



Survey of Wells and Stream Gages in the Black Mountains Area,
California Wash Basin, Coyote Spring Valley, Garnet Valley,
Hidden Valley and the Muddy River Springs Area, Nevada

by

Southern Nevada Water Authority

May 2003

**Survey of Wells and Stream Gages in the Black Mountains Area, California Wash Basin,
Coyote Spring Valley, Garnet Valley, Hidden Valley, and Muddy River Springs Area**

By

Southern Nevada Water Authority/Las Vegas Valley Water District

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May 2003

Front cover picture insets: Top, GPS data collection on well BM-ONCO2 (May 24, 2002) in the Black Mountains Area; Bottom from left: Surface water flume at the LDS Gage site (October 10, 2002) in the Muddy Springs Area; and GPS data collection at Well MX-4 (May 21, 2002) in Coyote Spring Valley. Background picture of Jackass Spring (looking Northeast) in Muddy River Springs Area (July 2001).

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Black Mountains Area

- BM-DL-1
- BM-DL-2
- BM-ONCO-1
- BM-ONCO-2

California Wash Basin

- PAIUTES-ECP-1
- PAIUTES-ECP-2
- PAIUTES-ECP-3
- PAIUTES-M1
- PAIUTES-M2
- PAIUTES-M3

PAIUTES-TH2
Coyote Spring Valley
CE-VF-1
CE-VF-2
CSV-3
DV-1
MX-4
MX-5
CSV-RW2

Garnet Valley
GARNET WELL
GV-1
GV-2
GV-MIRANT1
GV-PW-MW-1
GV-PW-MW-2
GV-PW-WS1
GV-RW-1

Hidden Valley
SHV-1

Muddy River Springs Area
ABBOTT
BEHMER MW
CSV-1
CSV-2
EH-4
EH-5B
IVERSON FLUME
LDS CENTRAL
LDS EAST
LDS GAGE
LDS WEST
LEWIS 1 OLD
LEWIS 2M
LEWIS NORTH
LEWIS SOUTH
MX-6
PEDERSON SPRING GAGE
PERKINS OLD
PEDERSON EAST GAGE
WARM SPRINGS WEST GAGE

Appendix B: National Geodetic Survey OPUS solution report for the survey sitesB

Introduction

The importance of accurate ground-water elevations in determining ground-water contours and flow directions has long been recognized. It assumes an even greater importance when ground-water studies are conducted on a regional basis by different organizations. The difficulty in the interpretation of ground-water level data has been the uncertainty in the land surface elevation. Currently there are at least five organizations involved in the collection of surface water and ground-water level data in the on-going investigation of the regional carbonate system within the White River and Lower Meadow Valley Wash Flow Systems. In order to obtain a common reference point for water level measurements, a detailed location and elevation survey of about fifty wells and stream gages belonging to various entities and individuals (including the Southern Nevada Water Authority/Las Vegas Valley Water District (SNWA/LVVWD)) in the Black Mountains Area, California Wash Basin, Coyote Spring Valley, Garnet Valley, Hidden Valley, and the Muddy River Springs Area was undertaken during the months of May, June and July 2002. The locations of wells and stream gages surveyed are shown in Figure 1.

The survey also meets a component of SNWA's obligation under an agreement signed in July 2001 between the SNWA and the Federal Bureaus (National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), and the U.S. Bureau of Land Management (BLM)) regarding monitoring, management and mitigation of SNWA/LVVWD's current and future ground water rights in Coyote Spring Valley. The survey was performed under the supervision of the LVVWD's state of Nevada registered professional land surveyor. The list of wells and stream gages surveyed and their respective ground-water basins are given in Table 1.

The survey results are reported using the most standard datum available. To ensure reproducibility, all the parameters listed below were utilized in the survey.

Methodology

Static surveying techniques were used in acquiring location and elevation data. The technique involves the use of a global positioning system (GPS) in the acquisition of data for a minimum of two hours. Most of the occupations in this study exceeded the two-hour minimum during the survey.

Measurement Point

Elevation measurements were generally made at known depth to water measurement points (DTW MPs) but this was not possible in all cases. The survey measurement points (SMPs) therefore, may or may not be the same points used to acquire sub-surface water levels. The survey measurement points (SMPs) have been adequately described in Table 2 and also on the pictures in Appendix A. Attention must be paid to the SMP information to determine the type of adjustment that should be made during any future survey or determination of ground-water altitude. For survey measurements made at the known DTWMPs, ground-water altitude can be obtained by subtracting the depth to water measurement (DTWM) from the survey measurement point elevation (SMP) elevation (i.e. $SMP - DTWM$; Figure 2a). For SMP elevation measurement made below the MP, (Figure 2b), ground water altitude is obtained by adding the

Figure

1

Table 1: Location and list of wells and stream gages surveyed for the project in May/June 2002.

Site Name	Alias	Hydrographic Basin
BM-DL-1	Apex-1	Black Mountains Area
BM-DL-2	Apex-2	Black Mountains Area
BM-ONCO -1	ONCO-1	Black Mountains Area
BM-ONCO-2	ONCO-2	Black Mountains Area
PAIUTES-ECP-1	ECP-1	California Wash
PAIUTES-ECP-2	ECP-2	California Wash
PAIUTES-ECP-3	ECP-3	California Wash
PAIUTES-M-1	M-1	California Wash
PAIUTES-M-2	M-2	California Wash
PAIUTES-M-3	M-3	California Wash
PAIUTES-TH-2	TH-2	California Wash
CE-VF-1	365232114554401	Coyote Spring Valley
CE-VF-2	365227114554401	Coyote Spring Valley
CSV- RW2	NPC-CSV	Coyote Spring Valley
CSV-3	364127114553001	Coyote Spring Valley
DF-1	Dutch Flat-1 365008114541101	Coyote Spring Valley
MX-4	CE-DT-4; 364743114533101	Coyote Spring Valley
MX-5	CE-DT-5; 364741114532801	Coyote Spring Valley
GARNET WELL		Garnet Valley
GV-1		Garnet Valley
GV-2		Garnet Valley
GV-MIRANT1		Garnet Valley
GV-PW-MW1	Pinnacle MW-1	Garnet Valley
GV-PW-MW2	Pinnacle MW-2	Garnet Valley
GV-RW1	NPC-Harvey Well Replacement	Garnet Valley
SHV-1	363308114553001	Hidden Valley
ABBOTT	UM7	Muddy River Springs Area
BEHMER-MW	Behmer Monitoring Well	Muddy River Springs Area
CSV-1	364601114514301	Muddy River Springs Area
CSV-2	364650114432001	Muddy River Springs Area
EH-4		Muddy River Springs Area
EH-5B		Muddy River Springs Area
IVERSON FLUME	09415927	Muddy River Springs Area
LDS CENTRAL	UM49	Muddy River Springs Area
LDS EAST	UM50	Muddy River Springs Area
LDS WEST	UM18	Muddy River Springs Area
LEWIS 1 OLD	NPC Old; UM55	Muddy River Springs Area
LEWIS 2M	UM74 - Lewis 2 monitoring well	Muddy River Springs Area
LEWIS NORTH	UM45	Muddy River Springs Area
LEWIS SOUTH	UM43	Muddy River Springs Area
MUDDY SPRING GAGE AT LDS FARM	09415900	Muddy River Springs Area
MX-6	CE-DT-6; 364604114471301	Muddy River Springs Area
PEDERSON EAST GAGE	Playboy Pool Gage; 09415908	Muddy River Springs Area
PERDERSON SPRING GAGE	09415910	Muddy River Springs Area
PERKINS OLD	UM15	Muddy River Springs Area
WARM SPRINGS WEST GAGE	09415920	Muddy River Springs Area

Table 2

Table

2

Continued

height of casing above SMP to the SMP elevation and then subtracting the DTWM (i.e. SMP + the height of casing above SMP – DTWM).

Photographs taken at the measurement sites during the survey depicting the locations of surveyed measurement points are given in Appendix A.

Horizontal Datum

The North American Datum of 1983 (NAD83), which employs the use of the Geodetic Reference System 1980 for ellipsoidal orientation (see *Ellipsoid* below) was used as the horizontal datum.

Vertical Datum

The vertical datum is the North American Vertical Datum of 1988 (NAVD88). It consists of three elements; Datum, Ellipsoid & Geoid model. To obtain similar results for any future surveys, all three elements for this datum must be maintained.

Ellipsoid

The ellipsoid used to measure these points is the Geodetic Reference System of 1980 (GRS 1980). The semi-major and semi-minor axes for this ellipsoid directly conform to the World Geodetic System 1984 (WGS '84).

Geoid Model

Adjustments for the undulating effects of gravity due to unevenly distributed mass (e.g. high-mass rock vs. low-mass alluvium) were made using bi-quadratic interpolation using the International GPS Service (IGS) Geoid 1999 (Geoid '99).

Results

Precise Ephemeris

The best available ephemeris IGS was used to adjust the data. The IGS tracks United States Navigation Satellites with Timing and Ranging (NAVSTAR) constellation GPS satellites and provides the most accurate satellite-by-satellite trajectory information available. The IGS works in conjunction with NASA on these calculations. By comparison, real-time kinematics (RTK) uses the last 24-hours satellite tracking information to estimate the satellite trajectory used in the broadcast ephemeris. The drawback to using this more precise ephemeris is that the IGS does not release these data until two weeks after collection or compilation mainly for defense purposes.

Scenario (a)

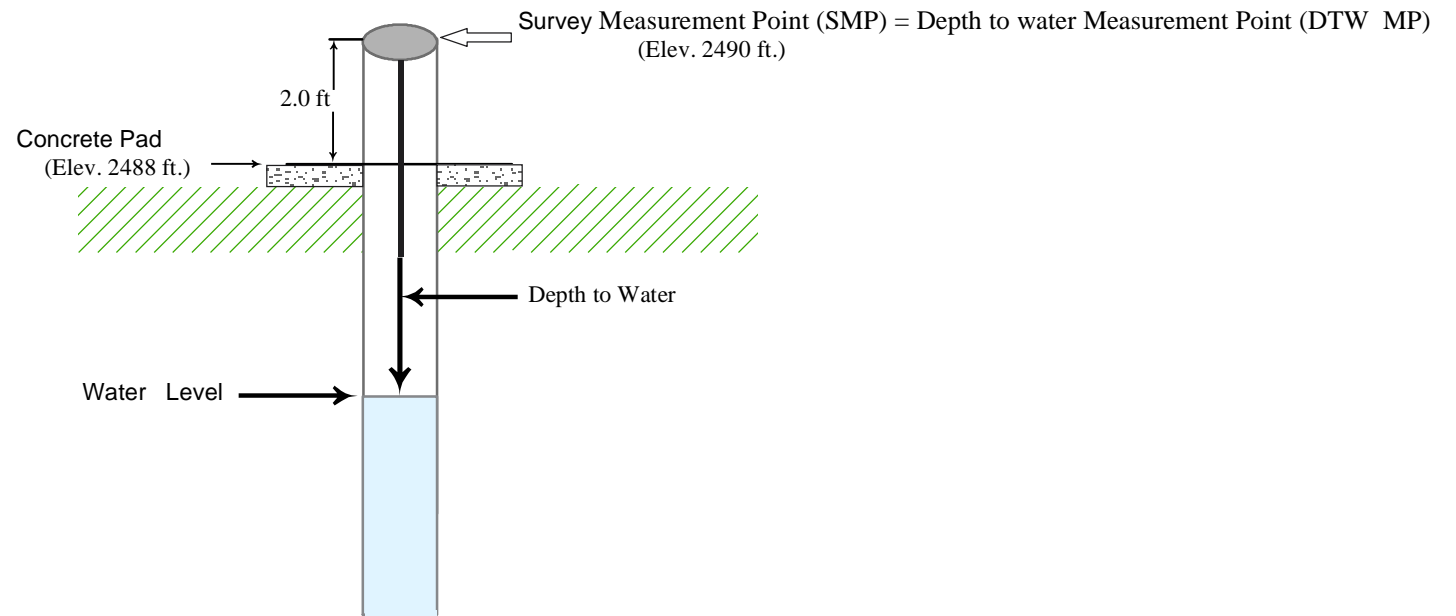


Figure 2a. Survey Measurement Point = Depth to Water Measurement Point (DTW MP)
Ground Water Altitude = SMP (2490 ft) - depth to water

Scenario (b)

