer parameters of the alluvium and consolidated rock. These parameters, transmissivity (T) and storage coefficient (S), can be used to estimate future water levels at various distances and time. Also, possible pumping interference between the production wells may be estimated.

The preproduction yield rating and possible drawdown interference projected for SS-1A and SS-3 can appear somewhat misleading. SS-1A derives most of its water from fractured consolidated rock, while SS-3 derives its water from a shallow alluvial aquifer. Given the duration of the pumping test (44 hours) connection (leakage) between the consolidated rock and alluvial aquifers and the recharge effect of the Orr Ditch could not be determined. The data presented in Table 1 shows the maximum drawdown at the distances given without recharge into the aquifer system.

An evaluation of pumping and recovery data, indicates that there may be drawdown interference between the production wells (SS-1A and SS-3). SS-3 is located 2,800 feet from SS-1A. Table 1. shows the projected drawdowns of pumping SS-1A at various distances from SS-1A.

Table 1 shows that over a period of time pumping effects from SS-1A will be felt at SS-3. The other production well utilized by Sky Ranch (SS-6), is approximately 5,000 feet from SS-1A. The effect on SS-6 by pumping SS-1A may be approximately 20 feet after 10 years.

Table 1: Projections for Time & Distance Drawdowns From SS-1A

DISTANCE	TIME & DRAWDOWN		
(Feet)	1 Year	5 Years	10 Years
wellsite	119	129	133
500	47	57	61
1,000	39	49	53
1,500	35	44	48
2,000	31	40	45
2,500	29	38	42
2,800	27	37	41

7.0 WATER CHEMISTRY

Field water chemistry measurements were taken during the step-drawdown and constant-discharge pumping tests. Results indicate the following general parameters: 1) water temperature, 72 F; 2) Electric conductivity of 450 micromhos/cm; and 3) pH of 7.2.

Water samples collected were submitted to Sierra Environmental Monitoring, Sparks, Nevada, for chemical analysis. Results of the analysis are tabulated on Table 2 and indicate that the water is of excellent quality and meets all mandatory standards for public water supplies.

Table 1. WATER CHEMISTRY DATA, SKY RANCH (NORTH) PROJECT

Location	EPA-Nevada (1) Drinking Water Standards	SS-1A
Date-Time		11/2/89-1600 Hrs.
Discharge, gpm		700
Temperature, ($^{\circ}_{F}$)		72
pH (field)	6.5-8.5	7.2
pH		7.6
Total Dissolved Soilds (evap.)	500s(1000)	313
Total Dissolved Solids (calc.)		250
Electrical Conductivity (lab)		400
Electrical Conductivity (field)		450
Constituent		
HCO_3		101
CO_3		---
Cl	250s(400)	30
SO_4	250s(500)	17
F	1.4-2.4p(2)	0.1
B		<0.1
NO_3 (as No_3)	45.Op	24
Na		17
K		4.7
Ca		39.6
Mg	125s(150)	10.7
SiO_2		47
As	0.05p	0.006
Cu	1.0s	<0.02
Fe	0.3s(0.6)	0.10
Mn	0.05s(0.1)	<0.02
Zn	5.0s	<0.01
Ba	1.0p	<0.4
Cd	0.01p	<0.01
Cr	0.05p	<0.02
Pb	0.05p	<0.05
Hg	0.002p	<0.0005
Se	0.01p	<0.003
Ag	0.05p	<0.02
P (total)		0.02
CN		0.005
Hardness (mg/1 equivalent $CaCO_3$)		142

Notes:

(1) Nevada and EPA mandatory primary standards for public water systems are noted with "p". Nevada and EPA recommended secondary standards for public water systems are noted with an "s". The secondary standard for magnesium is Nevada only. Nevada mandatory secondary standards for public water systems are shown in parentheses.

(2) Dependent on annual average maximum daily air temperature.

Analyses by Sierra Environmental Monitoring, Reno, Nevada.

Chemical concentrations are in mg/1, pH is in standard pH units, and electrical conductivity is in micromhos/cm @ 25°c.

