GRANTS RECLAMATION PROJECT
1st QUARTER 2016 SAN ANDRES WELL INTEGRITY TESTING

Prepared for:
Homestake Mining Company
P.O. Box 98 – San Mateo Road
Grants, NM 87020

Prepared by:
Hydro-Engineering, LLC
4685 East Magnolia Street
Casper, Wyoming 82604

March 2016

Grants Reclamation Project
1st Quarter 2016 San Andres Well Integrity Testing

For:

Homestake Mining Company
P. O. Box 98
Grants, New Mexico 87020

By:

Hydro-Engineering, L.L.C.
March 2016

Adam Arguello
Hydro-Engineering, LLC

George L. Hoffman, P.E.
5831 N.M. Hydrologist

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Figures
(Located at the end of each section)

Appendix

Executive Summary

Well integrity testing is being conducted by Homestake Mining Company of California (HMC) on HMC San Andres wells that are located on the Grants Reclamation Project (GRP). The schedule for this testing program was approved by the New Mexico Environment Department (NMED) on July 6, 2015. While other wells will be tested and evaluated at a future date, this particular report presents the results of the well integrity testing of San Andres wells 951R and 943. Subsequent reports will be sent to the regulatory agencies as the testing of additional San Andres wells is completed.

Geophysical logging and a video camera were used to evaluate the two aforementioned wells. The report also presents water quality results from monitoring of the four San Andres wells that are being used to supply fresh water for the ground-water restoration program.

- The San Andres well integrity testing for well 951R, which was drilled in 2012, shows that the integrity of this well is good and the well is suitable for use as a fresh water supply well.

- The testing of well 943, which was drilled in 1952, shows considerable corrosion but the video of the well does not show any significant leakage of alluvial water into the well. Therefore, this well is suitable for use as a fresh water supply well.

- The water quality in existing San Andres supply wells #1, #2, 943 and 951R is unchanged in 2016 and this indicates that well integrity in these wells has not changed. The increase in 2014 and decline in 2015 in uranium concentrations in well 951R is not a function of pumping from this well, because it was continuously pumped over that entire period. The last five uranium concentrations have been steady and low. Therefore, these four San Andres wells can continue to be used as a fresh water supply. Well integrity testing for wells #1 and #2 is planned for later in 2016.

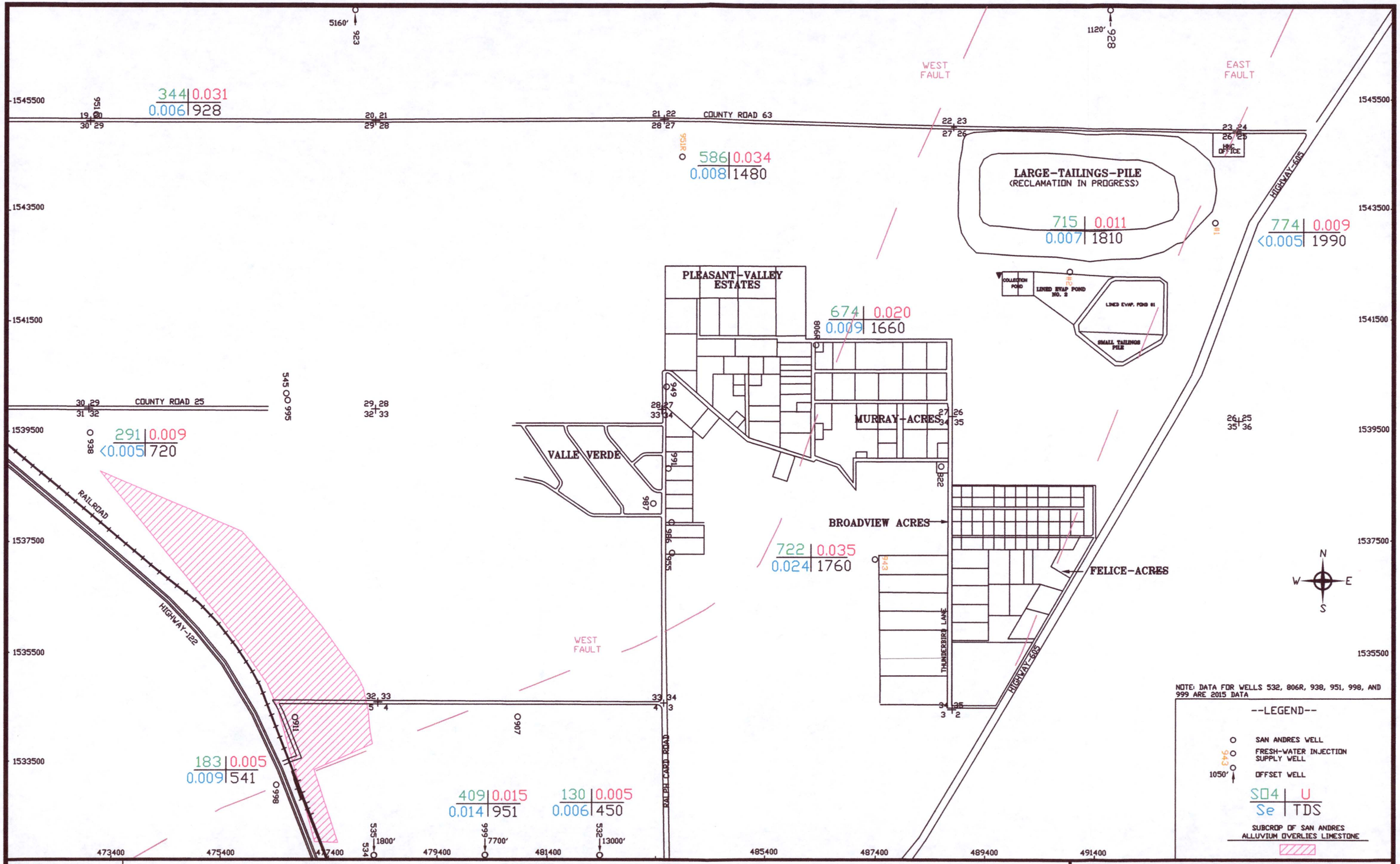
1.0 Introduction

This report presents the results from the integrity testing of Homestake Mining Company of California's (HMC) San Andres wells 951R and 943. These two San Andres wells are located on the Homestake Grants Reclamation Project. HMC's DP-200 required testing in the first quarter of 2016 to evaluate the integrity of HMC's San Andres wells, 951R and 943.

San Andres well 951R is currently used for a supply for fresh water and has been since it was drilled in 2012. Well 943 is also used as a supply for fresh water.

Figure 1-1

Location of San Andres Wells and Water Quality Data for San Andres Aquifer
2016, mg/l



SCALE: 1" = 1000'	
C:\PROJECTS\2016-06\1600SAN.ada	
DATE: 3/17/16	

FIGURE 1-1. LOCATION OF SAN ANDRES WELLS AND WATER QUALITY DATA FOR THE SAN ANDRES AQUIFER 2016, mg/l

2.0 San Andres Well Integrity

The integrity of San Andres wells 951R and 943 were evaluated in the first quarter of 2016. A video of the wells and geophysical logs were done by Jet West Geophysical Services to assess the integrity of these San Andres wells. Jet West Geophysical Services also provided interpretation of the logs included in the following discussion.

A gamma ray log was used to define the lithology. Gamma curves can be affected by the fill material in a well's annulus, and thus may indicate changes in completion materials. A 3-arm caliper log measures the inside diameter of a well's casing and indicates where scaling or corrosion/erosion may be present.

The sonic-cement bond log (CBL) is composed of four curves: near receiver (3-foot) variable density log (VDL), near first arrival, delta time, and amplitude. The tool consists of a sonic transmitter which emits a 20 kHz sound pulse twice every second, and two receivers which record the degraded sound energy at a distance of 3 and 4 feet. The tool requires fluid in the well to convey the sound energy. The near, or 3-foot, receiver VDL curve is presented in the log, and the last three curves are derived from the VDL curve. Near first arrival is a measure of the initial compressional energy (in micro-seconds of time) from the tool's transmitter to the receiver spaced 3 feet up the tool. Amplitude represents the signal height of the near first arrival and is read qualitatively. High amplitude readings indicate "ringing" steel pipe and lower amplitudes indicate attenuated sound energy or bonded pipe. Delta time is a measurement of "slowness" in micro-seconds per foot (μsec/ft). Slowness is the inverse of velocity (ft/sec). The velocity of sound travelling through steel is approximately 17,500 ft/sec which equates into a slowness of 57 μsec/ft. Slowness is calculated by subtracting the first arrival of the 3-foot receiver from that of the 4-foot receiver.

The 4 Pi log is read qualitatively in a reverse fashion from higher to lower counts with the higher counts indicating lower density materials.

2.1 Well 951R

Well 951R is presently being used to supply fresh water for injection in the North Off-Site area. The well was logged from the top to a depth of 420 feet with video camera, gamma ray, 3-arm caliper, sonic, and 4 Pi density.

2.1.1 951R Lithology and Well Completion

Well 951R was drilled in 2012 and cased with 14 inch steel casing to a depth of 84 feet, 8" steel casing to a depth of 410, and open hole completion down to 525 feet. The annulus of the well was cemented from 0 to 410 feet using the Halliburton method. The water level in well 951R is representative of the San Andres aquifer. Figure 2-1 presents the well completion details and the lithology for well 951R which indicates the top of the San Andres aquifer is at a depth of 420 feet below the land surface.

2.1.2 951R Geophysical Logs

Gamma ray, caliper, amplitude, delta time and, 4 Pi density logs were run on well 951R on March 1, 2016 to evaluate the integrity of this well (see Figure 2-2). The gamma log indicates less permeable material between 97 and 142 feet, which generally corresponds to the clay and shale interval on the lithologic log. The caliper log was run on an enhanced scale of 5-15 inches, and shows that the casing inside diameter (ID) is a consistent 8.1" indicating no major scaling.

The sonic logs show an attenuated interval between 230 and 385 feet. The higher amplitude bands in this section line up primarily with casing joints (270, 290, 310, 350, and 370 feet). The higher amplitude from 385 feet to 410 feet may be caused by limestone behind the casing.

The near First Arrival appears ahead of the VDL due to adjustment in the VDL shading and also indicates some attenuation along most of the casing.

The 4 Pi Density and the Focused Density both indicated void spaces behind the casing from 82 to 107 feet.

2.1.3 951R Video

A video of the 951 well was conducted on March 1, 2016 and is presented in Appendix A with the video of well 943 as well. The video of well 951R above the water level at 153 feet shows no sign of water from the alluvial aquifer entering the casing. The base of the alluvial aquifer is at approximately 65 feet below land surface and the alluvium should be dry at this location. The water in the well was murky in a large portion of the casing but clears up near 330 feet. The video appears to show that the formation below 417 feet has collapsed.

2.1.4 Summary of Well 951R Integrity Testing

The geophysical logs and video for well 951R demonstrate that this well casing integrity is good. Well 951R is acceptable to continue to be used as a fresh water injection supply for the Grants restoration program.

2.2 Well 943

Well 943 is presently being used to supply fresh water for injection in the South Off-Site area. The well was logged from the top to a depth of 722 feet with video camera, gamma ray, 3-arm caliper, sonic, and 4 Pi density.

2.2.1 943 Lithology and Well Completion

Well 943 was drilled in 1952 and cased with 18" steel casing from the surface to 304 feet, 16" steel casing from 271 to 408 feet, 13" steel casing from 347 to 510 feet, 10" steel casing from 459 to 703 feet, and an open hole completion from 703 to 978 feet. Figure 2-3 presents the lithologic log for well 943 which indicates the top of the San Andres aquifer is at a depth of 743 feet below the land surface.

2.2.2 943 Geophysical Logs

Gamma ray, caliper, amplitude, delta time, and 4 Pi density logs were run on well 943 on March 1, 2016 to evaluate the integrity of this well.

The base of the alluvium in thought to be 33 feet below land surface based on the gamma log or 48 feet based on the lithologic log. The Middle Chinle sandstone is thought to exist from 226 to 274 feet below land surface as shown on the gamma log.

The caliper log is presented on a scale from 9 to 19 inches. The log shows a casing diameter of 17.5 inches from the surface to 272 feet, a 15.7" casing diameter from 272 to 347 feet, a 12.7 inch diameter from 347 to 459, and a 10.7 inch diameter casing from 459 to 702. An open hole is shown from 702 to 727 feet with the bottom two feet being sediment. The log shows variations in these casing diameters due to corrosion and nodules that have built up on the casing.

The sonic logs show a strong signal difference as the casing diameter reduces. These changes in casing diameter are shown on both of the 3 arm caliper plot and on the VDL near-stacked plot at 272, 347, and 459 feet. An attenuated section is shown between 126 and 347 feet indicated either a heavily weathered section, cementing behind the casing, or a dry formation. From 347 to 459 feet a mostly un-attenuated section which may indicate a sleeve that is not cemented. The high ringing response (un-attenuated) from 459 to 579 feet is likely in response to the smaller casing size. The faint change in response at 704 feet may indicate the top of the limestone formation behind the casing.