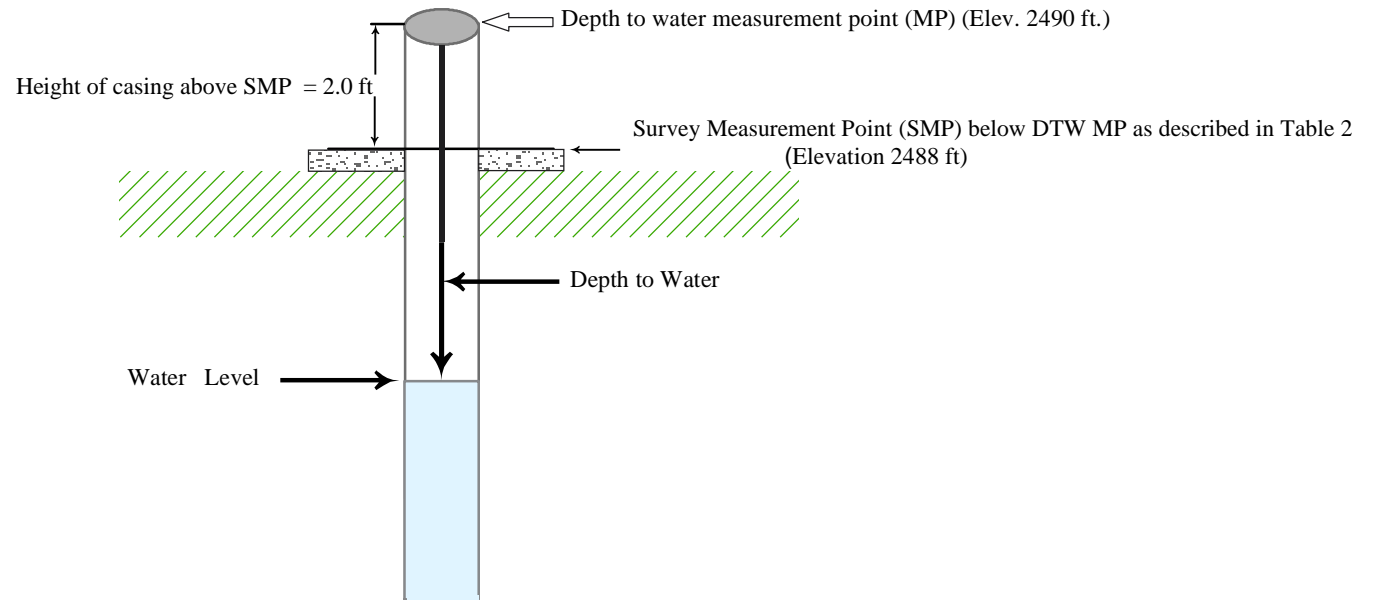


Figure 2b. Survey Measurement Point (SMP) is below depth to water measurement point (DTW MP)
Ground Water Altitude = SMP elevation (2488) + height of casing above SMP (2 ft) - depth to water

Adjustment Agency

The results of the survey were calculated and adjusted by the National Geodetic Survey's (NGS') "On-line Positioning User Service" (OPUS). The OPUS is a service provided by the NGS as an on-line adjustment service for geodetic-grade spatial positioning solutions (<http://www.ngs.noaa.gov/OPUS/index.html>). The minimum service adjusted by OPUS and the NGS is a two-hour static observation. The results thereof were processed using Continually Operating Reference Stations (CORS) at a minimum occupation time of two hours. The accuracy of the system is observation-site dependent.

The NGS-OPUS solution is attached as Appendix B. The final position was calculated using NGS' PAGES program that provides a variance/covariance matrix solution employing a Least Squares adjustment to the final baseline. This adjustment is superior to most vendor-based solution software. Error estimates have also been calculated using statistical parameters observed during the survey, and are shown in Table 2. Errors in vertical elevation range from 0.082 to 0.371 of a foot.

Temporary reference points have been established for each of the wells to provide a reference point to re-establish the MP elevation should the MP (which is usually the top of casing) be modified. The temporary reference points survey data are given in Table 3.

Well Logs

Well logs of the wells surveyed are included in Appendix A. Copies of the original well logs submitted by drillers to the Nevada Division of Water Resources (NDWR) and electronic copies from the NDWR website were used in most cases. In some other instances, copies from other publications (e.g. drilling and monitoring reports) have been used and are appropriately credited.

Additional Work

Additional elevation surveys will be conducted on wells without elevation control as monitoring efforts are adjusted or additional wells are drilled. When additional surveys are completed, the individual survey results will be forwarded to report holders for incorporation into this report without re-issuing the entire report. All inquiries regarding SNWA/LVVWD surveys or updates should be submitted in writing to SNWA Resources Department, Water Resources Division, 1900 E. Flamingo Road, Suite 180, Las Vegas, NV 89119.

Table 3

Table 3 (continued)

References

Berger, D.L., Kilroy, K.C., and Schaefer, D.H., 1988, Geophysical logs and hydrologic data for eight wells in the Coyote Spring Valley area, Clark and Lincoln Counties, Nevada: U.S. Geological Survey Open-File Report 87-679, 59 p.

Converse Consultants, 2002, Ground water level monitoring program – 2001 annual report, Moapa, Nevada, *prepared for Nevada Power Company*, 80 p.

Desert Research Institute, 1986, Summary of deep drilling activities at NPC Reid Gardner facility, Clark County, Nevada, *John W. Hess*, Project Manager, October 1985 – May 1986, 26 p.

<http://water.nv.gov/IS/wlog/wlog.htm> Nevada Division of Water Resources well log database.

<http://www.ngs.noaa.gov/OPUS/index.html> On-line Positioning User Service.

Mifflin and Associates, Inc., 2001, Hydrogeologic and ground water modeling analyses for the Moapa Paiute Energy Center, A Calpine Company Project in cooperation with the Moapa Band of Paiute Indians, 218 p.

Acknowledgement

We thank Jason Dixon and Martin Mifflin of Converse Consultants and Mifflin and Associates, Inc. respectively for their help in the field, and also providing access to the Nevada Power Company wells in Moapa and the Paiute Indians wells in the California Wash Basin. We acknowledge the help of R. J. Johnson, a consulting geologist, for providing information and access to the Onco wells in the Black Mountains Area.

APPENDIX A

PHOTOGRAPHS OF SURVEYED SITES, AND LOGS OF SURVEYED WELLS

List of wells in Black Mountains Area

Site Name	Alias	Owner
BM-DL-1	Apex-1	Dry Lake Water LLC
BM-DL-2	Apex-2	Dry Lake Water LLC
BM-ONCO -1	ONCO-1	SNWA
BM-ONCO-2	ONCO-2	SNWA



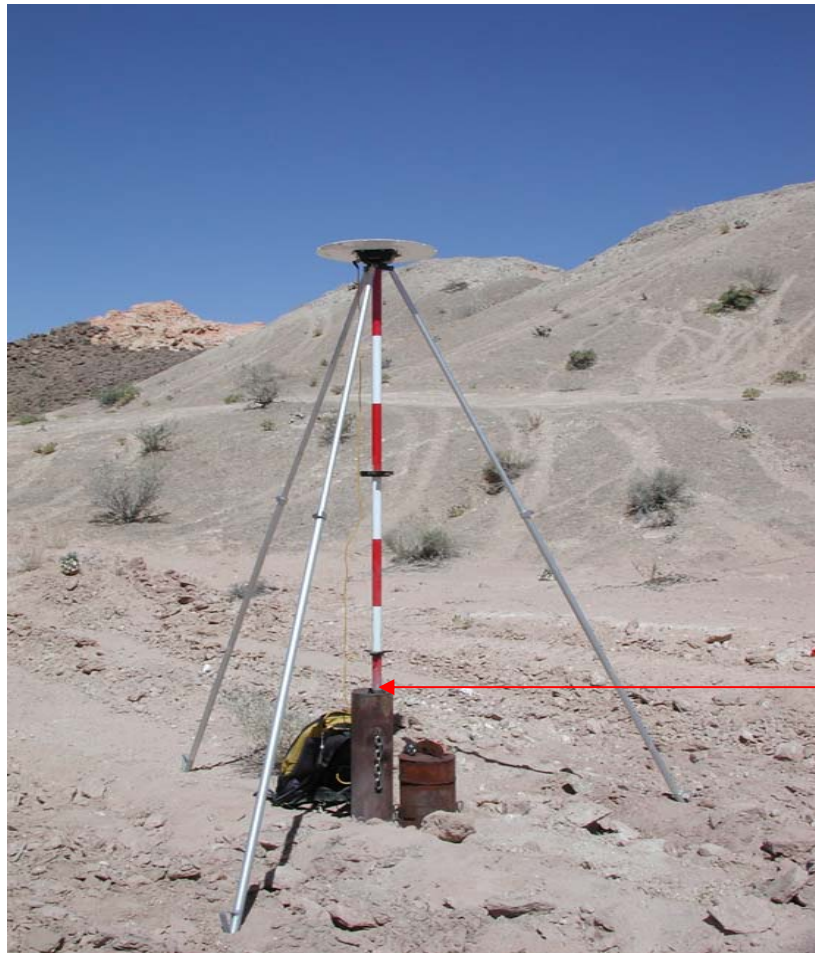
Survey measurement point at top of 2" access port east of big casing at DTWMP

GPS setup at BM-DL-1 (Apex-1) in the Black Mountains Area (Well has since been fenced)



Survey measurement point is the top of 2" access port N. of big well casing at DTW MP

GPS setup at Well BM-DL-2 (Apex-2) in the Black Mountains Area (Well has since been fenced)



Survey measurement point is at the top of 2" casing inside vault at the DTW MP

Setup of GPS data gathering station at BM-ONCO-1 (ONCO-1) in the Black Mountains Area

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 50885

Sequence No.: 27546

Permit No.: 58048

Basin: 215

Notice of Intent#: 15543

Owner: OGLEBAY NORTON CORPORATION

Mailing/Well Address: GALE HILLS NV

Location NE SW

Sec: 08

Twn: 20S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: K

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 1291 feet

Construction Data Quality: G

Surface Casing Diameter: 2 inches

Lithologic Data Quality: G

Cased To: 1291 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 4/26/1995

Perforations:

Date Complete: 5/11/1995

From 440 feet to 1280 feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: N

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 344.09 ft below LSD

General Remarks:

Water Temperature: 75° F

Additional Remarks:

Contractor Name: GUSTIN CORP

Contractor License Number: 22193

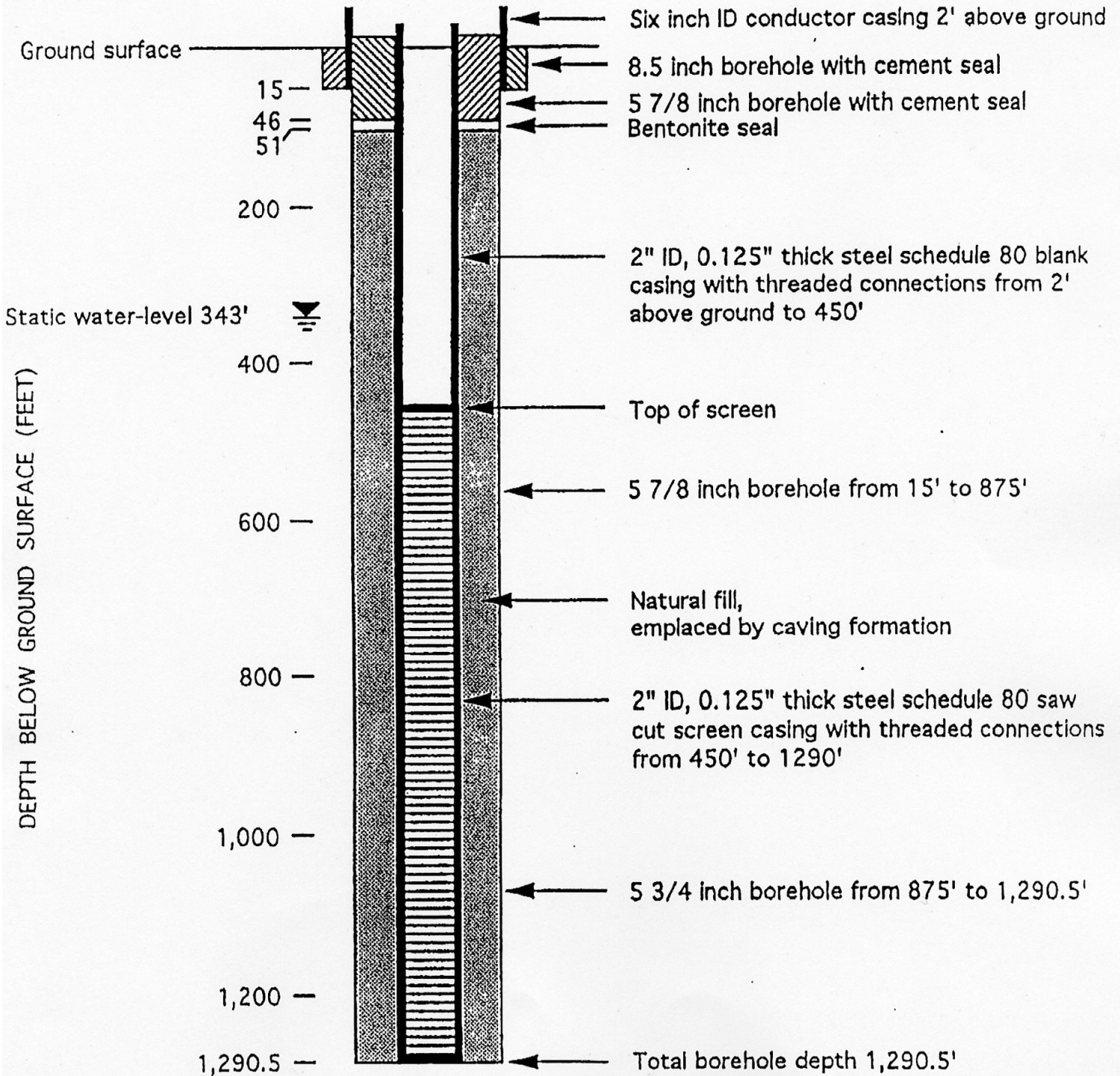
Address: P O BOX 894 ELKO NV 89803

Contractor's Drlr No.:

Driller Lic.No.: 1821

Code Definitions

ONCO-1 GROUND-WATER EXPLORATION WELL
 GALE HILLS, NEVADA
 MAY, 1995
 MONITOR WELL CONSTRUCTION



Not to scale



Survey measurement point is the top of a 2" casing inside vault at the DTW MP

Gathering GPS data on BM-ONCO-2 (ONCO-2) Well in the Black Mountains Area

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N
Sequence No.: 27471

Log No.: 50810
Permit No.: 58047
Basin: 215
Notice of Intent#: 15544

Owner: OGLEBAY NORTON CORPORATION

Mailing/Well Address: GALA HILLS NV

Location SE SW Sec: 08 Twn: 20S Rng: 65E Ref: MD State/Co. Code: 32
Waiver No: Parcel No.: Lot No.: Block No.:
Type of Work: N Proposed Use: K Drilling Method R Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 1575 feet

Construction Data Quality: G

Surface Casing Diameter: 2 inches

Lithologic Data Quality: G

Cased To: 1570 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 5/11/1995

Perforations:

Date Complete: 5/27/1995

From 1445 feet to 1575 feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: N

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 549.55 ft below LSD

General Remarks:

Water Temperature: 82° F

Additional Remarks:

Contractor Name: GUSTIN CORP

Contractor License Number: 22193

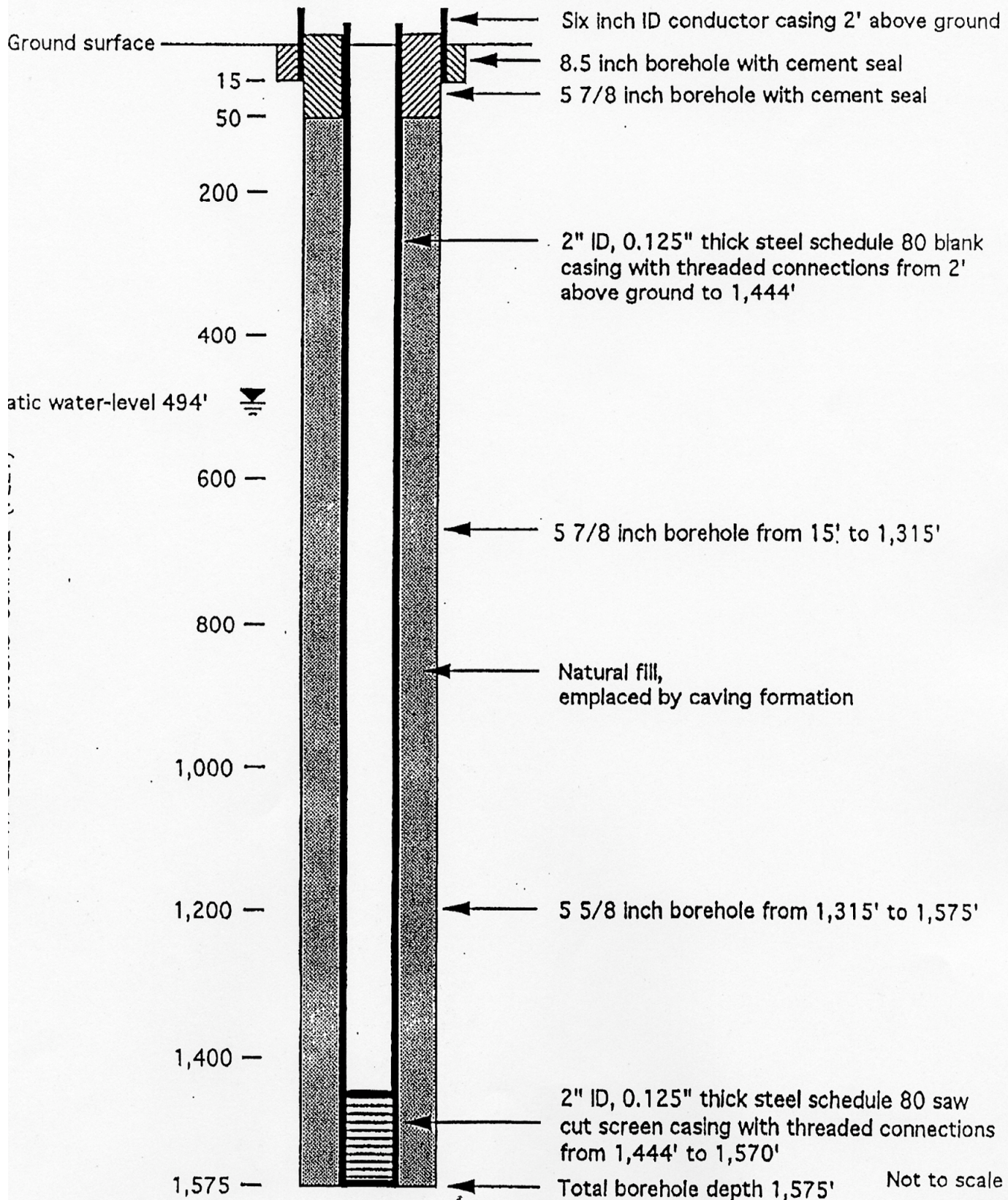
Address: P O BOX 894 ELKO NV 89803

Contractor's Drlr No.:

Driller Lic.No.: 1821

Code Definitions

ONCO-2 GROUND-WATER EXPLORATION WELL
 GALE HILLS, NEVADA
 JUNE, 1995
 MONITOR WELL CONSTRUCTION



List of Wells in California Wash Basin

Site Name	Alias	Owner
PAIUTES-ECP-1	ECP-1	Moapa Band of Paiutes
PAIUTES-ECP-2	ECP-2	Moapa Band of Paiutes
PAIUTES-ECP-3	ECP-3	Moapa Band of Paiutes
PAIUTES-M-1	M-1	Moapa Band of Paiutes
PAIUTES-M-2	M-2	Moapa Band of Paiutes
PAIUTES-M-3	M-3	Moapa Band of Paiutes
PAIUTES-TH-2*	TH-2	Moapa Band of Paiutes

* Could not obtain drill log



Survey measurement point is top of well casing inside vault at DTW MP

PAIUTES-ECP-1 WELL (ECP-1) in California Wash prior to setting up a GPS data gathering station



Survey measurement point is at an "X" at the top of 1.5' casing.

PAIUTES-ECP-2 WELL (ECP-2) in California Wash Basin prior to setting up a GPS data gathering station

Survey measurement point is an 'X' on 1' diameter casing



PAIUTES-ECP-3 WELL (ECP-3) in California Wash prior to setting up a GPS data gathering station

Owner: Moapa Band of Paiutes
 Notice of Intent: 19991

ECP-3



LITHOLOGIC LOG

MATERIAL	FROM	TO	THICK
calcrete & alluvium	0	20	20
mudstone	20	40	20
sandstone & limestone	40	60	20
limestone	60	70	10
limestone & sandstone	70	100	30
limestone	100	140	40
siltstone	140	170	30
sandstone	170	220	50
limestone	220	240	20
sandstone, limestone	240	340	100
limestone	340	415	75
siltstone & limestone	415	535	120
limestone	535	570	35
sandstone	570	610	40
limestone	610	670	60
sandstone	670	685	15
dolomite, sandstone	685	690	5
lime, sand & silt stone	690	740	50
sandstone, siltstone	740	785	45
sandstone	785	790	5
limestone & sandstone	790	805	15
dolomite	805	810	5
sandstone & limestone	810	845	35
limestone & siltstone	845	855	10
siltstone, sandstone	855	880	25
limestone	880	935	55
sandstone, dolomite	935	950	15
lime, sand & silt stone	950	1055	105
limestone	1055	1120	65
lime, sand & silt stone	1120	1150	30
dolomite	1150	1175	25
limestone, sandstone	1175	1200	25
limestone, siltstone	1200	1220	20
limestone	1220	1255	35
siltstone	1255	1260	5
limestone	1260	1445	185
siltstone	1445	1450	5
limestone, dolomite	1450	1480	30
limestone	1480	1500	20
TOTAL			1500

HOLE DIAMETER (BIT SIZE)

INCHES	FROM	TO
12	0	80
8 1/2	80	990
7 7/8	990	1500

CASING (TEMPORARY)

SIZE (OD)	WALL (IN)	TO	FROM
12	0	0	74





Survey measurement
point is top of
casing at DTW
MP inside vault

PAIUTES-M-1 (M-1) WELL in California Wash Basin prior to setting up GPS station

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 82302

Sequence No.: 61045

Permit No.:

Basin: 218

Notice of Intent#: 45357

Owner: MARTY MIFFLIN & ASSOCIATES

Mailing/Well Address: 10 MI S OF GLENDALE

Location SE SE

Sec: 09

Twn: 15S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No.:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: G

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 400 feet

Construction Data Quality: G

Surface Casing Diameter: 8.625 inches

Lithologic Data Quality: G

Cased To: 400 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 10/11/2000

Perforations:

Date Complete: 10/13/2000

From 360 feet to 400 feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: N

Test Method:

from feet to feet

Work Type Remarks:

Static Water Level: 150 ft below LSD

Water Temperature: ° F

General Remarks:

Contractor Name: EKLUND DRILLING CO INC

Contractor License Number: 30823

Additional Remarks:

Address: P O BOX 2748 ELKO NV 89803

Contractor's Drlr No.:

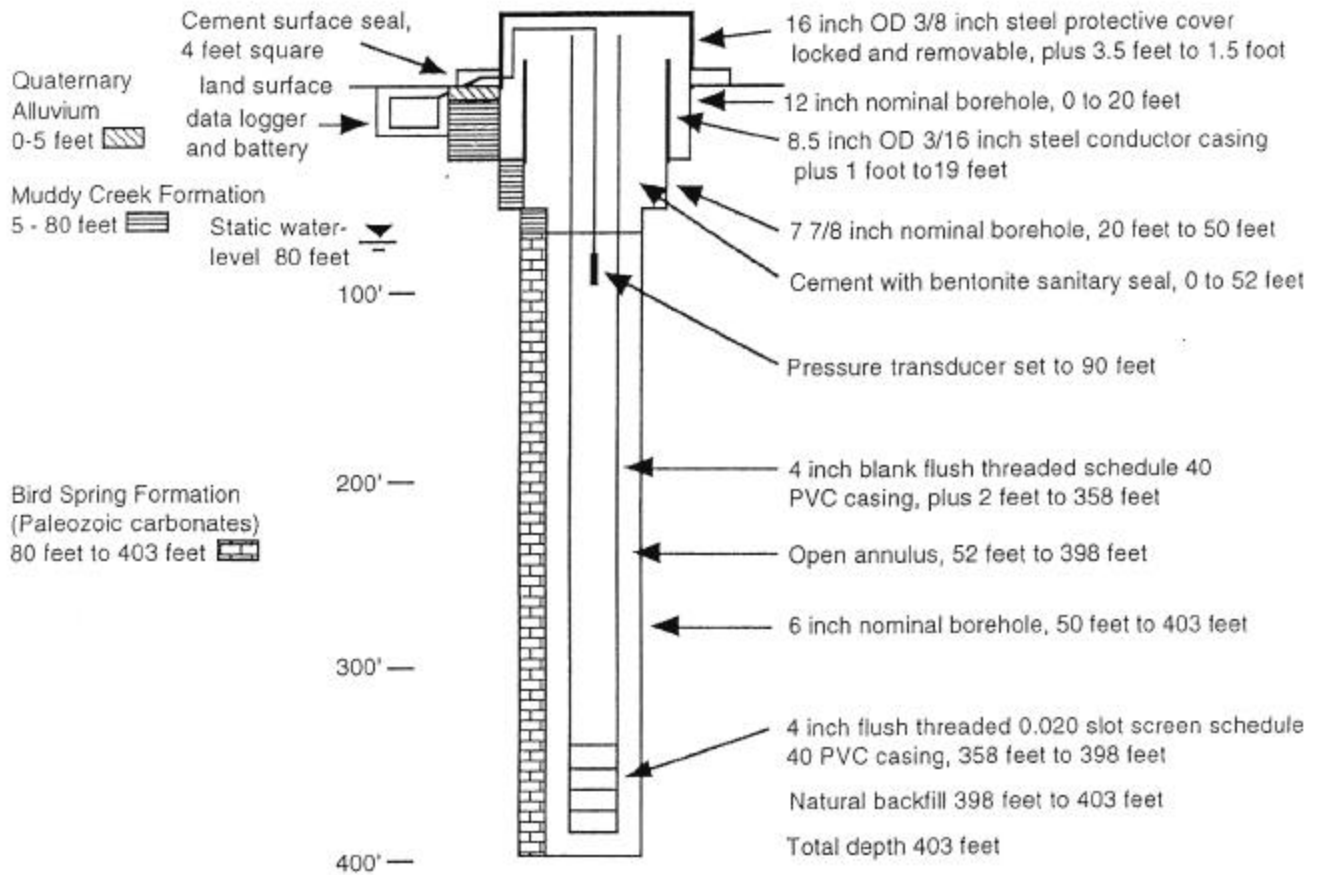
Driller Lic.No.: 1960

Moapa Band of Paiutes

Monitoring Well M-1

SE 1/4, SE 1/4, S 9, T. 15 S., R. 65 E., MDBM

Notice of Intent #45357



not to scale

Borehole and well construction

commenced 10/10/00

completed 10/14/00

Monitoring well M-1 borehole history, stratigraphy, and well construction details.



Survey measurement point is an 'X' etched in the concrete pad (well below DTW MP)

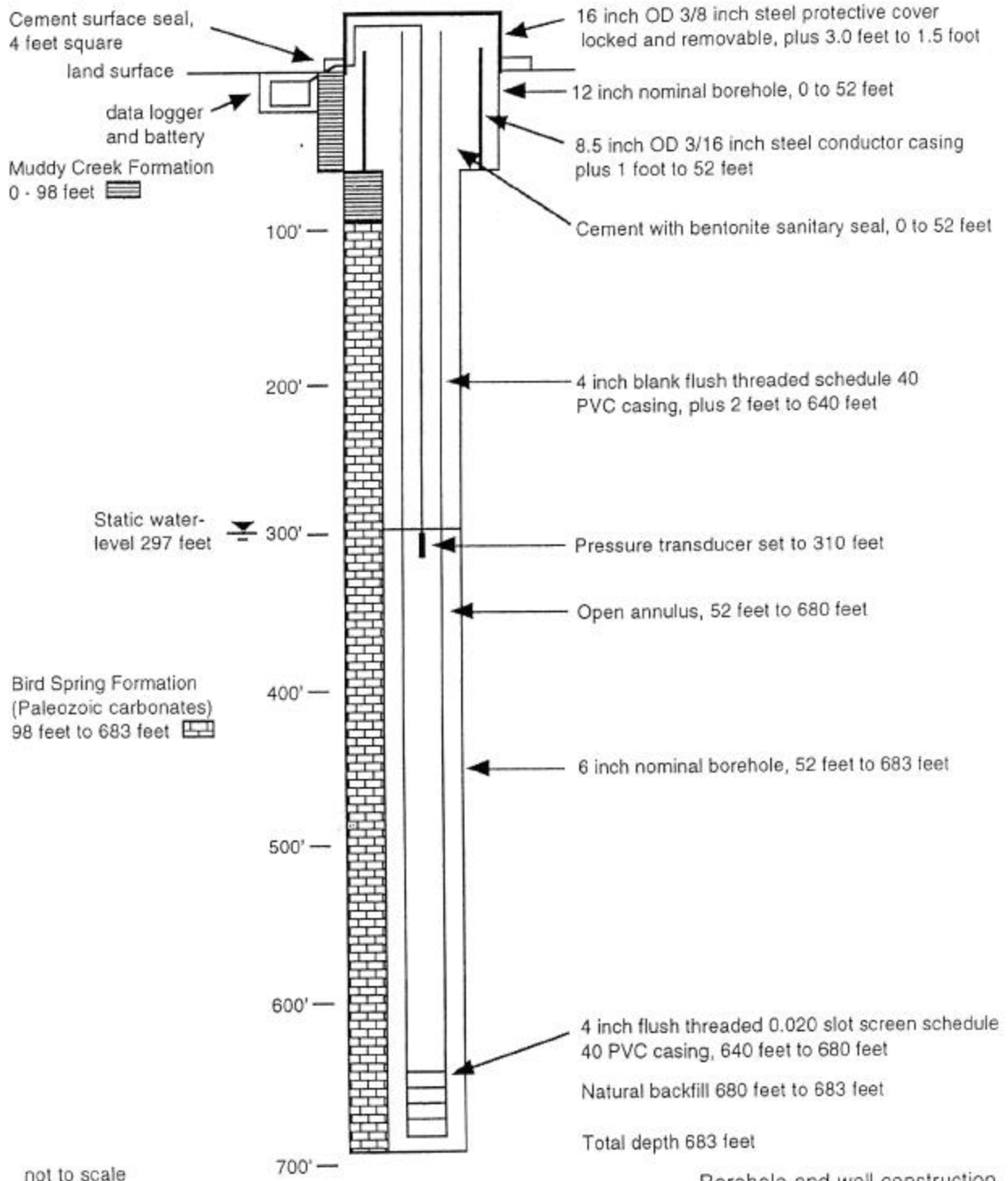
Tim Wolf, LVVWD Professional Land Surveyor setting up a GPS data gathering station on Well M-2 (PAIUTES-M-2 WELL (M-2) in the California Wash Basin.

Moapa Band of Paiutes

Monitoring Well M-2

SE 1/4, SW 1/4, S 34, T. 16 S., R. 64 E., MDBM

Notice of Intent #45362



Borehole and well construction
commenced 10/14/00
completed 10/18/00

Monitoring well M-2 borehole history, stratigraphy, and well construction details.



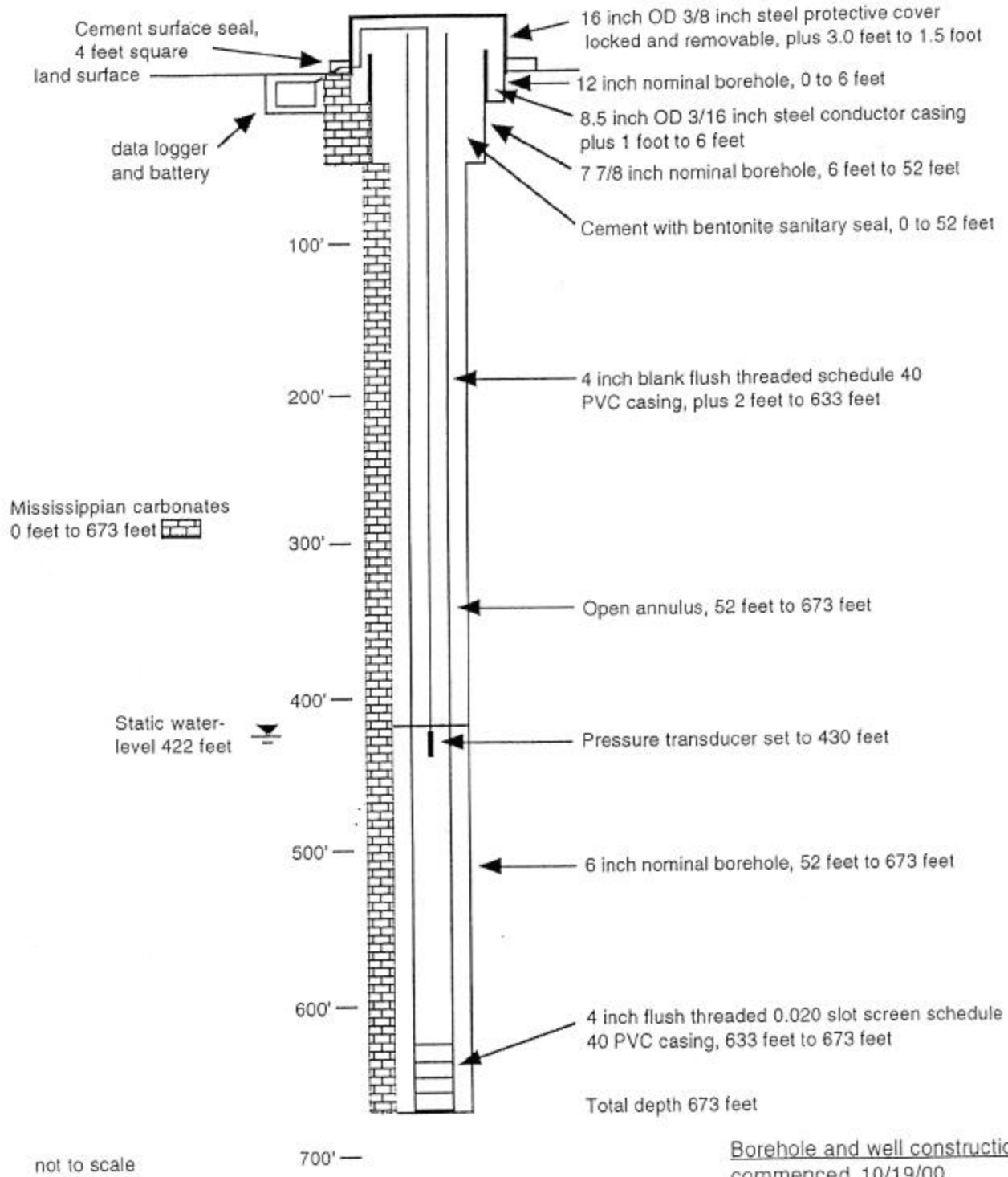
PAIUTES-M-3 WELL (M-3) in California Wash Basin prior to setting up a GPS station

Moapa Band of Paiutes

Monitoring Well M-3

NE 1/4, SW 1/4, S 19, T. 16 S., R. 64 E., MDBM

Notice of Intent #45358



Monitoring well M-3 borehole history, stratigraphy, and well construction details.