* Exceeds a non-mandatory standard.
** Exceeds a mandatory standard.

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8.0 FUTURE POTENTIAL WELL SITES

To meet the anticipated long-term water-supply requirement of approximately 600 gpm for both the existing subdivision an the future development, another production well will be required. This well could serve as a backup for both subdivisions. The location for the proposed well is approximately 100 feet west of SS-3. If this location is unavailable, other prospective well-sites 2,000 feet west of SS-3 and 2,000 feet east of SS-3 appear appropriate.

9.0 SOURCES OF INFORMATION

Hadiaris, Amy K., 1988, Quantitative Analysis of Groundwater Flow in Spanish Springs Valley, Washoe County, Nevada. Master of Science, University of Nevada-Reno.

Nork, William E., 1989, Aquifer Stress Test, GWSA Production Well No. 2, William E. Nork, Inc., Reno, Nevada.

Sky Ranch Utility, 1989, Personal Communications, well logs, pumping records, and water levels.

Well Logs, Nevada Department of Conservation and Natural Resources, Division of Water Resources, Carson City, Nevada.

APPENDIX A

Log of Borehole and Well Construction Summary

LOG OF BOREHOLE

Project: Sky Ranch - North Owner: European Invest. Well Number: SS1-A

Location: Spanish Springs Valley Project Number: 2151-89

Loc. or Coords.: SW1/4 SE1/4, Section 26, T21N, R20E	Driller: Humboldt Drilling and Pump	Start / Finish Date: 10/10/89 / 10/13/89 Time: 12:30 / 14:30
Ground Elev.: 4533 Feet	Rig: Ingersoll-Rand TH100	Geophys. Log: [Yes] No
Total Depth: 800 Feet	Bit(s): 9 7/8-inch Tricone	How left: Reamed to Production
Borehole Diam.: 9 7/8-inch	Fluid: Polymer	Logged by: DEC, JT

DEPTH	PENE. RATE	CIRC. Ret	CIRC. Loss	AIRLIFT Q (gpm)	MATERIAL	SYM-BOL	DESCRIPTION and COMMENTS
0					Alluvium		Alluvial type setting interlayers of clay and sand with little chance to define actual strata until deeper in the hole.
10							
20							
30	18						Good coarse sand.
40							
50	18						50 - 60, Some clay.
60							Mostly coarse sand.
70	16						
80							80 - 90 Good clay with some fine sand.
90	16						Mostly coarse sand.
100							100' - 110' Fine grained sand with some clay.
110	12						More clay from 110' - 120' than sand.
120							Fine grain sand 60% clay, 40% for zone 120' - 140'.
130	16						
140							Fine and coarse grained sand with some clay.
150	13						150' - 160' Coarse sand (70%) with some clay (30%).
160							

LOG OF BOREHOLE

Project: Sky Ranch - North

Well Number: SS-1A

DEPTH	PENE. RATE	CIRC. Ret	CIRC. Loss	AIRLIFT Q (gpm)	MATERIAL	SYM-BOL	DESCRIPTION and COMMENTS
160					Alluvium		Appears to have more clay than fine grained sand. Sand 50% clay 50%.
170	15						
180							Fine grained sand (60%) with clay (40%).
190	11						Rounded coarse sand, mixed with clay.
200							Mostly coarse sand with some clay, hard to tell, because strata thickness varies. Sand 70%, Clay 30%.
210	11						Mostly sand between 220'-230'. Sand 80%, Clay 20%.
220							234'-240' Good sand zone.
230	11						Medium sand (70%) with some clay (30%).
240							End of day's drilling 10/10/89.
250	12						Start of Day's drilling 10/11/89.
260							Clay zone between 276' and 282'.
270	28						Mostly coarse sand 80%, clay 20%.
280							290'-300' Coarse sand 60%, clay 40%.
290	27						Mostly clay.
300							(olive color clay contains little fine sand).
310	21						Sand 315'-318'.
320							320'-330' 70% sand.
330	17						334'-344' More clay.
340							344'-356' Coarse sand
350	13						356'-370' Clay-blue-gray color,
360							(15% yellowish brown sandy clay)
370	26						370'-376' Coarse sand
380							(round-subrounded, moderate well sorted)
							376'-380' Clay