The 4 Pi Density log showed the various casing sizes changes with the exception of the lowest density section near 300 feet which may represent the area of highest corrosion. The Focused Density log was less affected by the diameter changes and generally followed the 4 Pi log, but showed more character likely due to the weathered condition of the casing.

2.2.3 943 Video

A video of the 943 well was conducted on March 1, 2016 and is presented in Appendix A with the video of well 951R. The video of well 943 shows no intrusion of alluvial water into the casing. Nodules, both circular and pipe-like in shape, were commonplace below 172 feet in the well casing. Three small diameter pipes were found below 702 feet in the open hole completion portion of the well. The video appears to show at 725 feet the well has either collapsed or filled in with sediment.

2.2.5 Summary of Well 943 Integrity Testing

The geophysical logs and video for well 943 demonstrate that the casing has considerable corrosion but the video of the well does not show any significant leakage of alluvial water into the well. The alluvium is likely dry, based on the depth to its bottom at this location. Therefore, the well integrity for well 943 is adequate for continued use as a supply for fresh water injection.

Figure 2-1

Well 951R Completion Details and Lithology

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

San Andres well

(A) Owner of well Homestake Mining Co. Owner's Well No. 951R

Street or Post Office Address P.O. Box 98 Hwy 605

City and State Grants, NM 87020

Well was drilled under Permit No. 1605 & B-28 POD 1338 and is located in the:

a. ____ ¼ ____ ¼ NW ¼ NW ¼ of Section 27 Township 12N Range 10W N.M.P.M.

b. Tract No. ____ of Map No. ____ of the ____

c. Lot No. ____ of Block No. ____ of the ____ Subdivision, recorded in ____ County.

d. X= ____ feet, Y= ____ feet, N.M. Coordinate System ____ Zone in the ____ Grant.

(B) Drilling Contractor Coyote Drilling Inc. License No. WD-1451

Address P.O. Box 3467 Milan, NM 87021

Drilling Began 4-9-12 Completed 4-20-12 Type tools bit Size of hole 77/8" in.

Elevation of land surface or ____ at well is 6577 ft. Total depth of well 525' ft.

Completed well is ☐ shallow ☒ artesian. Depth to water upon completion of well 156' ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
420'	525'	105	San Andres	800+

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
14"	22	Weld	0	84	21	N/A		
8"	22	Weld	0	415	21	Open	Open	

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement
0	84	17½"	30		tremi
0	415	12¼"	6 yds.		haliburtion method

Section 5. PLUGGING RECORD

Plugging Contractor ____

Address ____

Plugging Method ____

Date Well Plugged ____

Plugging approved by: ____

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received ____ Quad ____ FWL ____ FSL ____

File No. ____ Use ____ Location No. ____

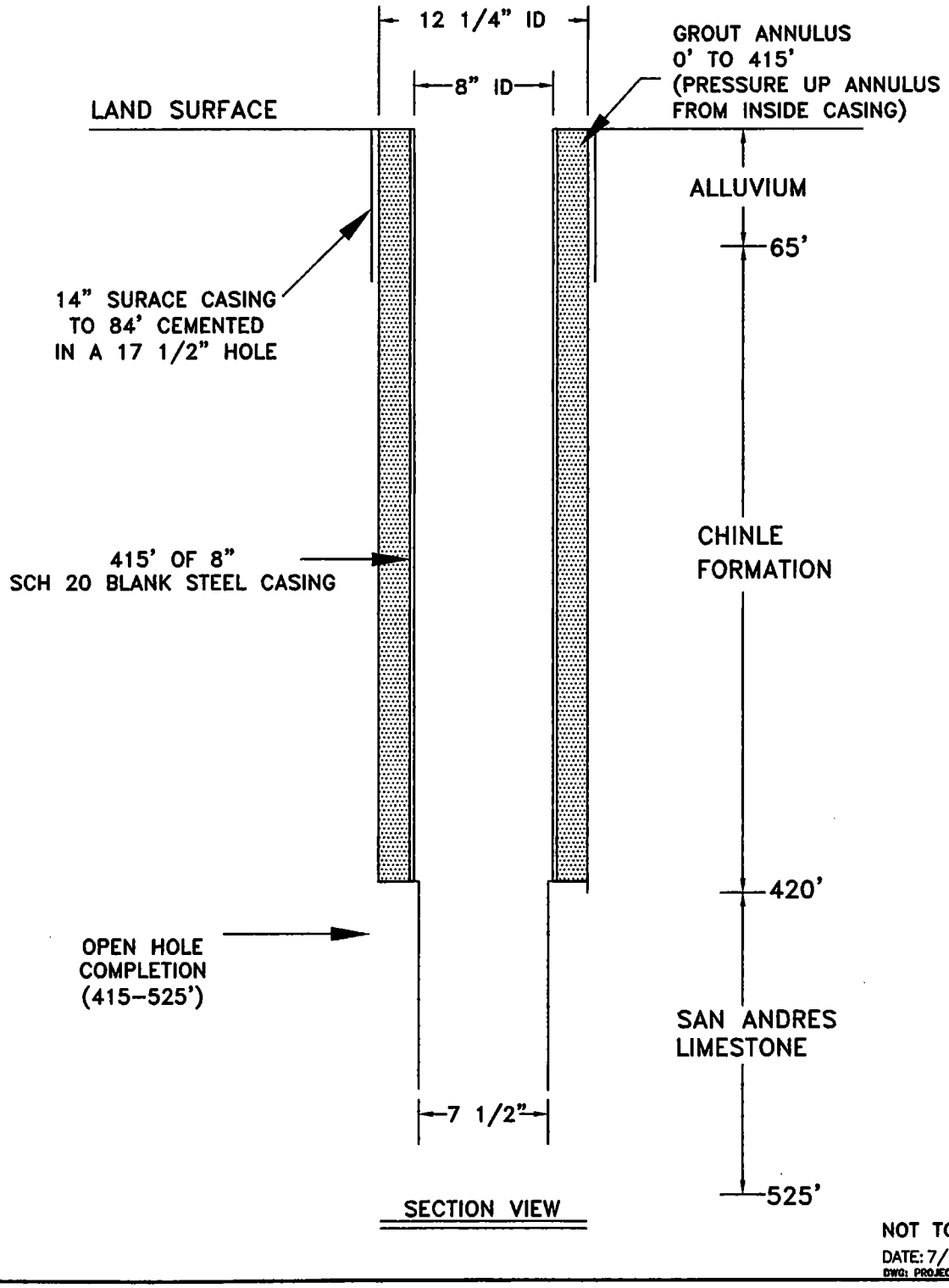
Depth in Feet From	To	Thickness in Feet	Color and Type of Material Encountered.
0	65	65	brown blow sand
65	270	205	chinle shale
~~270~~ 270	320	50	red shale & sand stone
~~320~~ 320	390	70	red shale & lime stone stringers
~~390~~ 390	420	30	red shale, sand stone & limestone
~~420~~ 420	525	100	San Andres limestone

Section 7. REMARKS AND ADDITIONAL INFORMATION

e undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above cribed hole.

Driller

STRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office f the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is lled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.



HOMESTAKE MINING COMPANY

FIGURE 1. WELL 951R COMPLETION SCHEMATIC

Figure 2-2

Well 951R Geophysical Logs

JET WEST
GEOPHYSICAL SERVICES, LLC.

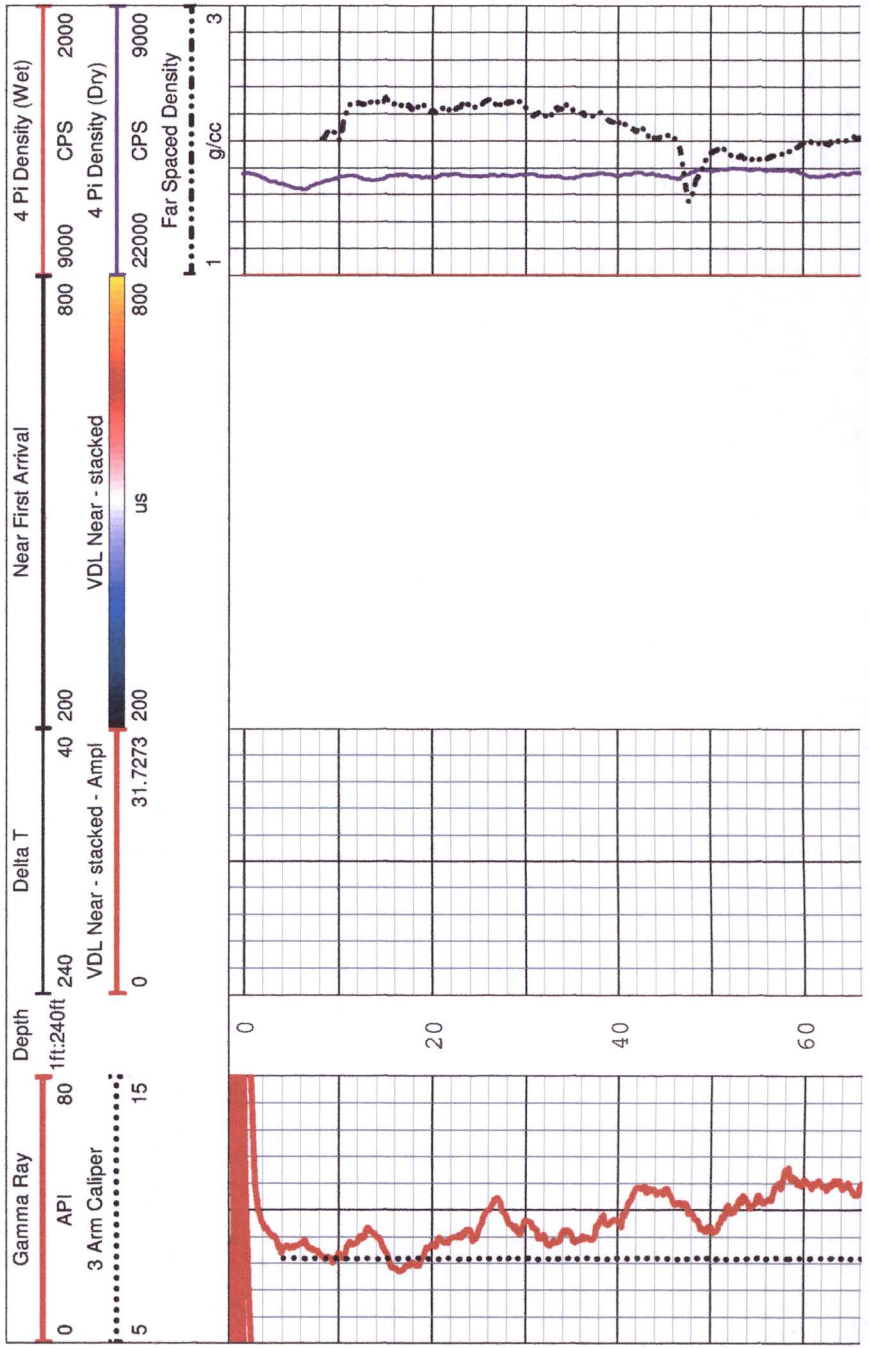
COMPANY	Homestake Mining Company
WELL ID	951R
FIELD	Grants
COUNTY	Cibola STATE New Mexico
TYPE OF LOG:	**Gamma Ray, 3 Arm Caliper, Sonic, 4 Pi Density**
OTHER SERVICES	Video
LOCATION	
SEC TWP RGE	API No.
Northing: Easting:	