Survey measurement point is the top of 4" casing inside vault at DTW MP

PAIUTES-TH-2 (TH-2) in California Wash Basin prior to setting up a GPS station

List of wells in Coyote Spring Valley

Site Name	Alias	Owner
CE-VF-1	365232114554401	USGS
CE-VF-2	365227114554401	USGS
CSV-3	364127114553001	USGS
DF-1	Dutch Flat-1	Coyote Spring Investment, LLC
MX-4	CE-DT-4; USGS 364743114533101	Coyote Spring Investment, LLC
MX-5	CE-DT-5; USGS 364741114532801	SNWA
CSV-RW2	NPC-CSV	Nevada Power Company

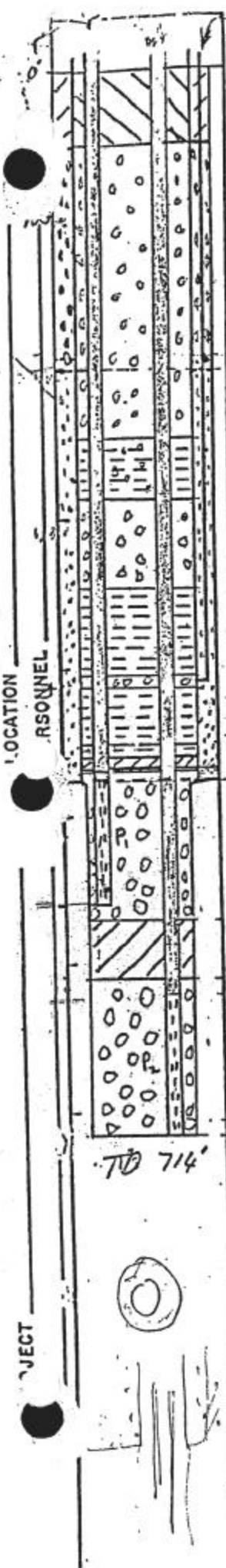


Survey measurement point is top of steel casing at DTW MP

Survey team setting up a GPS station on Well CE-VF-1 in Coyote Spring Valley (date on picture is an error)

VF-1 SHALLOW
WELL CONSTRUCTION SUMMARY

LOCATION or COORDS: 12S-63E-29 ELEVATION: GROUND LEVEL 2465'
 TOP OF CASING 2467'



DRILLING SUMMARY:
 TOTAL DEPTH 714'
 BOREHOLE DIAMETER 11 1/2" TO 40'
17 1/2" 140' TO 480' 7 7/8" 480' TO 714'
 DRILLER STEVENSON DRILLING: MITCHELL RIG.
SERRA MITCHELL & BERT REEDLINGER
 RIG CP-RT-1800
 BIT(S) 12 1/2" TRICONE 26" REAMER 17" REAMER 7 7/8" TRICONE.
 DRILLING FLUID BENTONITE. ADDITIVES INCLUDE: CMC, SODA ASH COAR FIBER.
 SURFACE CASING 40" x 22" ID.

WELL DESIGN:
 BASIS: GEOLOGIC LOG GEOPHYSICAL LOG
 CASING STRING(S): C=CASING S=SCREEN

0	-	246	C ₃		
246	-	286	S ₂		
286	-	346	C ₂		
346	-	406	S ₂		
406	-	411	C ₁		
411	-	471	S ₁		

 2" SANDING TUBES: 0 TO 408'

2" CASING: 1. +2' TO 470'
 2. +2' TO 620'
 2" SLOTTED P₁ 470' TO 560'
 P₂ 620' TO 714'

CENTRALIZERS EVERY 100' FROM THE BOTTOM UP

CEMENT 0'-50' 460'-470' 570'-610'

OTHER _____

CONSTRUCTION TIME LOG:

TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING: 7 7/8"	11/11/80	2231 hrs	11/24/80	1320h
12 1/2"	11/13/80	1742 hrs	11/15/80	0840
26" REAM	11/15/80	1506 hr	11/15/80	1945
17 1/2" REAM	11/17/80	00:00 hr	11/17/80	
GEOPHYS. LOGGING:	11/15/80	1030 hr	11/15/80	1200h
CASING:				
22"	11/15/80	1842 hr	11/15/80	2030h
10"	11/14/80	0630 hr	11/18/80	1730h
2"	11/22/80	NO SURF LOG	11/22/80	1462
FILTER PLACEMENT				
CEMENTING:				
DEVELOPMENT:				
OTHER:				

PRELIMINARY

GRAVEL PACK:

ANNULAR SPACE	ANNULAR SPACE
10" @ WALL OF WELL	2" @ 10"
50'-200' Pea Gravel	50' TO 460'
200'-475' 8-12 Gravel	Pea Gravel 470'-475'
ANNULAR SPACE 2" @ WALL	
475'-570' Pea Gravel	
610'-714' Pea Gravel	



Survey measurement
point is top of
casing at DTW MP

Well CE-VF-2 in Coyote Spring Valley prior to setting up GPS data gathering station

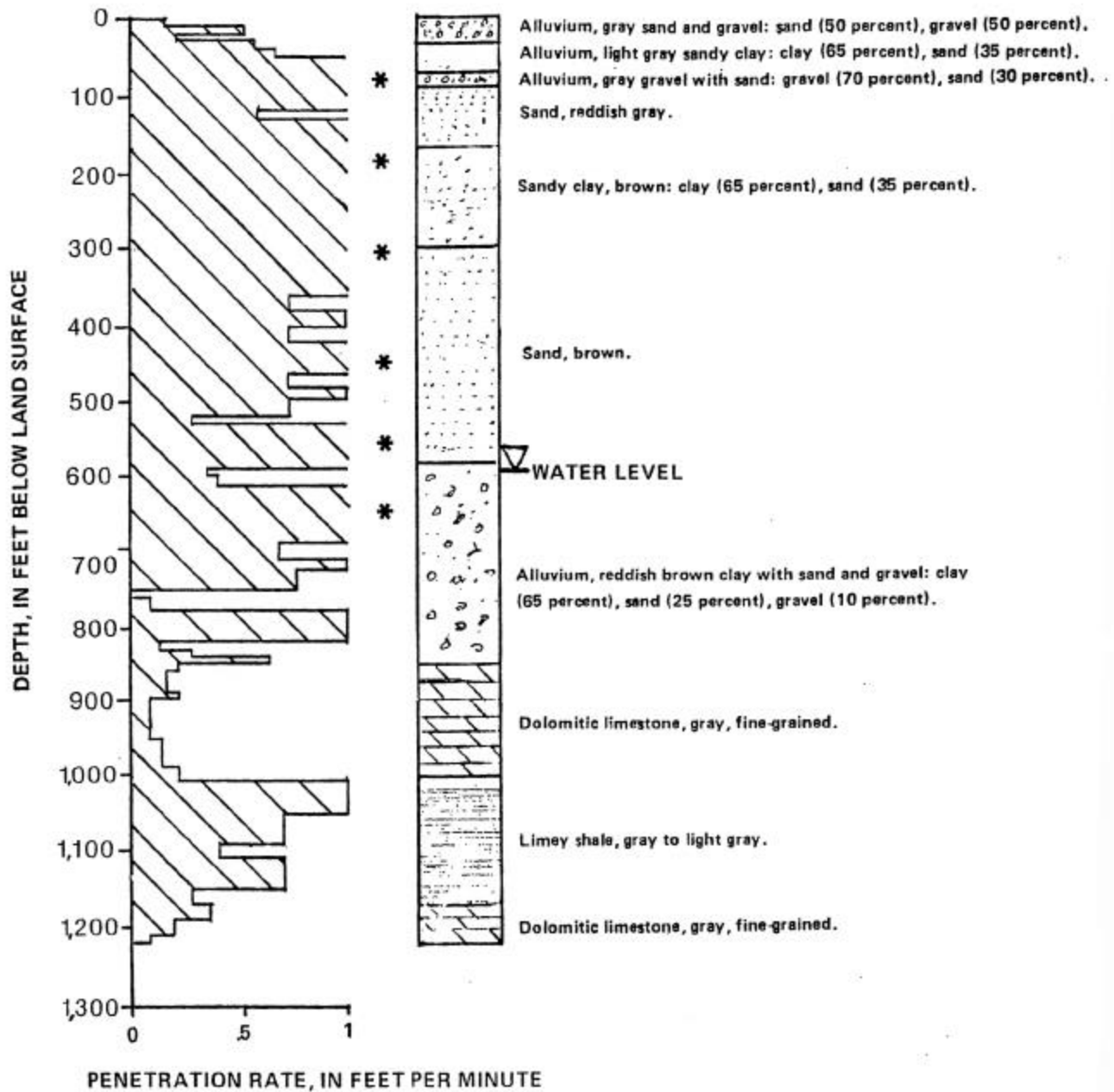
CE-VF-2

Well CE-VF-2 in Coyote Spring Valley, Lincoln County, is adjacent to U.S. Highway 93, approximately 4 miles north of the intersection of U.S. Highway 93 and State Route 168 (figure 1). The well site is east of Pahranaagat Wash in Coyote Spring Valley.

Drilling began on December 15, 1980, and was completed sometime before April 1981 (exact date not known). The reported total depth is 1,221 feet and the water table was near 611 feet below land surface. Dolomitic limestone bedrock was penetrated at 850 feet. The well is cased with 10-inch-diameter blank casing from 0 to 860 feet and is uncased from 860 to 1,221 feet. The casing was set with cement from the surface to 50 feet and from 840 to 860 feet. Nongraded gravel pack was placed in the annulus from 50 to 840 feet. The drilling penetration rate and lithologic log for CE-VF-2 are shown in figure 24, and geophysical well logs are shown in figure 25. Another well, CE-VF-1, was drilled as an observation well approximately 300 feet north of CE-VF-2. A reported depth of 714 feet was attained, bottoming in basin-fill deposits. The water level is 593 feet below land surface, indicating a vertical gradient between CE-VF-2 and CE-VF-1.

Well CE-VF-2 was tested by the Geological Survey in February of 1986. The well was developed initially in 1981 by bailing 25 bails per day for 5½ days (16.5 gallons per bail). The pump, flow-meter assembly, and pressure transducer used in 1986 were the same as those used in the test at CSV-2. The pump intake was set at 707 feet and the discharge was piped 80 feet away from the site. The well was pumped at 77 gal/min for 14 hours, and recovery took 2 hours. The pump stopped unexpectedly due to mechanical failure and, as a result, the exact time for the beginning of the recovery portion of the test is uncertain within 1 to 4 minutes. The initial recovery measurements exhibit a great deal of scatter due to rapid oscillations of the water in the well or to problems with the pressure transducer or recorder. Despite these initial difficulties, the long-term recovery of water levels was accurately measured. See tables 12 and 13 and figures 26 and 27. Measurements of water levels in an observation well 300 feet away, CE-VF-1, showed no change during the 14-hour test. The observation well does not penetrate the carbonate aquifer.

(Source: Berger and others, 1988).



Drilling penetration rate and lithology for MX test well CE-VF-2. Asterisk indicates penetration rate exceeding 1.0 foot per minute. (Source: Berger and others, 1988).

WELL CONSTRUCTION SUMMARY

VF 2 DEEP.

PROJECT: MY-Water Resources 80-300-45-621
 PERSONNEL: Tom Smith CE-VF-2
 LOCATION OR COORDS: NW 1/4 SE 1/4 29 T12S R63E ELEVATION: GROUND LEVEL 2460' (topo)
 TOP OF CASING 1.2 ft above L50

DRILLING SUMMARY:

TOTAL DEPTH 1221 ft
 BOREHOLE DIAMETER 9 3/8" pilot. Reached 17 1/2" 0-860'
 DRILLER Stephenson Drilling-Mitchell R/g - Bert Reedlinger, Terry Mitchell
 RIG CP-RT-1800
 BIT(S) 9 3/8" tricone millbit 0-941'
9 3/8" tricone bottom 791 HN 941'-1221'
 DRILLING FLUID bentonite
 SURFACE CASING 10" ID blank 0-860'

WELL DESIGN:

BASIS: GEOLOGIC LOG ✓
 GEOPHYSICAL LOG ✓
 CASING STRINGS (S): C=CASING S=SCREEN
0 - 860 C

CASING C1 _____
 C2 _____
 C3 _____
 C4 _____
 SCREEN S1 _____
 S2 _____
 S3 _____
 S4 _____

CENTRALIZERS Every 100 feet from bottom

FILTER MATERIAL None

CEMENT 20 cement 2 bentonite from 840-860'

OTHER uncased from 860' to 1221'

Well to be capped and left for future evaluation

CONSTRUCTION TIME LOG:

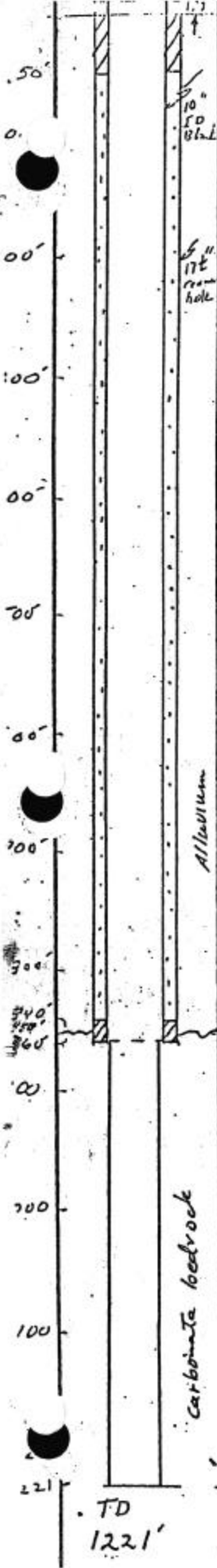
TASK	START		FINISH	
	DATE	TIME	DATE	TIME
DRILLING: 0-941'	12/15/81	1000hrs	12/18/81	1400hrs
941'-1221'	1/26/82	2000hrs	1/28/82	2135
GEOPHYS. LOGGING:	1/21/81	0730	1/21/81	1030hrs
CASING:				
FILTER PLACEMENT:				
CEMENTING:	1/24/81	0800	1/24/81	1430hrs
DEVELOPMENT:				
OTHER:				

PRELIMINARY

WELL DEVELOPMENT

COMMENTS:

Before site is left, drillers are to back fill annulus with natural fill and pressure seal upper 50 feet (0-50') with a cement-bentonite slurry and then the top is to be welded shut until further drilling operations can be planned.