LOG OF BOREHOLE

Project: Sky Ranch - North

Well Number: SS-1A

DEPTH	PENE. RATE	CIRC. Ret	CIRC. Loss	AIRLIFT Q (gpm)	MATERIAL	SYM-BOL	DESCRIPTION and COMMENTS
380					Alluvium		376'-380' Clay.
390	42						Clay (blue-gray).
400							408'-417' Sand.
410	31						417'-419' Clay.
420							~ 60% sand, 40% clay.
430	14						450'-460' More sand (90%).
440							Coarse sand (round-subrounded, moderate well sorted)
450	15						480'-490' Slower, cuttings still sand.
460							490'-500' Faster, suttings 20% clay.
470	13						80% sand, 20% clay.
480							520'-530' Coarse sand.
490	18						530'-540' 70% coarse sand, little gravel, 30% clay.
500							70% sand, 30% clay.
510	15						571'-577' Sand.
520							End of day's drilling 10/11/89. Start of day's drilling 10/12/89. Coarse sand, no clay. (rounded, round-subrounded, some fine sand) Hole clean so particularly good sample.
530	15						
540							
550	24						
560							
570	34						
580							
590	60						
600							

LOG OF BOREHOLE

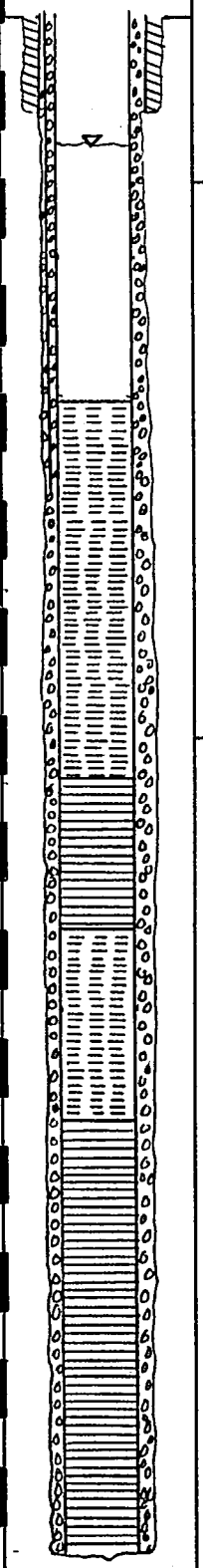
Project: Sky Ranch - North

Well Number: SS-1A

DEPTH	PENE. RATE	CIRC. Ret	CIRC. Loss	AIRLIFT Q (gpm)	MATERIAL	SYM-BOL	DESCRIPTION and COMMENTS
600					Consolidated Rock		Coarse sand, no clay, grading into granitic type rock.
610	28						Losing water 600-620'.
620							
630	32						
640							644' @9:26 Bouldery! Hole clean, good sample.
650	74						600' ~ 10:00 Coarse sand - fresh fracture surfaces Dark granitic, much quartz and felds.
660							
670	54						As in 640'-660'.
680							Driller thinks fractured rock. (680'-687' Faster)
690	57						As in 660'-680', rough drilling.
700							690'-700' Dark granite (70% quarts-felds, 30% mafic).
710	43						45 Minutes 700'-705', tripped out switched bits. End of drilling 10/12/89.
720							705'-710' slow.....} 50% quartz + felds (angular); 30% blue-gray soft rock; 20% volcanics (sub-
730	41						710'-720' Much faster} rounded).
740							Mixed lithology (as in 700'-720')
750	10						Slow 735'-740'; Visc = 3/sec.
760							Slow with ~ 4'-5' Faster zone. Fracture in rock.
770	8						Faster.
780							
790	24						TD = 800 Feet
800							