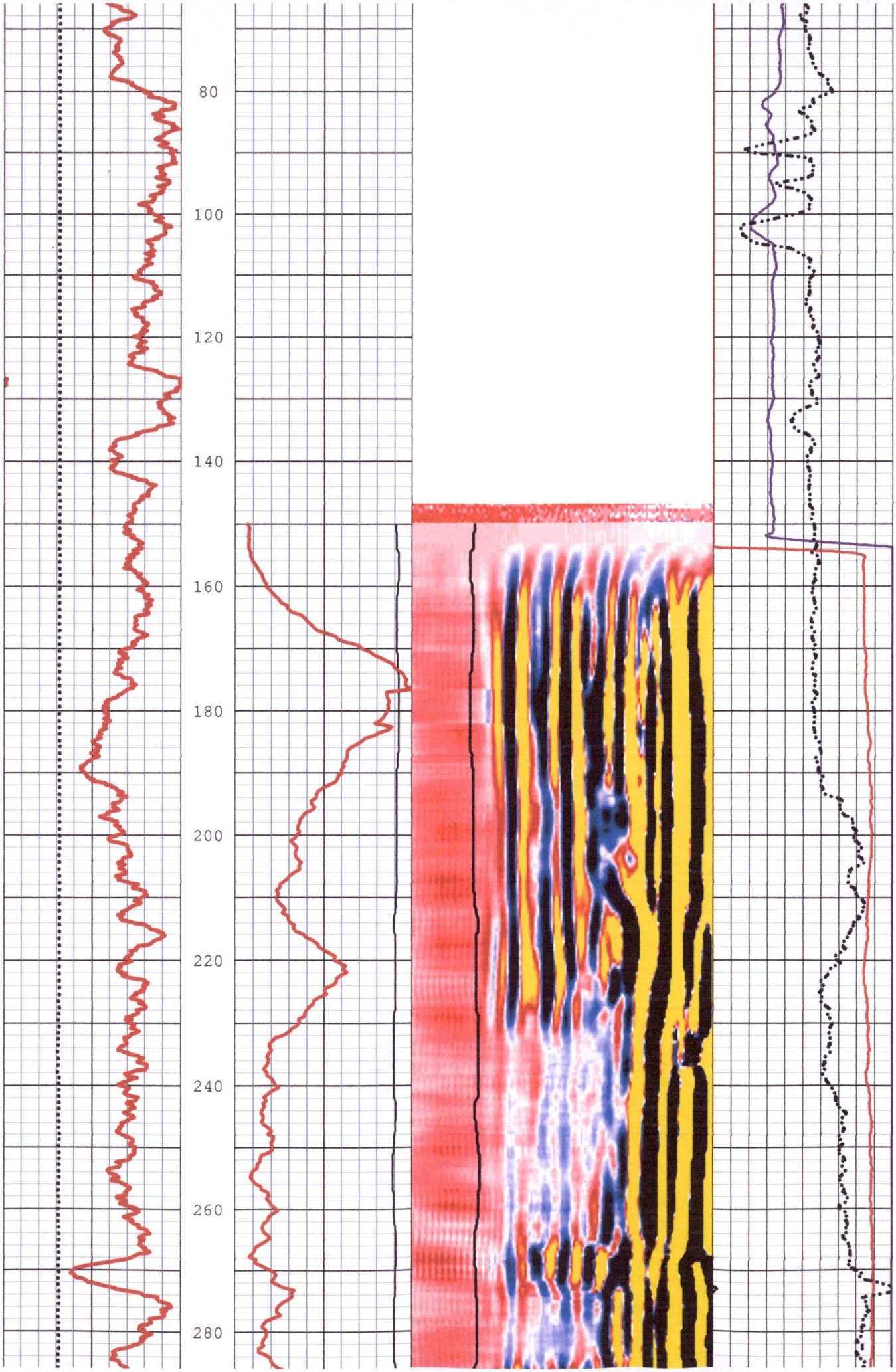
PERMANENT DATUM	Ground Level	ELEVATION	K.B.
LOG MEAS. FROM	Ground Level	ABOVE PERM. DATUM	T.O.C
DRILLING MEAS. FROM	Ground Level		G.L.

DATE	03-01-2016	TYPE FLUID IN HOLE	water
RUN No.	One	SALINITY	
TYPE LOG	QL-GR-3Arm, 4Pi, Sonic	DENSITY	
DEPTH-DRILLER	525 ft.	LEVEL	154 ft.
DEPTH-LOGGER	418 ft.	MAX. REG. TEMP	
BTM LOGGED INTERVAL	418 ft.	DIGITIZE INTERVAL	0.1 ft.
TOP LOGGED INTERVAL	Surface		
OPERATING RIG TIME			
RECORDED BY	T. Staatz / J. White		
WITNESSED BY	D. Kump		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1				18 in.	Steel	-2.1	525 ft.
2							
3							

REMARKS:




80
100
120
140
160
180
200
220
240
260
280

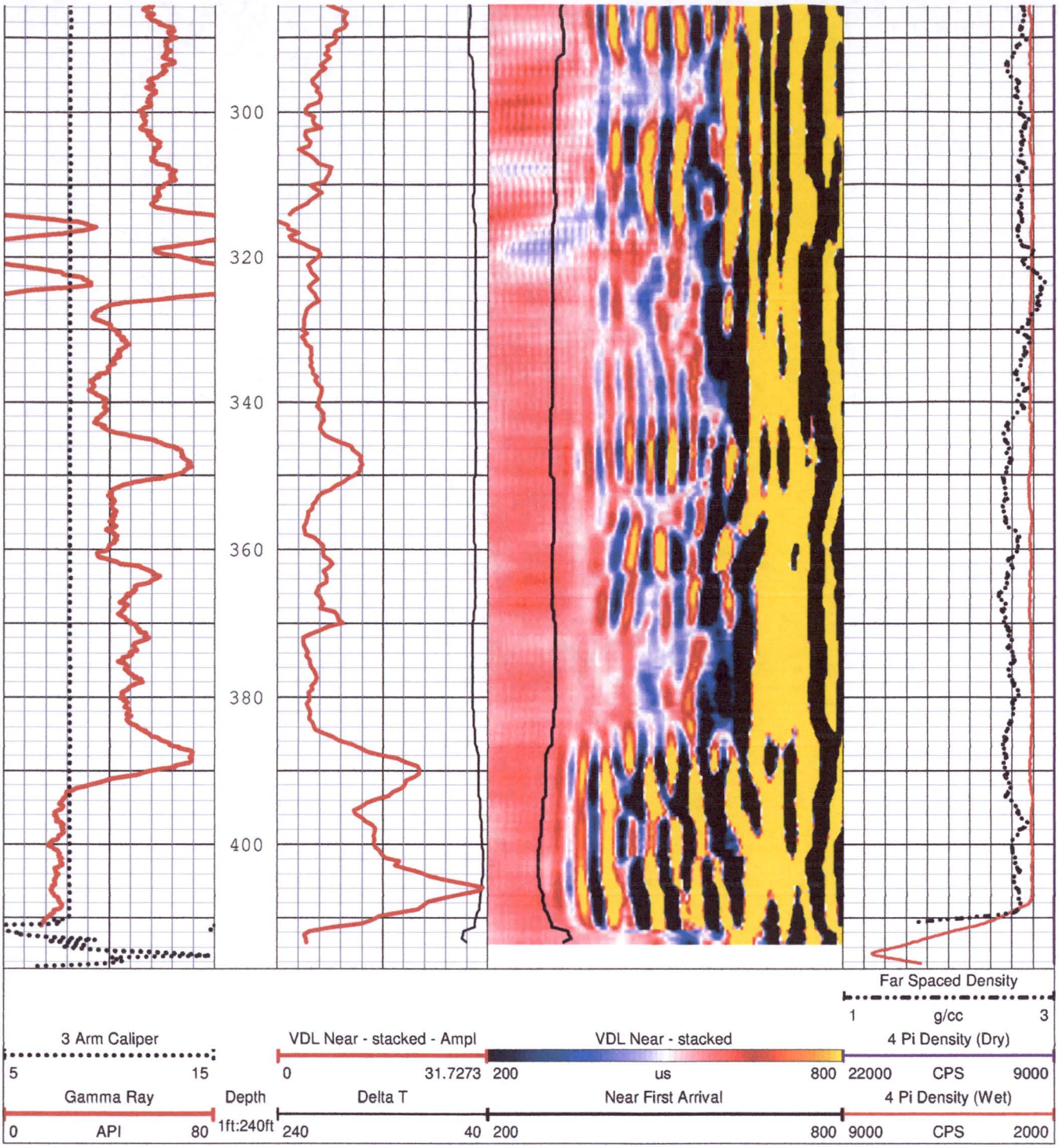

300
320
340
360
380
400
Far Spaced Density
1
g/cc
3
3 Arm Caliper
5
15
VDL Near - stacked - Ampl
0
31.7273
VDL Near - stacked
200
us
800
4 Pi Density (Dry)
22000
CPS
9000
Gamma Ray
0
API
80
Depth
1ft:240ft
Delta T
240
40
Near First Arrival
200
800
4 Pi Density (Wet)
9000
CPS
2000

Figure 2-3

Well 943 Completion Details and Lithology

Revised June 1972

STATE ENGINEER OFFICE

WELL RECORD

Section 1. GENERAL INFORMATION

(A) Owner of well Homestake Mining Company of Ca. Owner's Well No. 0943

Street or Post Office Address P.O. Box 98

City and State Grants, NM 87020

Well was drilled under Permit No. unknown and is located in the:

a. NE ¼ NW ¼ SE ¼ ¼ of Section 34 Township 12N Range 10W N.M.P.M.

b. Tract No. _____ of Map No. _____ of the _____

c. Lot No. _____ of Block No. _____ of the _____ Subdivision, recorded in _____ County.

d. X= _____ feet, Y= _____ feet, N.M. Coordinate System _____ Zone in the _____ Grant.

(B) Drilling Contractor unknown License No. unknown

Address unknown

Drilling Began _____ Completed 1/1/1980 Type tools _____ Size of hole _____ in.

Elevation of land surface or _____ at well is _____ ft. Total depth of well 978 ft.

Completed well is ☐ shallow ☒ artesian. Depth to water upon completion of well 107.07 ft.

Section 2. PRINCIPAL WATER-BEARING STRATA

Depth in Feet From	Depth in Feet To	Thickness in Feet	Description of Water-Bearing Formation	Estimated Yield (gallons per minute)
743	978	235	Sandy Limestone	

Section 3. RECORD OF CASING

Diameter (inches)	Pounds per foot	Threads per in.	Depth in Feet Top	Depth in Feet Bottom	Length (feet)	Type of Shoe	Perforations From	Perforations To
18" steel			0	304				
16"			255	408				
13" 10"			347 460	510 703		open hole	703	978

Section 4. RECORD OF MUDDING AND CEMENTING

Depth in Feet From	Depth in Feet To	Hole Diameter	Sacks of Mud	Cubic Feet of Cement	Method of Placement

Section 5. PLUGGING RECORD

Plugging Contractor _____

Address _____

Plugging Method _____

Date Well Plugged _____

Plugging approved by:

_____

State Engineer Representative

No.	Depth in Feet Top	Depth in Feet Bottom	Cubic Feet of Cement
1			
2			
3			
4			

FOR USE OF STATE ENGINEER ONLY

Date Received

Quad _____ FWL _____ FSL _____

File No. _____ Use _____ Location No. _____

Section 6. LOG OF WELL

Depth in Feet From	Depth in Feet To	Thickness in Feet	Color and Type of Material Encountered
0	10		surface soil
10	18		black sand
18	26		yellow clay
26	48		sand
48	66		shale
66	100		red clay
100	131		brown shale
131	145		blue shale
145	157		sandstone
157	177		blue shale
177	186		sandstone
186	225		blue shale
225	275		sand
275	304		red shale
304	325		sand gravel
325	395		blue shale
395	397		sand gravel
397	408		hard lime
408	441		blue shale
441	451		brown sandy shale
468	473		red shale
473	512		broken shale and conglomerate
512	575		red shale
575	653		gray shale
653	668		red shale
668	705		gray shale
705	712		blue shale
712	724		red shale streaks of sand stone
724	743		blue shally sand
743	848		sandy lime
848	851		yellow sand
851	870		fine white water sand
870	874		sand and iron pyrites
874	878		sand (hard)

Section 7. REMARKS AND ADDITIONAL INFORMATION

The undersigned hereby certifies that, to the best of his knowledge and belief, the foregoing is a true and correct record of the above described hole.

Driller

INSTRUCTIONS: This form should be executed in triplicate, preferably typewritten, and submitted to the appropriate district office of the State Engineer. All sections, except Section 5, shall be answered as completely and accurately as possible when any well is drilled, repaired or deepened. When this form is used as a plugging record, only Section 1(a) and Section 5 need be completed.

Drilling Casing Progress

943

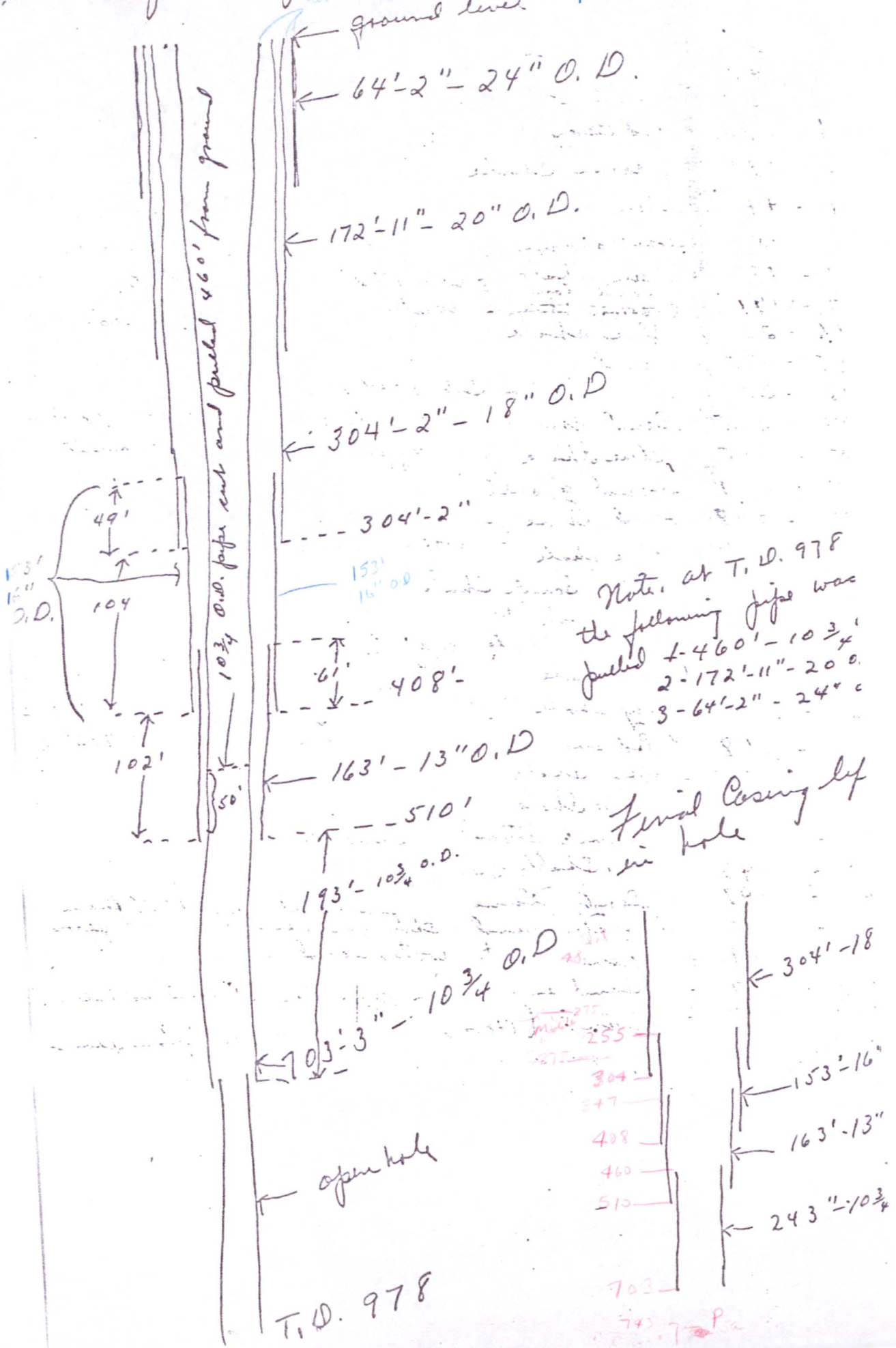


Figure 2-4

Well 943 Geophysical Logs

JET WEST
GEOPHYSICAL SERVICES, LLC.