TD 1221'



Survey measurement point is the top of 6" PVC casing inside vault at DTW MP

Gathering GPS data at Well CSV-3 in Coyote Spring Valley

Nevada Division of Water Resources

Well Log Database

CSV-3

Query Results

Type of Site: E
Sequence No.: 3216

Log No.: 28289
Permit No.:
Basin: 210
Notice of Intent#: 4014

Owner: U S GEOLOGICAL SURVEY
Mailing/Well Address: 705 N PLAZA CARSON CITY NV
Location SE NE Sec: 28 Twn: 14S
Waiver No: Parcel No.:
Type of Work: R Proposed Use: X

Rng: 63E Ref: MD State/Co. Code: 32
Lot No.: Block No.:
Drilling Method H Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 780 feet

Construction Data Quality: G

Surface Casing Diameter: 6 inches

Lithologic Data Quality: G

Cased To: 756 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 2/6/1987

Perforations:

Date Complete: 2/7/1987

From 736 feet to 756 feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: N

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 585 ft below LSD

General Remarks:

Water Temperature: ° F

Additional Remarks:

Contractor Name: U S GEOLOGICAL SURVEY

Contractor License Number:

Address: 705 N PLAZA CARSON CITY NV

Contractor's Drlr No.:

Driller Lic.No.: 1515

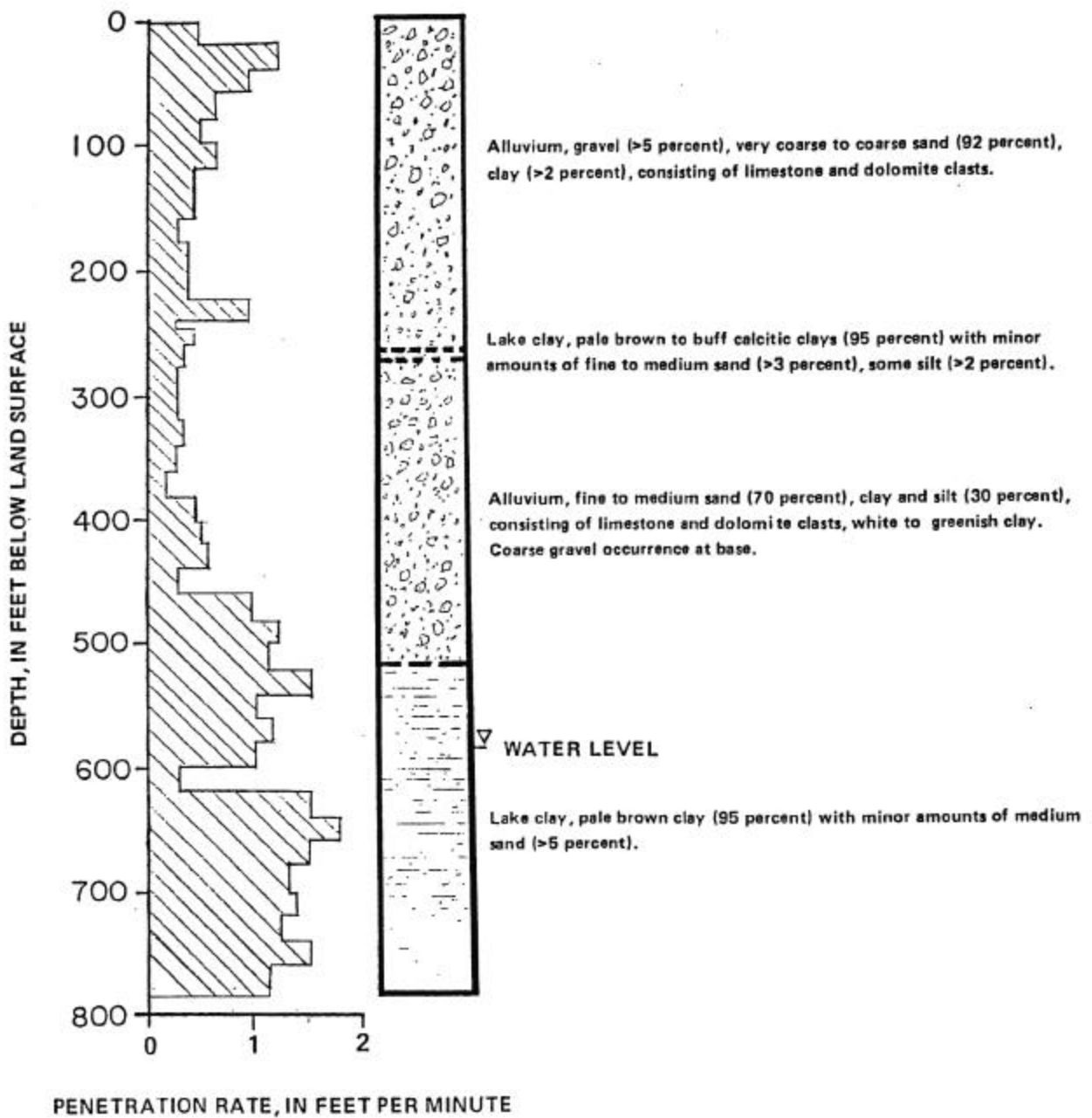
Code Definitions

CSV-3

Well CSV-3 in Coyote Spring Valley, Clark County, is adjacent to U.S. Highway 93, approximately 7 miles south of the intersection of U.S. Highway 93 and State Route 168 (figure 1). The well site is in the southernmost part of Coyote Spring Valley, between the Las Vegas Range and the Arrow Canyon Range.

The Geological Survey began drilling on November 6, 1985. Drilling-fluid circulation was lost at 430 feet due to a highly permeable and unconsolidated zone identified as a washout on the caliper log. Four thousand gallons of bentonite drilling mud was used as a sealer, but circulation was not regained. On December 18, 1985, a second episode of drilling was started using a 200-gallon mixture of Suprafoam¹ and Supramud to prevent circulation loss. At 515 feet, fluid circulation was lost which required thickening of the drilling fluid. On December 22, a total depth of 780 feet was attained, penetrating basin-fill deposits. The water table was reached about 580 feet below land surface. The hole later collapsed at a depth of 320 feet, and after reopening, 6-inch PVC was installed to a depth of 756 feet with 20 feet of perforated screen at the bottom. A 10-inch diameter, 7-foot section of PVC surface casing was cemented in place. The drilling penetration rate and lithology log are shown in figure 8. Geophysical well logs are shown in figures 9 and 10.

(Source: Berger and others, 1988).



--Drilling penetration rate and lithology for U.S. Geological Survey test well CSV-3. (Source: Berger and others, 1988).



Survey measurement point is an "X" etched in metal casing at (proposed) DTW MP. (The well was welded shut at the time of the survey).

Survey team setting up a GPS data gathering station on Well CSV-RW2 (NPC-CSV) in Coyote Spring Valley

RW-2

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 85546

Sequence No.: 65177

Permit No.: 49608

Basin: 210

Notice of Intent#: 22354

Owner: NEVADA POWER CO

Mailing/Well Address: 3 MI E OF HWY 95 & HWY 168 JCT

Location NW NE

Sec: 26

Twn: 13S

Rng: 63E

Ref: MD

State/Co. Code: 32

Waiver No.:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: P

Drilling Method: A

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 720 feet

Construction Data Quality: G

Surface Casing Diameter: 24 inches

Lithologic Data Quality: G

Cased To: 710 feet

Aquifer Type:

Casing Reductions: 1

Date Started: 2/4/2002

Perforations:

Date Complete: 2/25/2002

From: 460 feet to 700 feet

Yield: 150 G.P.M.

Perforation Length:

Draw Down:

After Hours Pump: 48

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: Y

Test Method: A

from: feet to 711 feet

Work Type Remarks:

Static Water Level: 380 ft below LSD

Water Temperature: ° F

General Remarks:

Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

Additional Remarks:

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Drlr No.:

Driller Lic.No.: 1887

Code Definitions

RW-2 STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

OFFICE USE ONLY
Log No. 85546
Permit No. 49608
Basin 21A

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.240

NOTICE OF INTENT NO. 22354

1. OWNER Nevada Power ADDRESS AT WELL LOCATION 1493 S 1416E
MAILING ADDRESS 226 West Sahara Ave 3 mi. East
Las Vegas, Nevada 89146

2. LOCATION NW 1/4 Sec 2E T. 13 N. R. 43 E. Clark County
PERMIT NO. 49608 Issued by Water Resources Parcel No. Segate Spring Valley

3. WORK PERFORMED
 New Well Replace Recondition
 Deepen Abandon Other

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal/Industrial Monitor Stock

5. WELL TYPE
 Cable Rotary RVC
 Air Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Iron sandstone		0	275'	275'
Hardstone		275'	595'	320'
Clay		595'	610'	15'
Limestone		610'	720'	110'

DATE: 02/17/02
TIME: 9:25
LAS VEGAS

8. WELL CONSTRUCTION
Depth Drilled 711 Feet Depth Cased 710 Feet

HOLE DIAMETER (BIT SIZE)
From To
36 Inches 0 Feet 50 Feet
22 Inches 50 Feet 720 Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
<u>74"</u>	<u>94.62</u>	<u>.375"</u>	<u>0</u>	<u>50</u>
<u>16"</u>	<u>62.56</u>	<u>.375"</u>	<u>0</u>	<u>460</u>
<u>16"</u>	<u>62.56</u>	<u>.375"</u>	<u>700</u>	<u>710</u>

Perforations:
Type perforation 5.5 304 wire wrapped
Size perforation 100 Size Size
From 460 feet to 700 feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

Surface Seal: Yes No Seal Type:
Depth of Seal 50' Neat Cement
Placement Method: Pumped Cement Grout
 Poured Concrete Grout

Gravel Packed: Yes No
From 0 feet to 711 feet

9. WATER LEVEL
Static water level 380 feet below land surface
Artesian flow NO G.P.M. _____ P.S.I. _____
Water temperature 144 WARM Quality NA