WELL/PROBE SS-1A

WELL/PROBE CONSTRUCTION SUMMARY



PROJECT: Sky Ranch (North)
PROJECT NO.: 2151-89
PERSONNEL: DIEC, DEW, JT

ELEVATION:
GROUND LEVEL: 4533 Feet
TOP OF RISER:
TOP OF PROT. CASING: 4534 Feet
LOCATION OR COORDS: SW 1/4, SE 1/4, Section 26, T21N, R20E

DRILLING SUMMARY:
TOTAL DEPTH: 800 Feet
BOREHOLE DIAMETER: 17 1/2-Inches

DRILLER: Humboldt Drilling + Pump

RIG: Ingersoll-Rand TH 100
BIT(S): 9 7/8 Tricone
17 1/2-Inch Reamer
DRILLING FLUID: Polymer + Bentonite

SURFACE CASING: 18-Inch 0-51 Feet

WELL DESIGN:
BASIC: GEOLOGIC LOG X GEOPHYS. LOG X

CASING STRING(S):			C=CASING / S=SCREEN		
+1	- 200	C1		-	
200	- 396	L1		-	
396	- 476	S1		-	
476	- 574	L1		-	
574	- 794	S1		-	
794	- 799	C1		-	

CASING: C1 12-Inch X 0.25-Inch Blank

SCREEN: S1 12-Inch 80-Slot
L1 12-Inch Louver-Standard

CENTRALIZERS:

FILTER MATERIAL: 1/4 X 3/8-Inch

CEMENT: 0' - 50'

OTHER: 3 Foot cement plug in blank casing at bottom

CONSTRUCTION TIME LOG:

TASK	START DATE 1989	START TIME	FINISH DATE 1989	FINISH TIME
DRILLING:				
9 7/8-Inch	10/10	12:30	10/13	14:30
17 1/2-Inch	10/18	14:00	10/22	16:10
GEOPHYSICAL LOGGING:	10/13	16:35	10/13	19:00
CASING:				
	10/14	10:30	10/14	12:00
	10/23	08:50	10/23	16:30
FILTER PLACEMENT:	10/24	09:00	10/24	11:00
CEMENTING:	10/14	12:00	10/14	12:30
DEVELOPMENT	10/24	11:00	10/24	18:00
OTHER:				
Pump Dev.	10/27	07:00	10/27	11:00

DEVELOPMENT SUMMARY:

COMMENTS:
SWL - 66.40 Feet
10/30/89 - Step Drawndown Test
400 GPM 7.32 Cs
600 GPM 5.96 Cs
800 GPM 5.49 Cs

10/31/89 - 11/2/89 Constant Discharge
700 GPM 4.87 Cs

Welenco ELECTRIC LOG

FILING NO.

COMPANY	EUROPEAN INVESTMENT MNGT. SRVS., INC.
WELL	SS - 1A
FIELD	SPANISH SPRINGS
STATE	NEVADA
COUNTY	WASHOE
LOCATION	
OTHER SERVICES	GAMMA RAY
SEC.	26
TWP.	21N
RGE.	20E

Permanent Datum: G.L., Elev. ___ Elev.: K.B. ___
Log Measured From G.L., ___ Ft. Above Perm. Datum D.F. ___
Drilling Measured From G.L. G.L. ___

Date	10-13-89			
Run No.	ONE			
Depth—Driller	800'			
Depth—Logger	789'			
Btm. Log Inter.	788'			
Top Log Inter.	50'			
Casing—Driller	NONE @	@	@	@
Casing—Logger	--			
Bit Size	9 7/8"			
Type Fluid in Hole	BENTONITE POLYMER			
Dens. | Visc.	N/A |	|	|	|
pH | Fluid Loss	N/A | ml	| ml	| ml	| ml
Source of Sample	PIT			
R_m @ Meas. Temp.	10.6 @ 75 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	10.6 @ 75 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	N/A @ °F	@ °F	@ °F	@ °F
Source: R_{mf} | R_{mc}	M |	|	|	|
R_m @ BHT	N/A @ °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HOURS			
Max. Rec. Temp.	N/A °F	°F	°F	°F
Equip. | Location	SB81 | RENO	|	|	|
Recorded By	ROBERTI			
Witnessed By	THORNBURG - HYDRO-SEARCH, INC.			