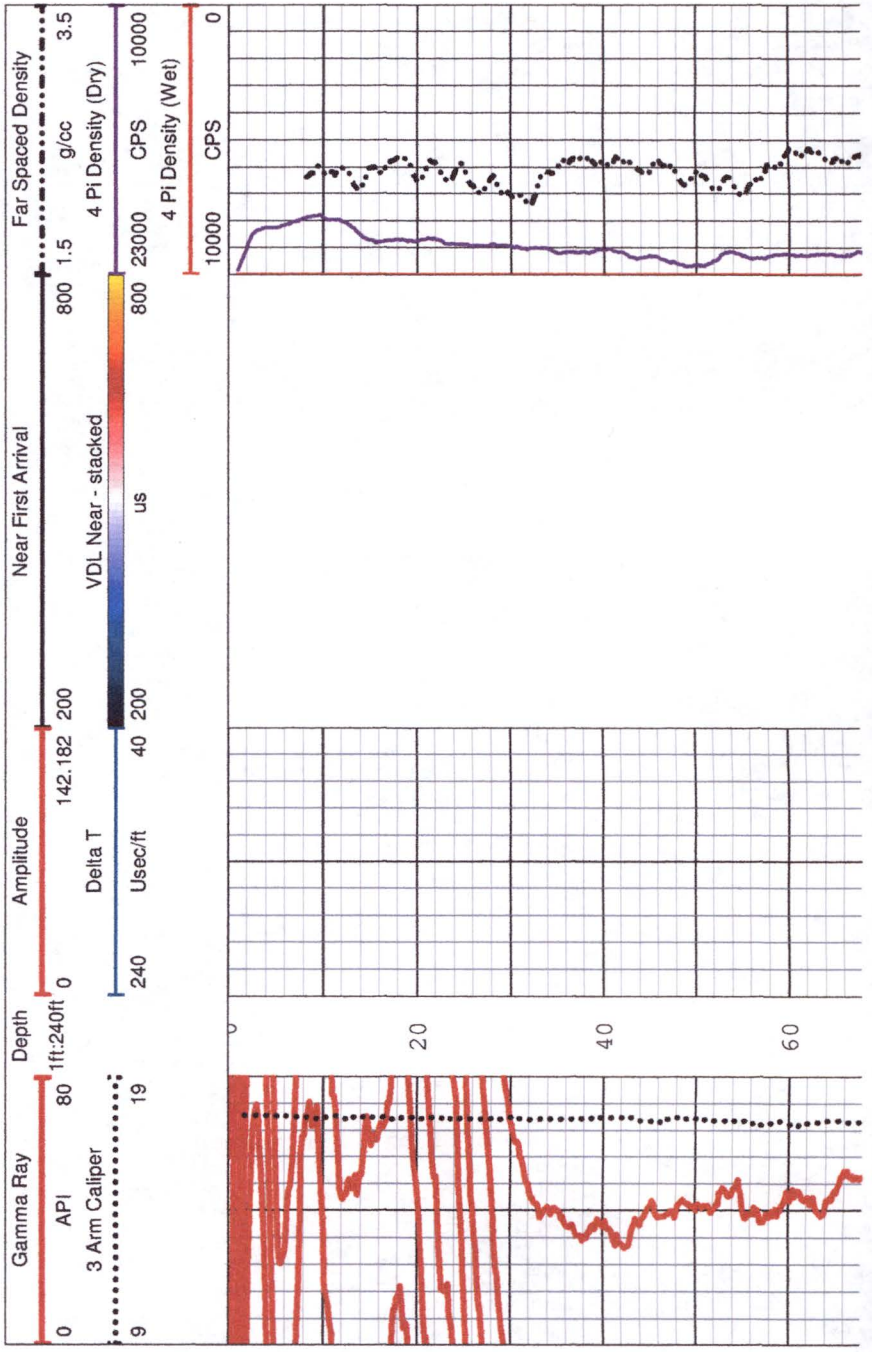
COMPANY	Homestake Mining Company
WELL ID	943
FIELD	Grants
COUNTY	Cibola STATE New Mexico
TYPE OF LOG:	**Gamma Ray, 3 Arm Caliper, Sonic, 4 Pi Density**
OTHER SERVICES	Video
LOCATION	
SEC TWP RGE	API No.
Northing: Easting:	

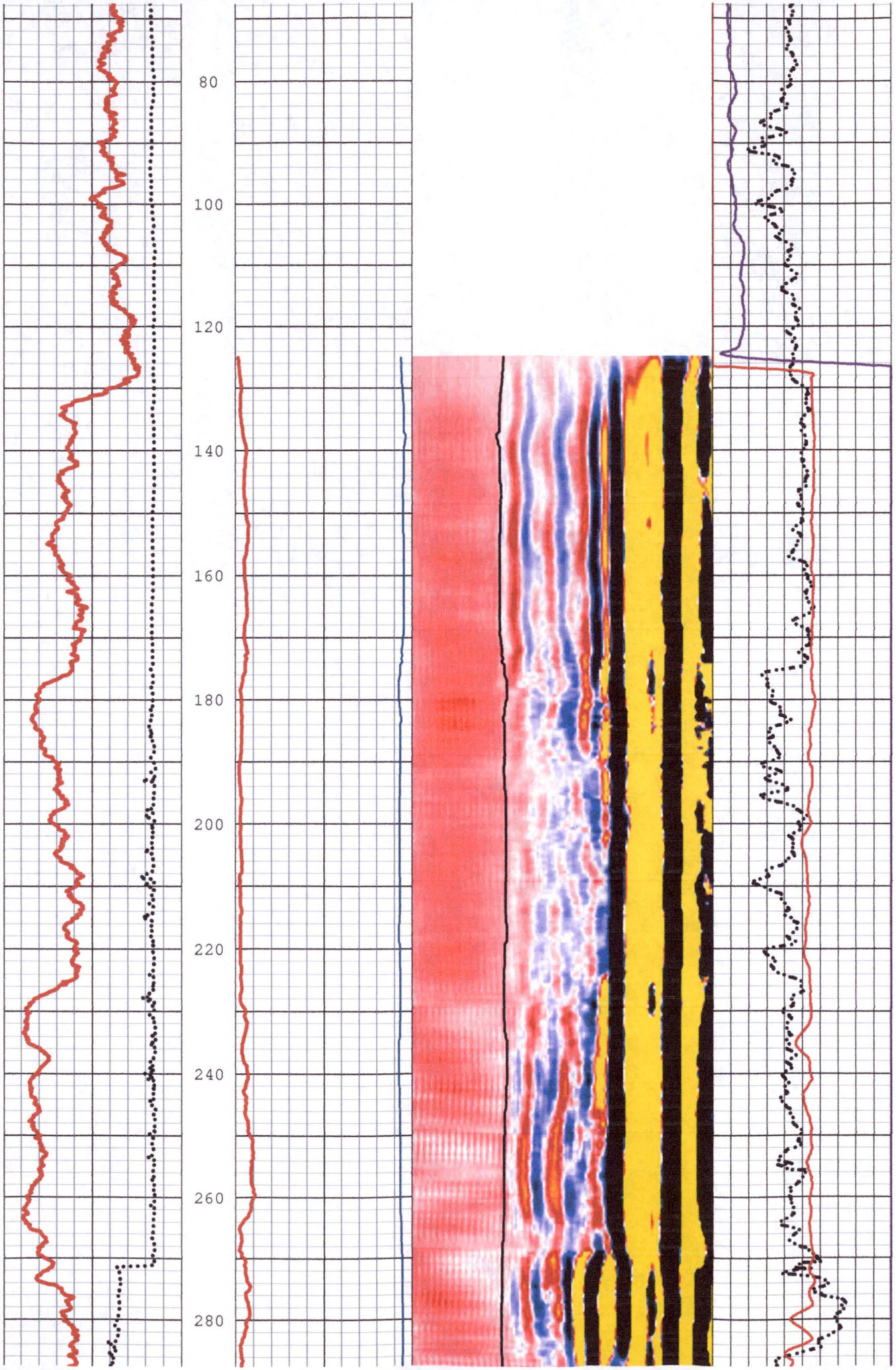
PERMANENT DATUM	Ground Level	ELEVATION	K.B.
LOG MEAS. FROM	Ground Level	ABOVE PERM. DATUM	T.O.C
DRILLING MEAS. FROM	Ground Level		G.L.

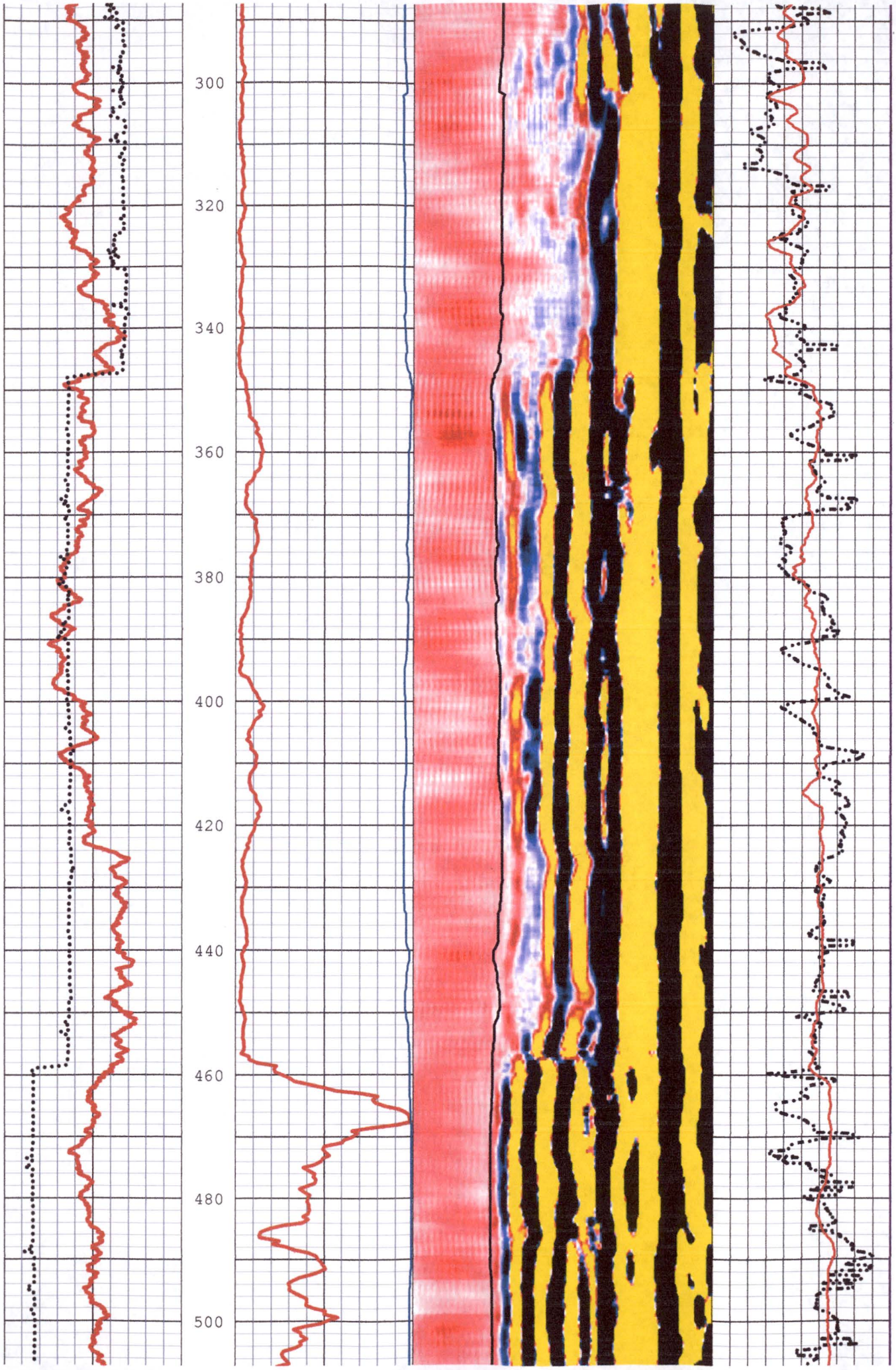
DATE	02-29to03-01-2016	TYPE FLUID IN HOLE	water
RUN No.	One	SALINITY	
TYPE LOG	QL-GR-3Arm, 4Pi, Sonic	DENSITY	
DEPTH-DRILLER	978 ft.	LEVEL	125 ft.
DEPTH-LOGGER	727 ft.	MAX. REG. TEMP	
BTM LOGGED INTERVAL	727 ft.	DIGITIZE INTERVAL	0.1 & 0.5 ft.
TOP LOGGED INTERVAL	Surface		
OPERATING RIG TIME			
RECORDED BY	T. Staatz / J. White		
WITNESSED BY	D. Kump		