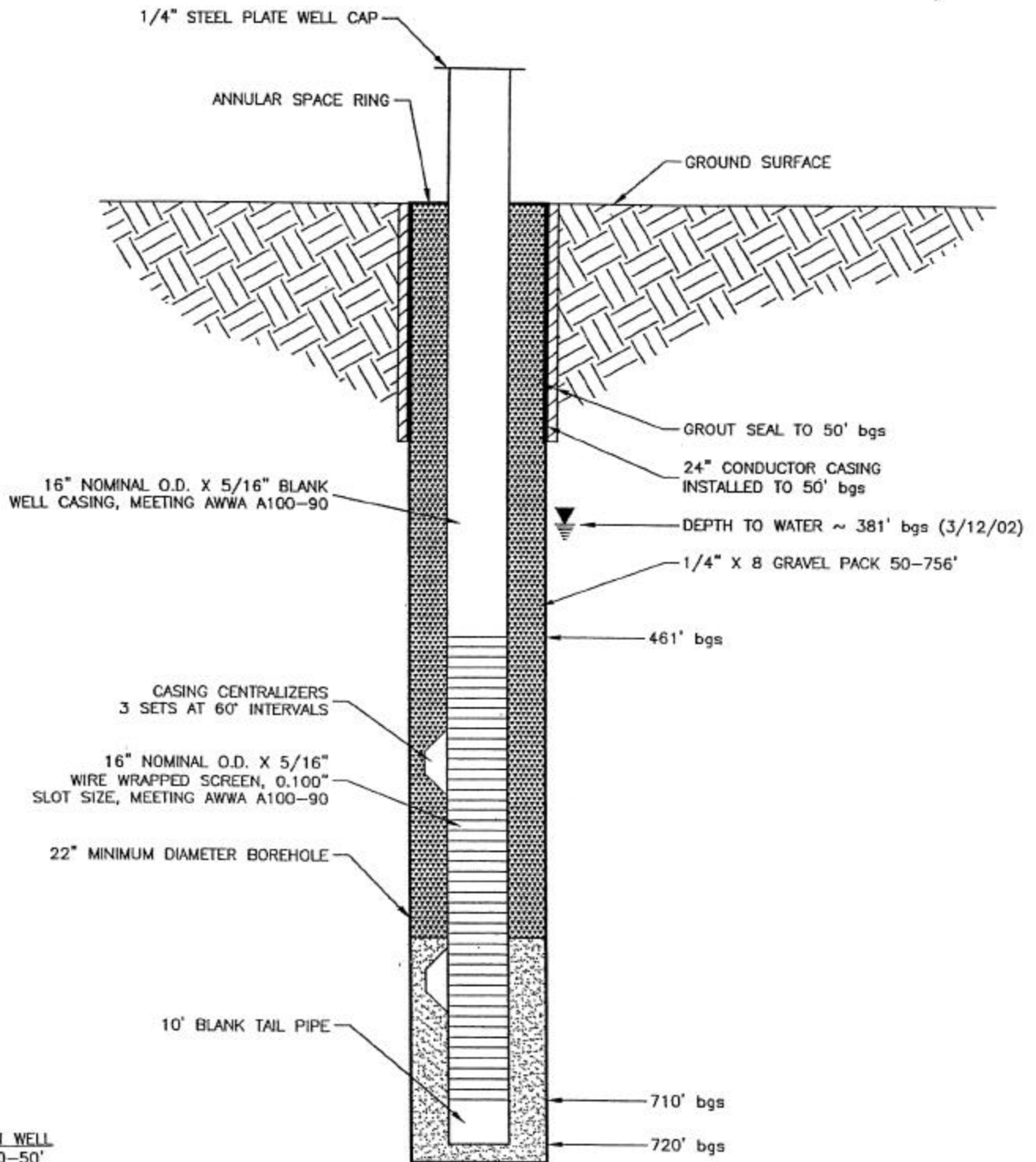
10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name Wayne Weston Contractor
Address 12030 E Riggs Road Contractor
Chandler, Arizona 85245
Nevada contractor's license number issued by the State Contractor's Board 19101
Nevada driller's license number issued by the Division of Water Resources, the on-site driller 1887
Signed Lowell Stephen Clow
By driller performing actual drilling on site or contractor
Date 2-25-02

Date started 2-4-02, 1902
Date completed 2-25-02, 1902

7. WELL TEST DATA

TEST METHOD: Bailer Pump Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
<u>150</u>	<u>NA</u>	<u>4.5</u>



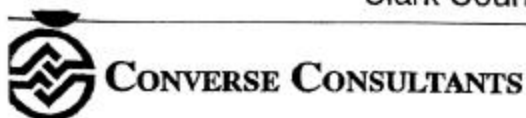
EXPLORATION WELL

Conductor: 0-50'
 Blank: 0-461'
 Screen (0.100"slot): 461-710'
 Blank and End Plug: 710-720'

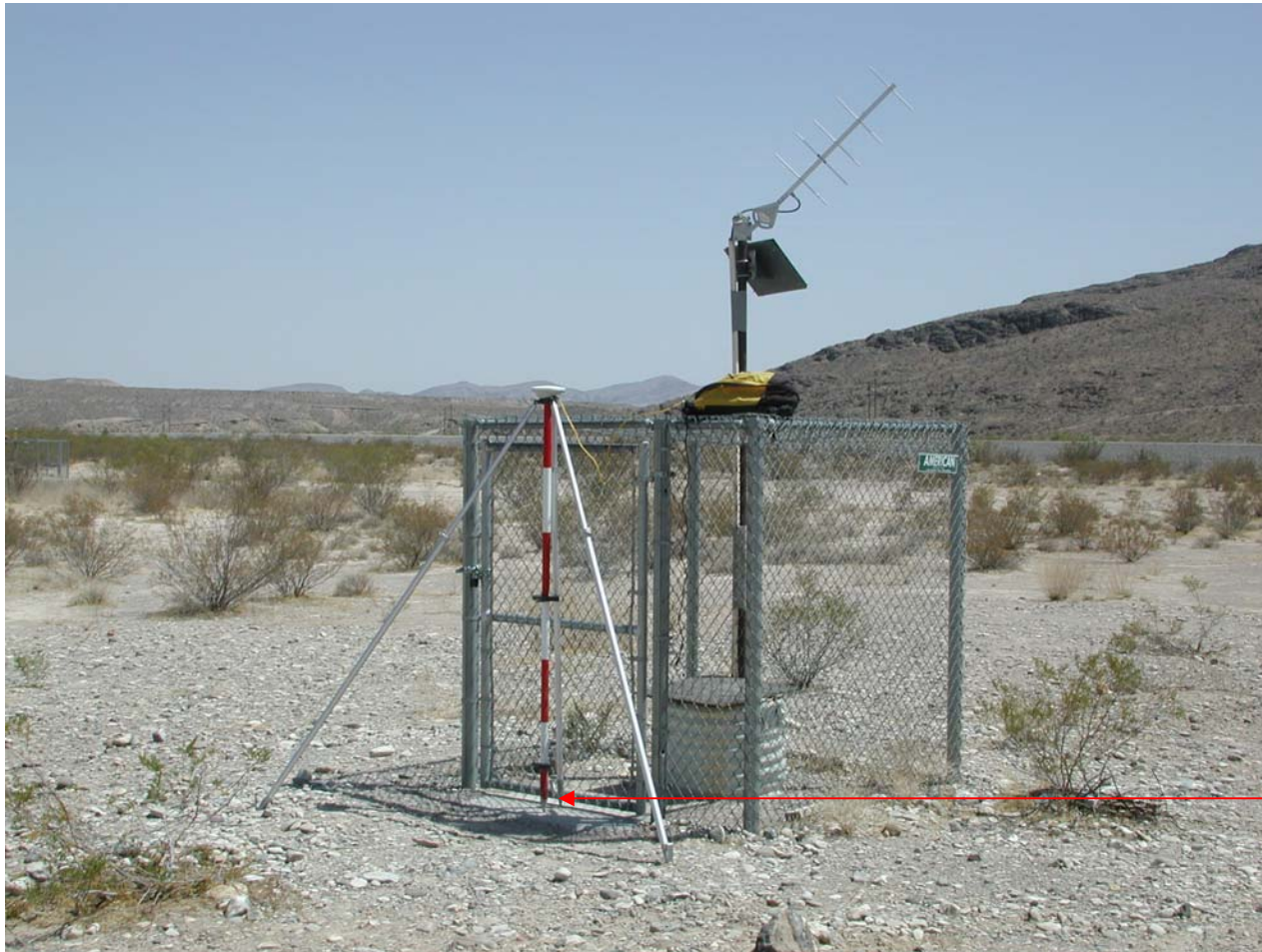
AS-BUILT RW-2 WELL CONSTRUCTION

NEVADA POWER COMPANY
 Coyote Spring Valley
 Clark County, Nevada

Scale	N.T.S.	File No.	44201003
Date	5/16/02	Project No.	01-33442-01
Drafted By	GLE	Drawing No.	
Checked By	JMD		
Approved By			



Over 50 Years of Dedication
 in Engineering and
 Environmental Sciences



Survey measurement point is an 'X' etched in concrete at the gate. DTW MP is at the top of casing vault.

Gathering GPS data on MX-4 (CE-DT-4) Well in Coyote Spring Valley

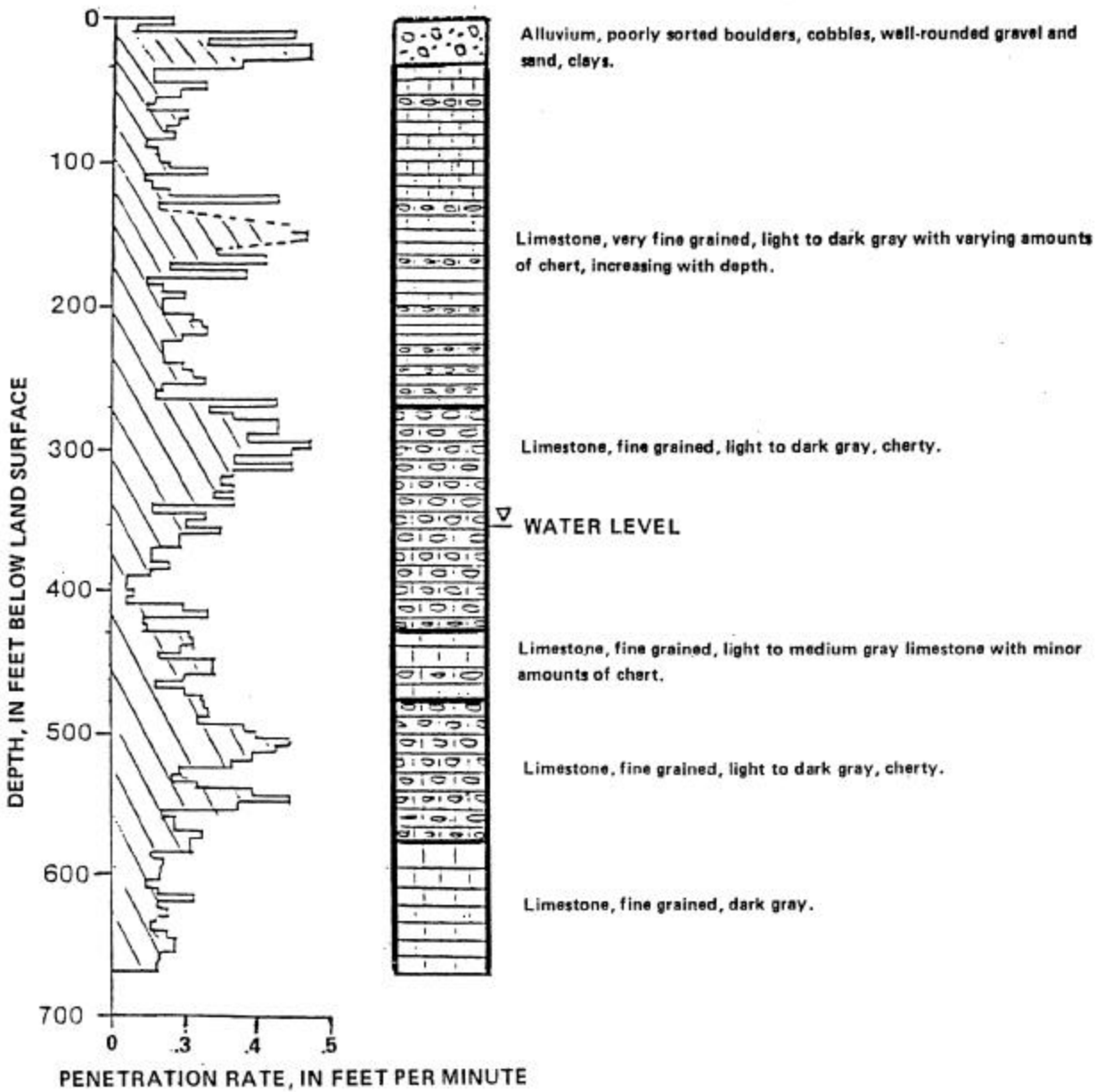
CE-DT-4

Wells CE-DT-4 and CE-DT-5 are in Coyote Spring Valley, Clark County, and are adjacent to State Route 168 approximately 3 miles east of the intersection of U.S. Highway 93 and State Route 168 (figure 1). CE-DT-4 is located approximately 300 feet west of CE-DT-5. The well sites are in the southeasterly draining Pahrangat Wash and just north of the Arrow Canyon Range.

Drilling began on CE-DT-4 on November 20, 1980. Limestone bedrock was penetrated at 30 feet below land surface, and a total depth of 669 feet was attained on December 6, 1980, when circulation loss terminated the drilling. The water table was reached at 352 feet below land surface. Due to vertical deviation of the well, cement was installed from 20 feet to the surface, drilled with a 7-7/8-inch-diameter milltooth tricone bit, and reamed with a 17-1/2-inch-diameter button bit. Three feet of 16-inch casing was set at the surface to facilitate sampling. Ten-inch-diameter surface casing was installed from 0 to 50 feet; the remainder of the hole was uncased. The drilling penetration rate and lithologic log are shown in figure 11. Figure 12 shows the geophysical well logs for the hole.