Fold Here — This Heading and Log Conform To API RP 31 ®

REMARKS

Changes in Mud Type or Additional Samples			Scale Changes			
Date | Sample No.			Type Log	Depth	Scale Up Hole	Scale Down Hole
Depth—Driller			16",64" NORMALS	620'	0-50 OHMS	0-200 OHMS
Type Fluid in Hole						
Dens. | Visc.						
ph | Fluid Loss	ml					
Source of Sample			Equipment Data			
R_m @ Meas. Temp.	@ °F	@ °F	Run No.	Tool Type	Pad Type / Tool Position	Other
R_{mf} @ Meas. Temp.	@ °F	@ °F	ONE	ELECTRIC LOG	FREE	
R_{mc} @ Meas. Temp.	@ °F	@ °F				
Source: R_{mf} | R_{mc}						
R_m @ BHT	@ °F	@ °F				
R_{mf} @ BHT	@ °F	@ °F				
R_{mc} @ BHT	@ °F	@ °F				

SPONTANEOUS POTENTIAL millivolts	Depths	RESISTIVITY ohms. m²/m	RESISTIVITY ohms. m²/m
5 ⊢ +		SHORT NORMAL 16 Inch 0 — 50; 0 — 200	RESISTANCE Detail Curve
		LONG NORMAL 64 Inch 0 — 50; 0 — 200	

Welenco

Gamma-Ray Log

COMPANY: EUROPEAN INVESTMENT MNGT. SRVS., INC.
WELL: SS - 1A
FIELD: SPANISH SPRINGS
STATE: NEVADA   COUNTY: WASHOE
LOCATION: SEC. 26   TWP. 21N   RGE. 20E
OTHER SERVICES: ELECTRIC LOG

PERMANENT DATUM: G.L.   ELEV.
LOG MEASURED FROM: G.L.   FT. ABOVE PERM. DATUM
DRILLING MEASURED FROM: G.L.
ELEV.: K.B.
D.F.
G.L.

DATE	10-13-89
RUN NO.	ONE
TYPE LOG	GAMMA RAY
DEPTH-DRILLER	800'
DEPTH-LOGGER	788'
BOTTOM LOGGED INTERVAL	787'
TOP LOGGED INTERVAL	0'
TYPE FLUID IN HOLE	BENTONITE/POLYMER
MAX. REC. TEMP., DEG. F.	N/A
RECORDED BY	ROBERTI
WITNESSED BY	THORNBURG - HYDRO-SEARCH, INC.

BORE-HOLE RECORD				CASING RECORD			
RUN NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1	9 7/8"	0'	800'	NONE			

EQUIPMENT DATA

Gamma Ray				Neutron			
Run No.	ONE			Run No.			
Tool Model No.	G27X4LD			Log Type			
Diameter	2"			Tool Model No.			
Detector Model No.	--			Diameter			
Type	SCINT.			Detector Model No.			
Length	4"			Type			
Distance to N. Source	NONE			Length			
				Source Model No.			
General				Serial No.			
Hoist Truck No.	SB81 RENO			Spacing			
Instrument Truck No.	SB81			Type			
Tool Serial No.	153			Strength			

LOGGING DATA

General				Gamma Ray				Neutron			
Run No.	Depths From	Depths To	Speed Ft/Min.	T.C. Sec.	Sens. Settings	Zero Div. L or R	API G.R. Units per Log Div.	T.C. Sec.	Sens. Settings	Zero Div. L or R	API N. Units per Log Div.
1	787'	0'	20	5	100/800	5 L	7.0				

Reference Literature:

Remarks:

Fold Here

	DEPTHS	GAMMA RAY API UNITS
		35 — 175