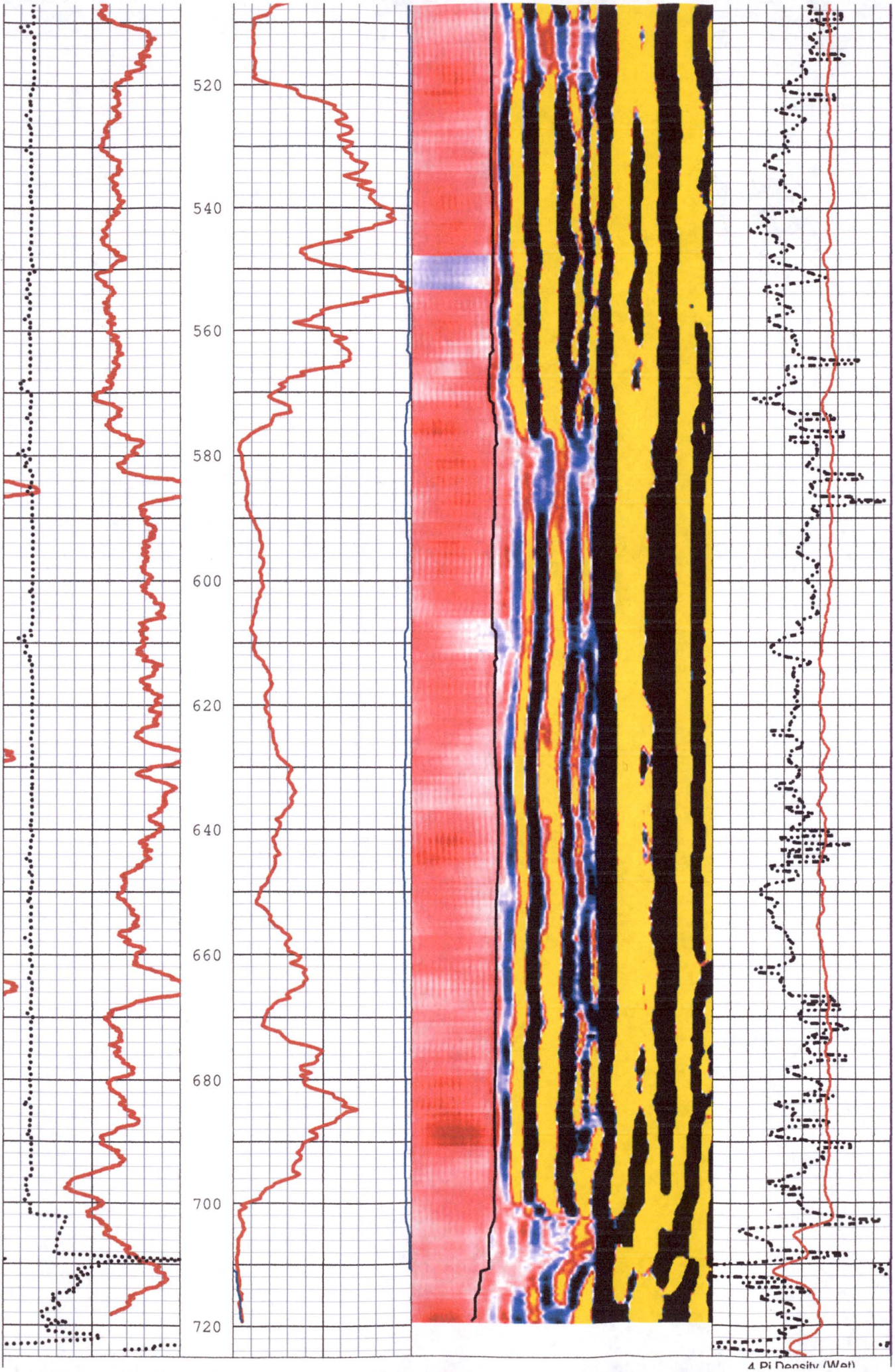
RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
1				18 in.	Steel	-2.1	978 ft.
2							
3							

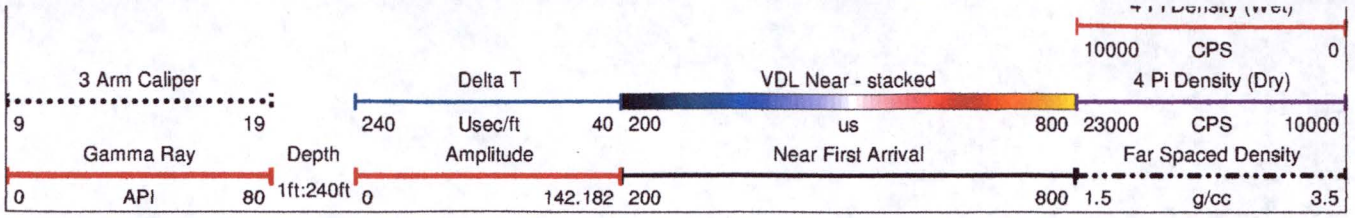
REMARKS:




80
100
120
140
160
180
200
220
240
260
280


300
320
340
360
380
400
420
440
460
480
500


520
540
560
580
600
620
640
660
680
700
720
4 Pi Density (Wet)


4 Pi Density (Wet)
10000 CPS 0
3 Arm Caliper
9 19
Delta T
240 Usec/ft 40
VDL Near - stacked
200 us 800
4 Pi Density (Dry)
23000 CPS 10000
Gamma Ray
0 API 80
Depth
1ft:240ft
Amplitude
0 142.182
Near First Arrival
200 800
Far Spaced Density
1.5 g/cc 3.5

3.0 San Andres Ground-Water Quality

Monitoring of San Andres ground-water quality in the Grants project area is being used to determine if any of the San Andres wells currently used to supply fresh water for the ground-water restoration program have exhibited a change in casing integrity that is reflected in water quality changes. Additional monitoring of the four San Andres wells that HMC uses to supply fresh water has been done in 2016. This data will be tabulated in the Annual Performance report, but for convenience, updated water quality plots are presented in this report for the evaluation of these wells.

3.1 Sulfate Concentrations

Sulfate is a major constituent that has been used to track water quality changes at the Grants Reclamation Project. Figure 3-1 presents an updated plot of the sulfate concentrations in San Andres wells 943, 951, 951R, #1 and #2. This plot has been presented in the Annual Performance report. Figure 3-1 shows sulfate concentrations for the 1st quarter of 2016 for wells 943, 951R, #1 and #2, and reveals that these concentrations are consistent with the concentrations measured since 2011 except for a high value from well 943 in late 2015. The values prior and after the higher value are consistent and indicate that it is an outlier. There was no measurable change in sulfate concentration in 2016, and this is indicative of no change in the well integrity for any of these four San Andres supply wells in 2016.

Figure 3-2 presents the plot of sulfate for irrigation supply wells 806R and 938 and two of the Milan supply wells (wells 532 and 999). No 2016 samples have been taken for these wells.

3.2 TDS Concentrations

TDS is also a major parameter that has been used to track water quality changes at the Grants project. Figure 3-3 presents a plot of the TDS concentrations in San Andres wells 943, 951, 951R, #1 and #2. This plot shows that the 2016 TDS concentrations are very similar to previous values for wells 943, 951R, #1 and #2. The late 2015 value from well 943 is thought to be an outlier. This plot does not indicate any change in the well integrity for any of these four San Andres supply wells in 2016.

Figure 3-4 presents the plot of sulfate for irrigation supply wells 806R and 938 and Milan supply wells 532 and 999. No 2016 samples have been taken for these wells.

3.3 Chloride Concentrations

Chloride is a major constituent that typically moves very conservatively and has been used to track water quality changes at the Grants Reclamation Project. Figure 3-5 presents a plot of the chloride concentrations in San Andres wells 943, 951, 951R, #1 and #2. This plot shows that the 2016 chloride concentrations are very similar to previous values for wells 943, 951R, #1 and #2. This plot does not indicate any change in the well integrity for any of these four San Andres supply wells in 2016.

Figure 3-6 presents the plot of chloride for irrigation supply wells 806R and 938 and Milan supply wells 532 and 999 through 2015. Samples for these wells have not been taken in 2016.

3.4 Uranium Concentrations

Uranium is a minor constituent that is very important relative to ground-water restoration at the Grants project. Figure 3-7 presents a plot of the uranium concentrations in San Andres wells 943, 951, 951R, #1 and #2. This plot shows that the recent uranium concentrations are very similar to previous values for wells 943, 951R, #1 and #2. The increase in uranium concentration in well 951R that was observed in 2014 prior to the 2015 decline is not thought to be a function of changes in well integrity in 951R, but is attributed to changes in the San Andres aquifer water quality in this area. The uranium concentration was higher in the late 2015 sample from well 943, but values before and after that sample indicate it is an outlier. This plot does not indicate any change in the well integrity for any of the San Andres supply wells in 2016.

Figure 3-8 presents the plot of uranium from 2000 through 2015 for irrigation supply wells 806R and 938 and two of Milan supply wells 532 and 999. 2016 samples have not been taken for these wells.

3.5 Selenium Concentrations

Selenium is also a minor constituent that is very important relative to ground-water restoration at the Grants project. Figure 3-9 presents a plot of the selenium concentrations in San Andres wells 943, 951, 951R, #1 and #2. This plot shows that the most recent selenium concentrations are very similar to previous values for wells 943, 951R, #1 and #2. The higher value from well 943 in late 2015 is thought to be an outlier. This plot does not indicate any change in the well integrity for any of these four San Andres supply wells in 2016.

Figure 3-10 presents the plot of selenium for irrigation supply wells 806R and 938 and two of Milan supply wells 532 and 999. 2016 samples have not been taken for these wells.

Figure 3-1

Sulfate Concentrations for San Andres Wells 943, 951, 951R, #1 Deep Well, and #2 Deep Well

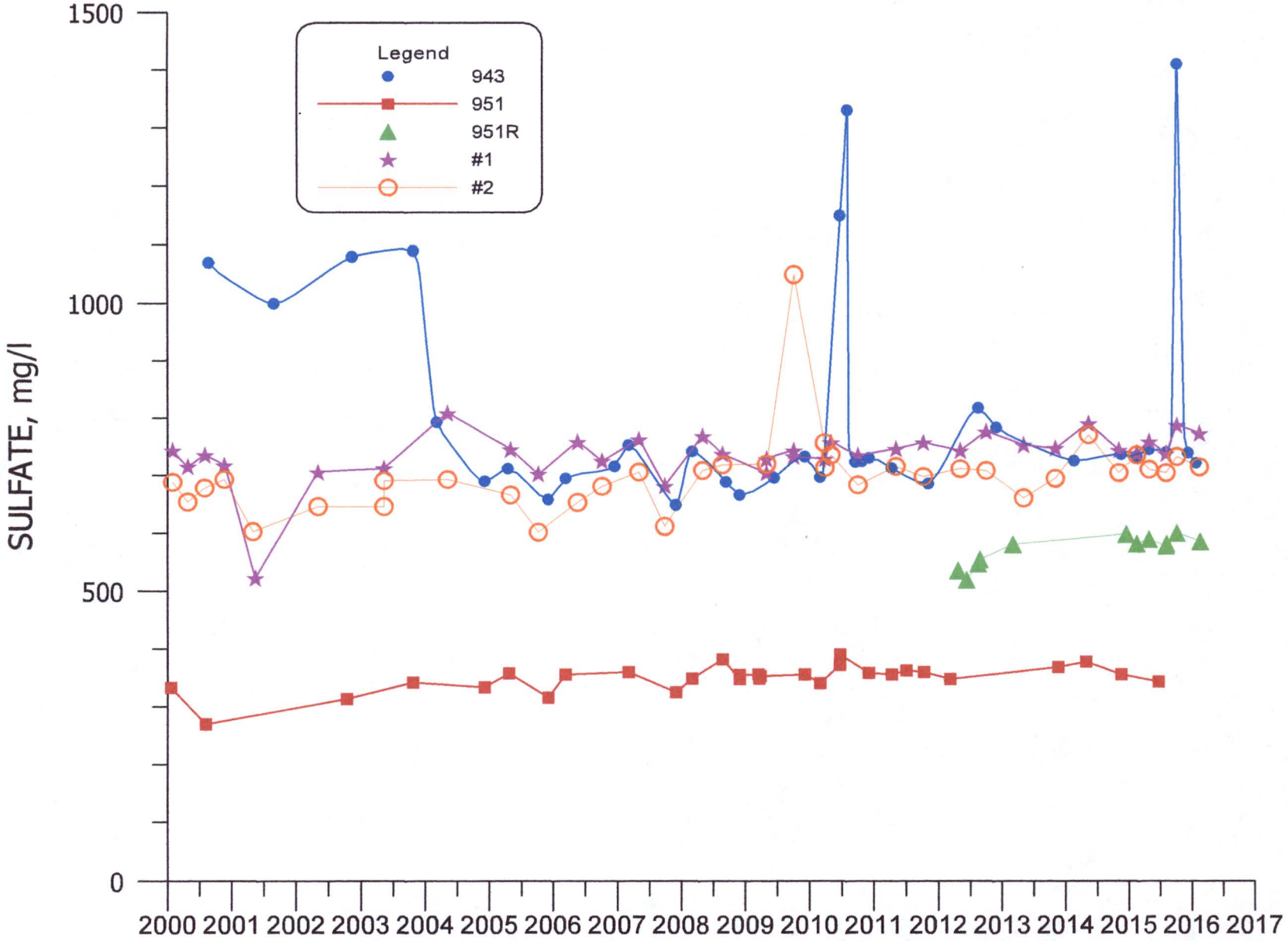


FIGURE 3-1. SULFATE CONCENTRATIONS FOR SAN ANDRES WELLS 943, 951, 951R, #1 & #2.

Figure 3-2

Sulfate Concentrations for San Andres Wells 532, 806R, 938, and 999

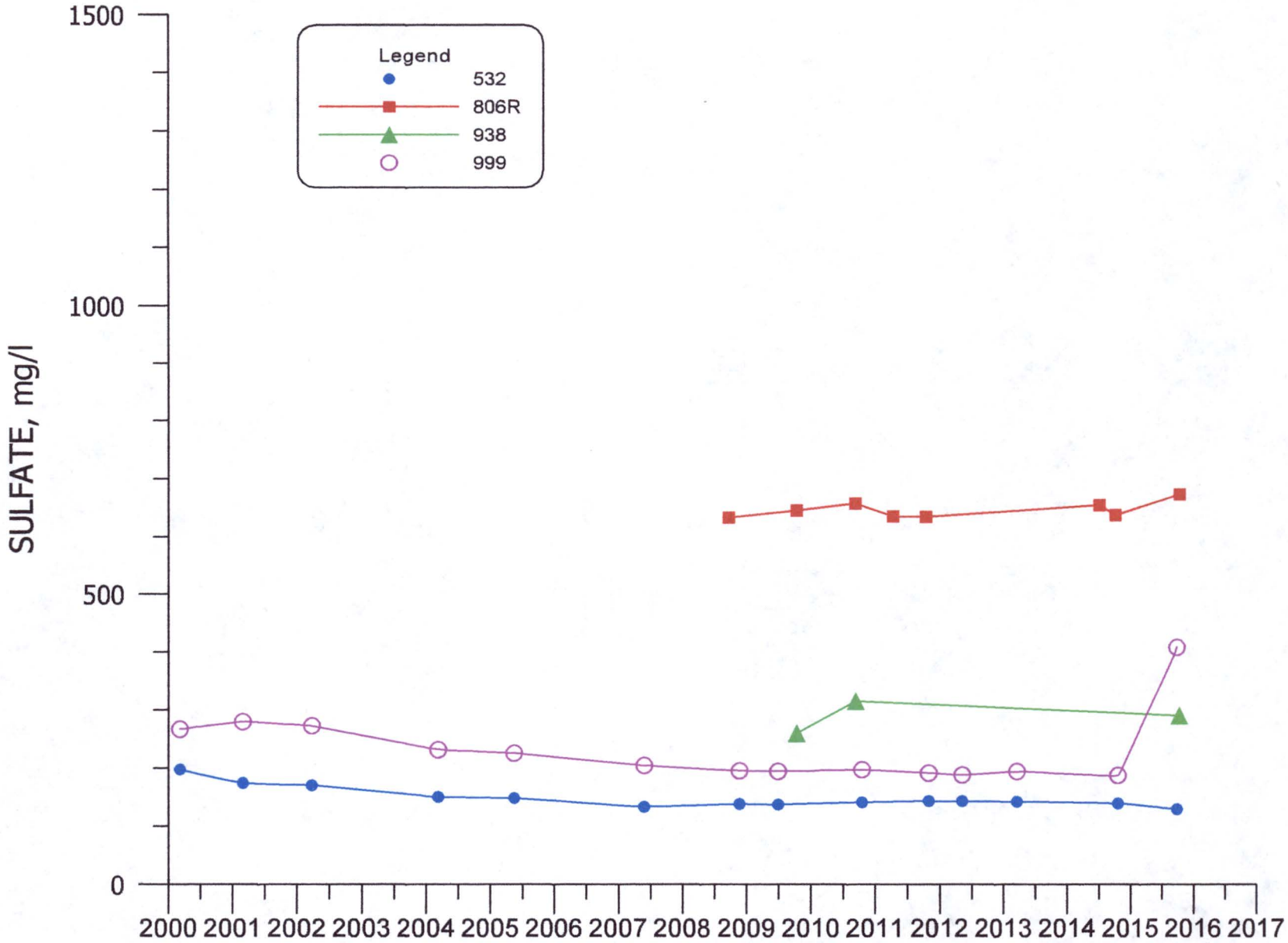


FIGURE 3-2. SULFATE CONCENTRATIONS FOR SAN ANDRES WELLS 532, 806R, 938 & 999.

Figure 3-3

TDS Concentrations for San Andres Wells 943, 951, 951R, #1 Deep Well, and #2 Deep Well

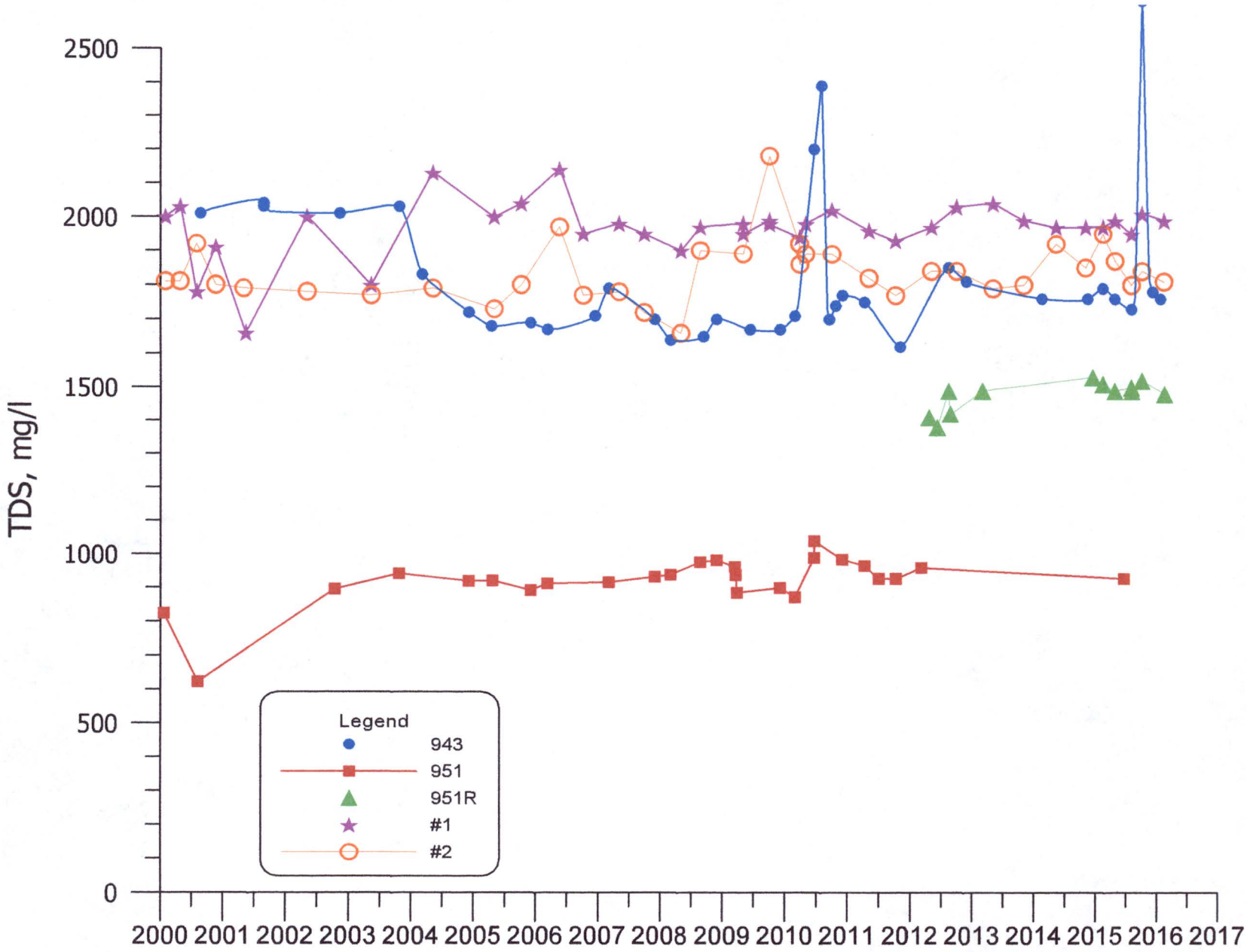


FIGURE 3-3. TDS CONCENTRATIONS FOR SAN ANDRES WELLS 943, 951, 951R, #1 & #2.

Figure 3-4

TDS Concentrations for San Andres Wells 532, 806R, 928, and 999

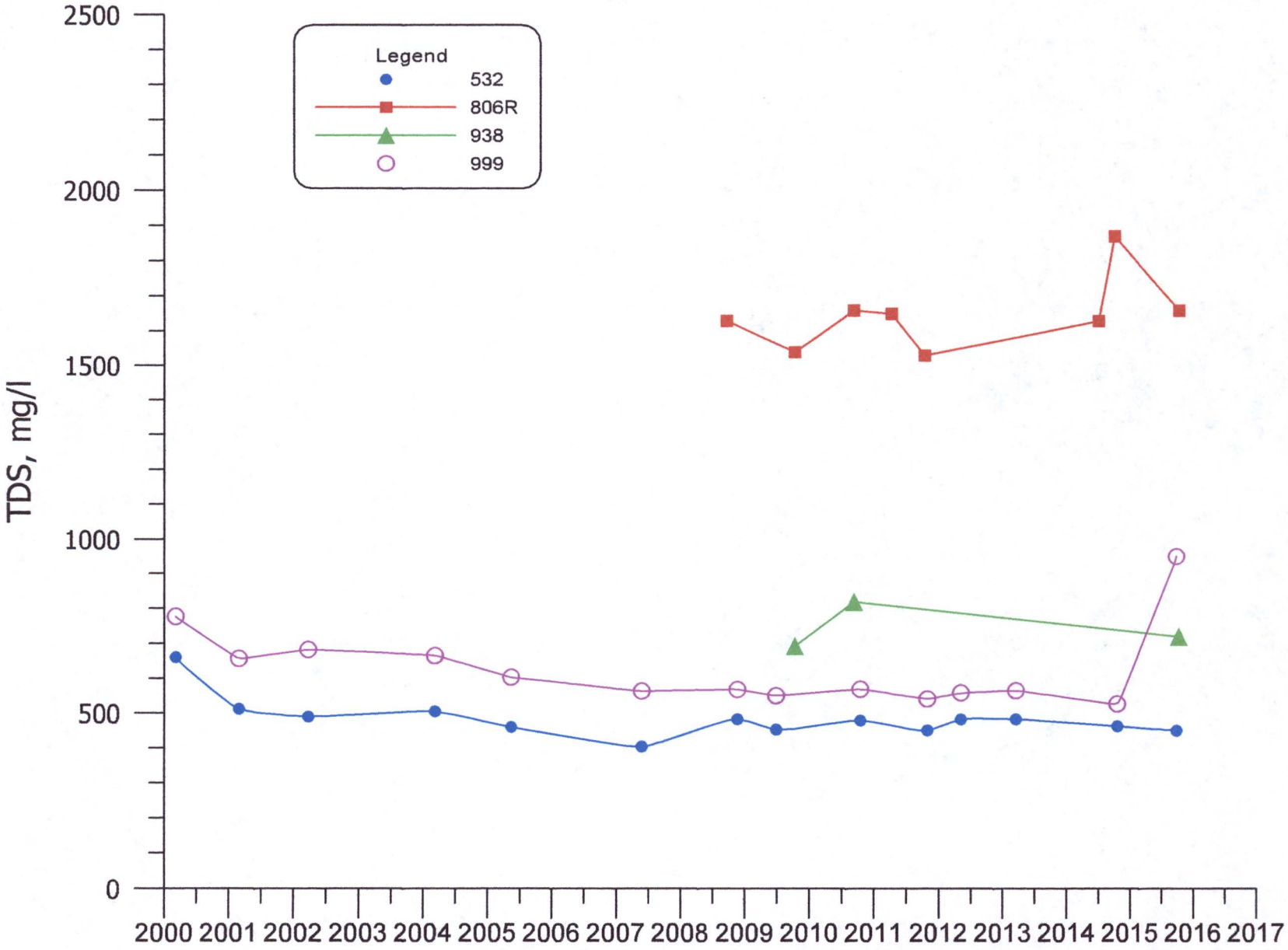


FIGURE 3-4. TDS CONCENTRATIONS FOR SAN ANDRES WELLS 532, 806R, 938 & 999.

Figure 3-5

Chloride Concentrations for San Andres Wells 943, 951, 951R, #1 Deep Well, and #2 Deep Well

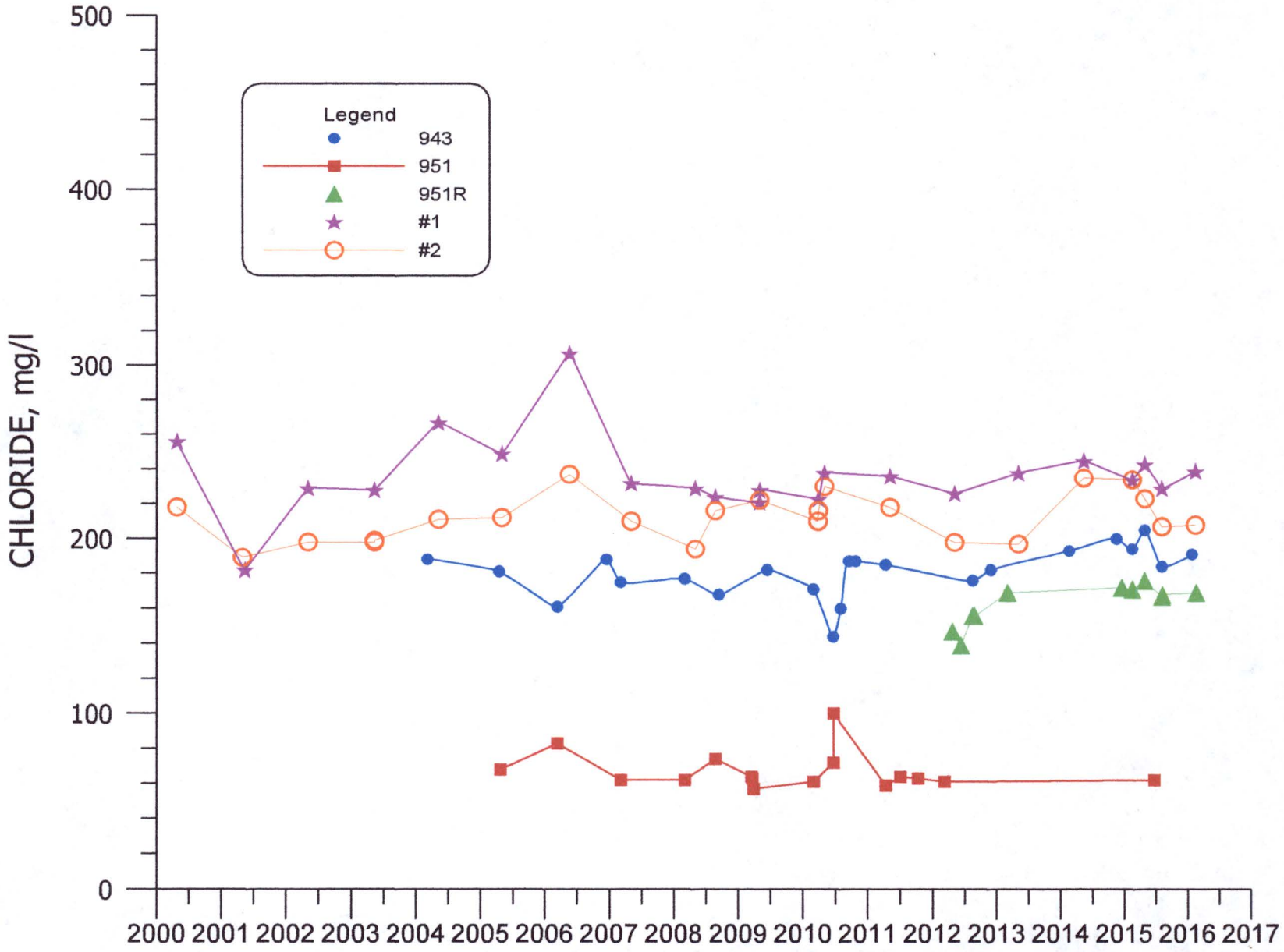


FIGURE 3-5. CHLORIDE CONCENTRATIONS FOR SAN ANDRES WELLS 943, 951, 951R, #1 & #2.

Figure 3-6

Chloride Concentrations for San Andres Wells 532, 806R, 938, and 999

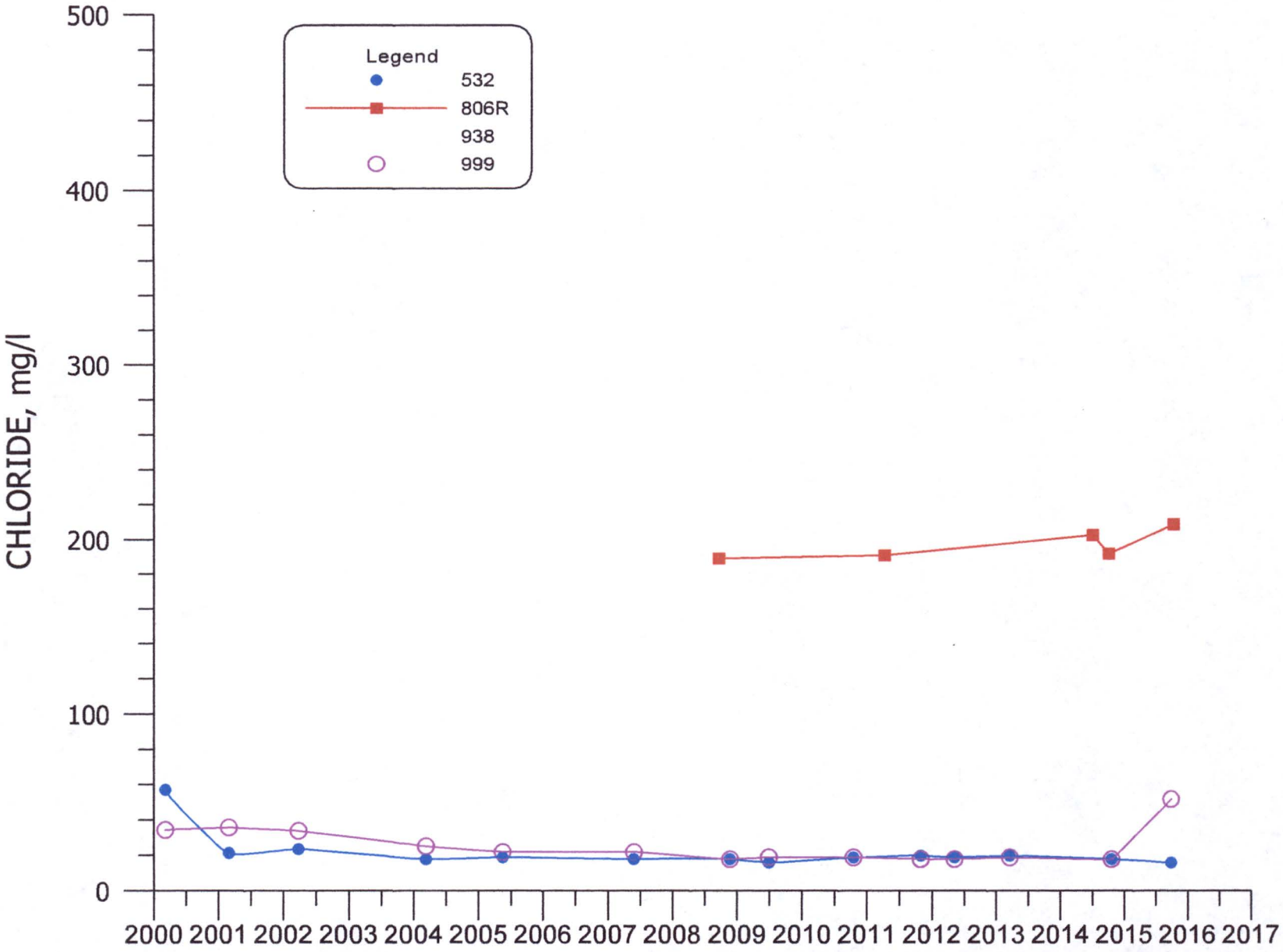


FIGURE 3-6. CHLORIDE CONCENTRATIONS FOR SAN ANDRES WELLS 532, 806R, 938 & 999.

Figure 3-7

Uranium Concentrations for San Andres Wells 943, 951, 951R, #1 Deep Well, and #2 Deep Well

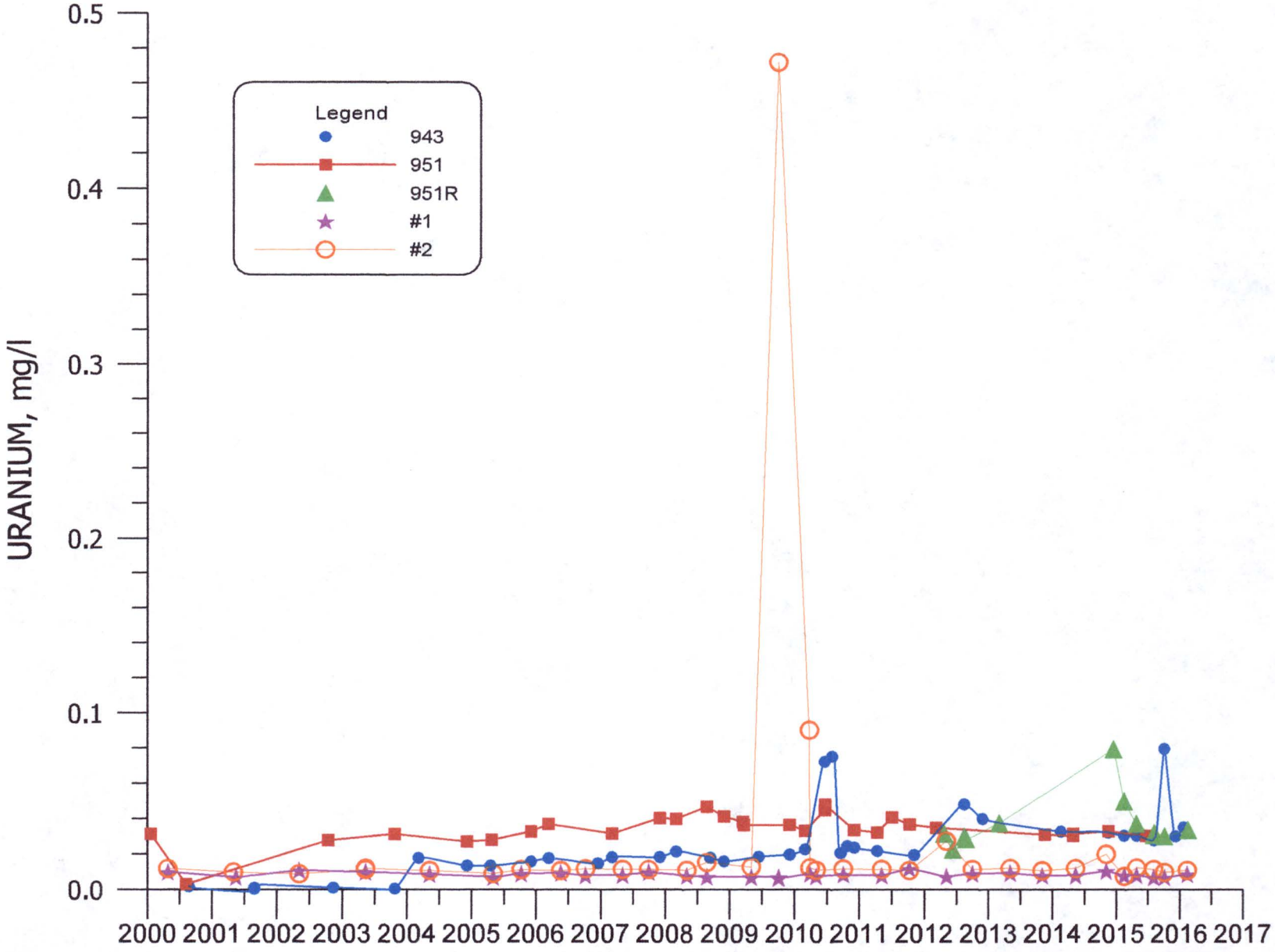


FIGURE 3-7. URANIUM CONCENTRATIONS FOR SAN ANDRES WELLS 943, 951, 951R, #1 & #2.

Figure 3-8

Uranium Concentrations for San Andres Wells 532, 806R, 938, and 999

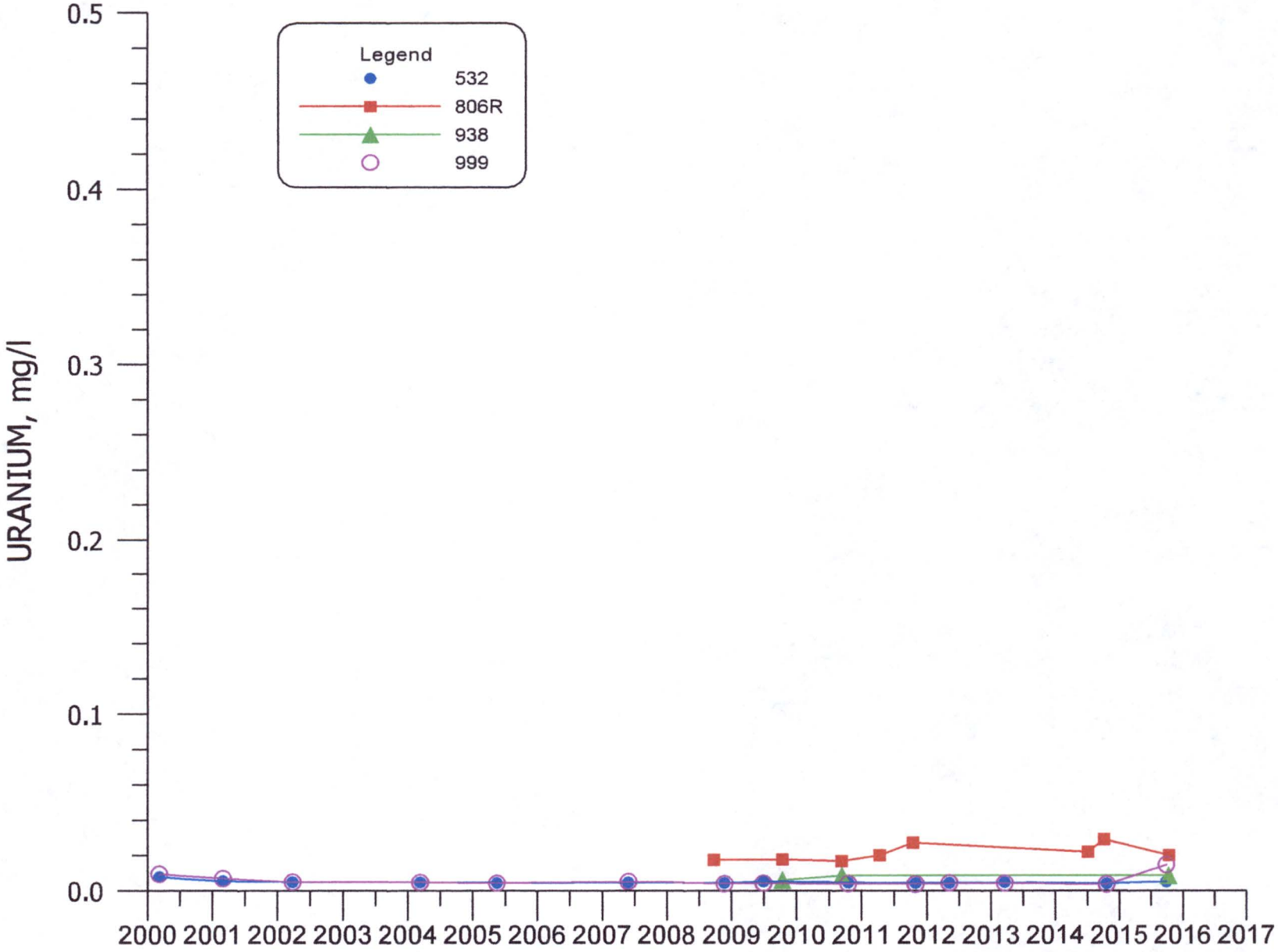


FIGURE 3-8. URANIUM CONCENTRATIONS FOR SAN ANDRES WELLS 532, 806R, 938 & 999.

Figure 3-9

Selenium Concentrations for San Andres Wells 943, 951, 951R, #1 Deep Well, and #2 Deep Well

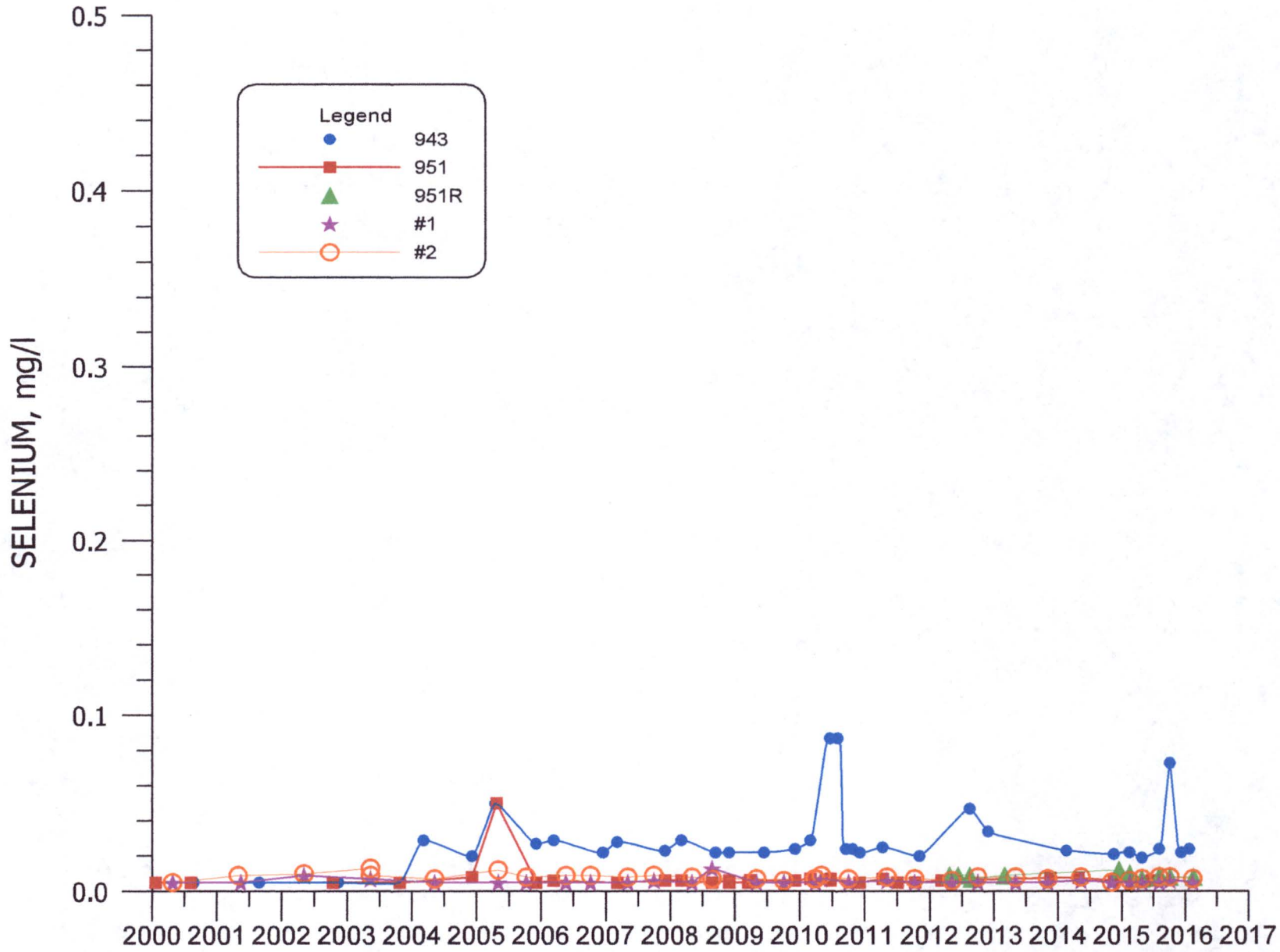


FIGURE 3-9. SELENIUM CONCENTRATIONS FOR SAN ANDRES WELLS 943, 951, 951R, #1 & #2.

Figure 3-10

Selenium Concentrations for San Andres 532, 806R, 938, 999

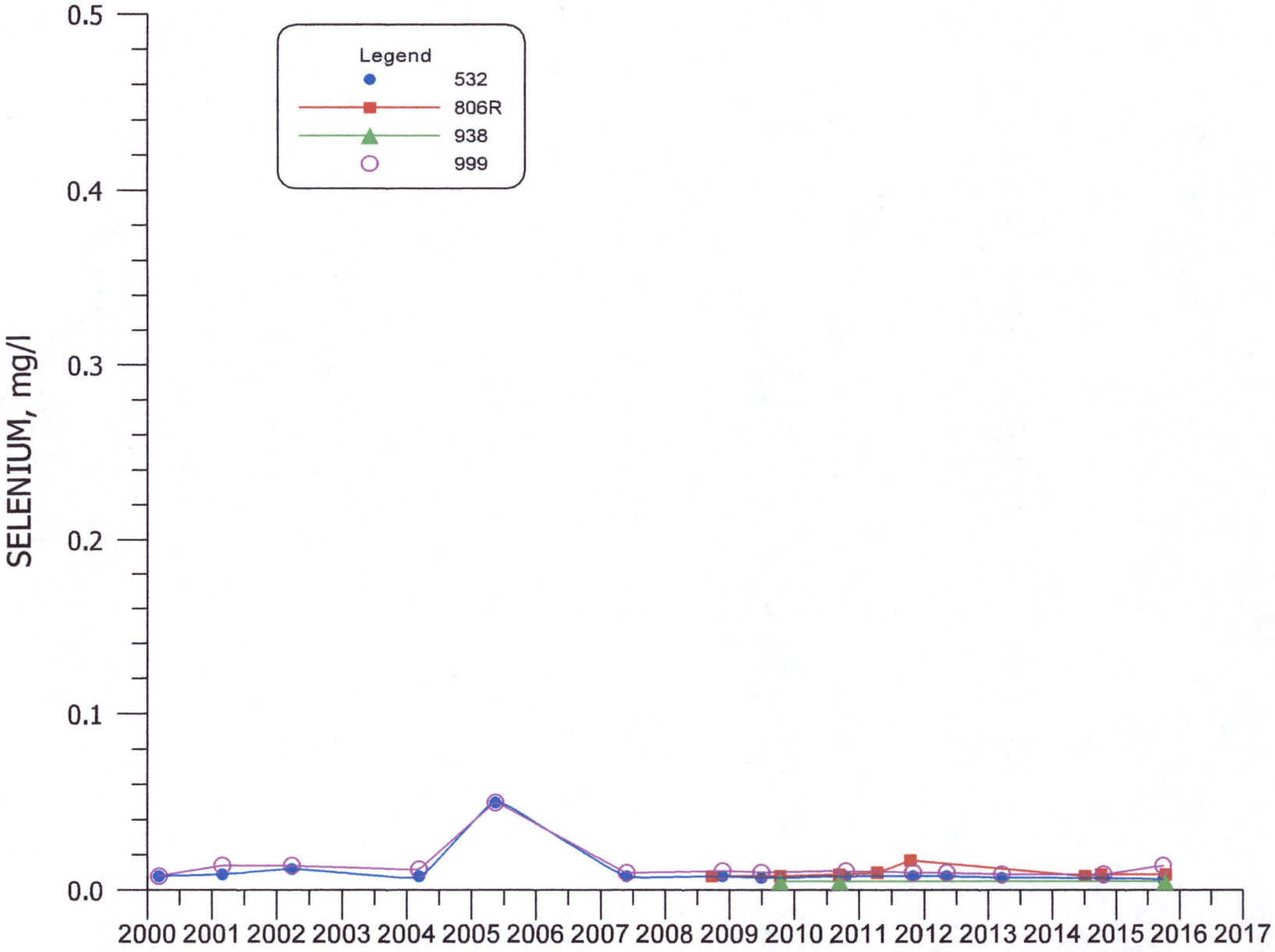


FIGURE 3-10. SELENIUM CONCENTRATIONS FOR SAN ANDRES WELLS 532, 806R, 938 & 999.

4.0 Conclusion

The San Andres well integrity testing for well 951R shows that the integrity of this well is good and the well can be used as a fresh water supply well. The casing in San Andres well 943 has considerable corrosion but the video of the well does not show any significant leakage of alluvial water into the well. Therefore, the well integrity for well 943 is adequate for its continued use as a fresh water injection supply well.

The San Andres monitoring in 2016 does not indicate that the integrity of the existing San Andres supply wells #1 and #2 well has changed. These San Andres wells can continue to be used as a fresh water supply. Well integrity testing for these two wells is planned for 2016.

5.0 References

Hydro-Engineering, L.L.C., 2015, Grants Reclamation Project, 2014 Annual Monitoring Report/Performance Review for Homestake's Grants Project Pursuant to NRC License SUA-1471 and Discharge Plan DP-200. Consulting Report for Homestake Mining Company of California.

APPENDIX A

Video of Wells 951R and 943
(see CD)