Well CE-DT-4 was tested in December 1980 by Hydro Search, Inc. The well was developed by surging five times with the drill-rig airlift at 1,100 ft³/min before a pump was set. Details of the pump setup are not available. The test lasted 3 days and 5 hours, and the discharge rate was about 530 gal/min (figure 13). Recovery occurred within 2 minutes after the pump was turned off and only a few water-level measurements were made (figure 14). Water-level drawdowns during pumping and recoveries after the pump stopped are shown in table 7. CE-DT-4 was also used as an observation well when aquifer tests were made at CE-DT-5.

(Source: Berger and others, 1988).



-Drilling penetration rate and lithology for MX test well CE-DT-4.
 (Source: Berger and others, 1988).

CE-DT-A

WELL DRILLERS REPORT

Please complete this form in its entirety

1. OWNER U. S. Gov. Air Force ADDRESS MX Ballistic Missile Office
by Furgo Inc. 3777 Long Beach Blvd. Long Beach California MX-4
 2. LOCATION SE 1/4 SE 1/4 Sec. 23 T. 13 N/S R. 63 E Clark County _____
 PERMIT NO. _____

3. TYPE OF WORK
 New Well Recondition
 Deepen Other
 4. PROPOSED USE
 Domestic Irrigation Test
 Municipal Industrial Stock
 5. TYPE WELL
 Cable Rotary
 Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
Alluvium		0	8	8
Tan Clay		8	20	12
Limestone		20	80	60
Limestone w/ Chert		80	270	190
Cherty Limestone	400	270	430	160
Limestone		430	480	50
Cherty Limestone		480	580	100
Limestone		580	669	89

8. WELL CONSTRUCTION
 Diameter hole 9 7/8" inches Total depth 669 feet
 Casing record 0 to 50 feet
 Weight per foot _____ Thickness _____

Diameter	From	To
<u>10.10</u> inches	<u>0</u> feet	<u>50</u> feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet

 Surface seal: Yes No Type Neat Grout
 Depth of seal 50 feet
 Gravel packed: Yes No
 Gravel packed from _____ feet to _____ feet
 Perforations:
 Type perforation _____
 Size perforation _____
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet

Date started November 20, 1980
 Date completed December 12, 1980

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
 G.P.M. _____ Draw down _____ feet _____ hours
 G.P.M. _____ Draw down _____ feet _____ hours
 G.P.M. _____ Draw down _____ feet _____ hours

9. WATER LEVEL
 Static water level 354 Feet below land surface 2180
 Flow _____ G.P.M.
 Water temperature 90 ° F. Quality _____

10. DRILLERS CERTIFICATION
 This well was drilled under my supervision and the report is true to the best of my knowledge.
 Name Don Peskcka
 Address 787 S. 950 W. Woods Cross, UT
 Nevada contractor's license number _____
 Nevada driller's license number 1235
 Signed _____
 Date _____

Permit No. 22-449
Basin

CE-DT-4

WELL DRILLERS REPORT

Please complete this form in its entirety

1. OWNER U.S. Government Air Force ADDRESS MX Ballistic Missile Office
by Fugro Inc - 377 Long Beach Blvd Long Beach Calif

2. LOCATION S. East 1/4 S. East 1/4 Sec 50 T13 N13 R63 E Clark County
PERMIT NO. at Coyote Springs

3. TYPE OF WORK
New Well Recondition
Deepen Other

4. PROPOSED USE
Domestic Irrigation Test
Municipal Industrial Stock

5. TYPE WELL
Cable Rotary
Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
ALLUVIUM		0	8	8
TAN CLAY		8	20	12
LIMESTONE		20	80	60
LIMESTONE chert		80	270	190
CHERTY LIMESTONE	400	270	430	160
LIMESTONE		430	480	50
CHERTY LIMESTONE		480	580	100
LIMESTONE		580	669	89

(SEE the attached lithologic log from Fugro and associates)

(Tests were not completed on this well until Jan 1981)

8. WELL CONSTRUCTION
Diameter hole 9 7/8 inches Total depth 669 feet
Casing record 0 to 58 FT
Weight per foot _____ Thickness 1/4"

Diameter	From	To
<u>10.10</u> inches	<u>0</u> feet	<u>58</u> feet
<u>13 3/4</u> inches	<u>0</u> feet	<u>53</u> feet
<u>10</u> inches	<u>casing</u> feet	<u>53</u> feet
<u>7 7/8</u> inches	<u>53</u> feet	<u>669</u> feet

Surface seal: Yes No Type Neat Grout
Depth of seal 50 FT feet
Gravel packed: Yes No
Gravel packed from _____ feet to _____ feet

Perforations:
Type perforation _____
Size perforation _____
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

Date started 11-20, 1980
Date completed 12-12, 1980

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
SEE attached copy of tests made by Rhodes Bros.			

BAILER TEST

G.P.M. _____	Draw down _____ feet	_____ hours
G.P.M. _____	Draw down _____ feet	_____ hours
G.P.M. _____	Draw down _____ feet	_____ hours

9. WATER LEVEL
Static water level 354 Feet below land surface 4150
Flow _____ G.P.M.
Water temperature 90 ° F. Quality _____

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Don Pericha
Address 287 So. 950 West 2000 Cross St
Nevada contractor's license number REDACTED
Nevada driller's license number 1235
Signed Don Pericha
Date 12-15-80



Survey measurement point is an 'X' etched in the top of casing at DTW MP

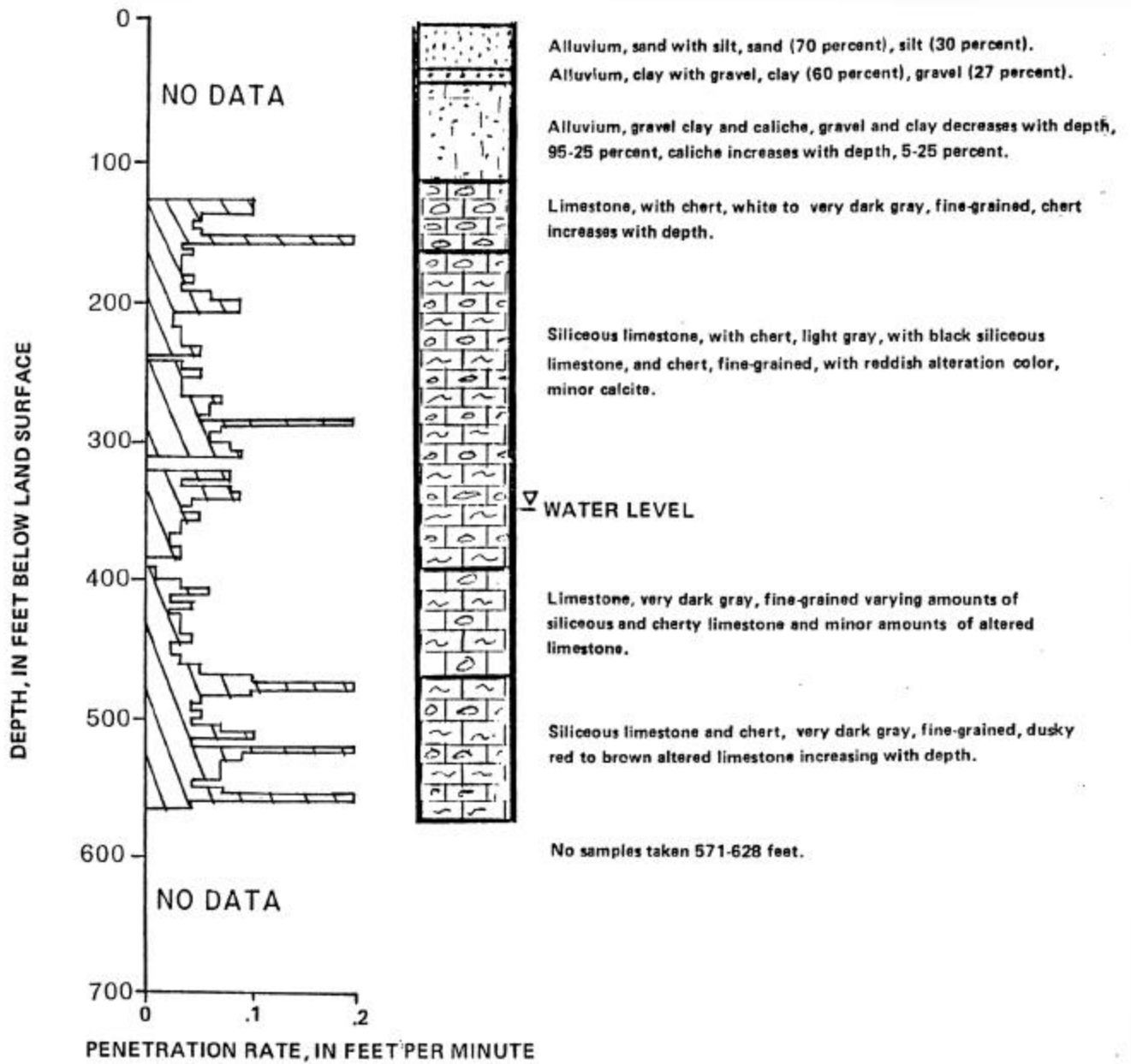
Gathering GPS data on MX-5 (CE-DT-5) Well in Coyote Spring Valley

CE-DT-5

See section on well CE-DT-4 for location of this well. Drilling began on CE-DT-5 on April 13, 1981. It was completed on May 6, 1981, at a total depth of 628 feet. Limestone bedrock was reported at 110 feet and the water table was reached at 350 feet below land surface. The well was cased with 20-inch-diameter steel casing and cemented to 126 feet. Frequent loss of circulation of drilling fluid was recorded. Two zones of significant circulation loss were encountered at 387 feet and 571 feet. The upper zone was cemented off and drilling continued through the lower zone until it became apparent that significant saturated fractures were penetrated. The drilling penetration rate and lithologic log for this well are shown in figure 15. A temperature log is shown in figure 16.

Well CE-DT-5 was tested during August and September of 1981. The well was developed by bailing 37 times. The bailer held 30.8 gallons. A vertical turbine pump with 10-inch-diameter discharge pipe was used in testing the well. The intake was set at 500 feet. Discharge was measured with orifice plates and a piezometer tube, and was piped 200 feet to an alluvial channel. Water levels were measured in the well and at observation well CE-DT-4 with a recording pressure transducer. Periodic checks were made by electric sounder and barometer to correct for atmospheric-induced drift. Water levels at six other observation wells and discharge at six springs were monitored daily but no effects due to pumping were discerned. The test, which was the eighth in a series of constant and step discharge tests, lasted 30 days and 3 hours, with a 3-hour shutdown for maintenance 13 days and 14 hours into the test. The initial increase in drawdown between 0.07 and 0.60 minutes, as shown in figure 17, represents the filling of the pump column before water from the formation was pumped. Table 8 and figure 17 present data from MX test well CE-DT-5, and table 9 and figure 18 present data from observation well CE-DT-4 during the testing at CE-DT-5.

(Source: Berger and others, 1988).



Drilling penetration rate and lithology for MX test well CE-DT-5.
 (Source: Berger and others, 1988).

(Well not completed -
to be completed after
test pumping.)

WELL DRILLERS REPORT

Please complete this form in its entirety

Log No. 22821

Permit No.

Basin

1. OWNER B. L. M. CE-DT-5 ADDRESS Dept. of Interior
Washington, D.C. (Ertec Western) 3771 Long Beach Blvd
Long Beach Calif. 90807 (213-426-2760)

2. LOCATION SE 1/4 SE 1/4 Sec. 23 T13S R62E Clark County
 PERMIT NO. TUP N5-81-31 - Page One R.03E

3. TYPE OF WORK
 New Well Recondition
 Deepen Other

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal Industrial Stock

5. TYPE WELL
 Cable Rotary
 Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
Silty Sand + Clay		0	30	30
Sand, clay + gravel		30	40	10
gravel, clay + fine stone		40	110	70
altared limestone + chert		110	380	270
limestone		380	460	80
Cherty limestone		460	571	111
drill blind		571	628	57

un-controlled circulation was encountered at 571' water level raised to 352.4'

surface casing 20" diameter set to a depth of 121' - 26" open hole to T.D of 628' - 17 1/2"

Surface casing was pressure grouted from bottom to top. This well has not been test pumped as of this date. When?

Completed this segment 5-6-81

8. WELL CONSTRUCTION

Diameter hole.....inches Total depth.....feet

Casing record.....

Weight per foot..... Thickness.....

Diameter	From	To
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet
.....inches	.....feet	.....feet

Surface seal: Yes No Type Pressure Grout

Depth of seal 121' feet

Gravel packed: Yes No

Gravel packed from.....feet to.....feet

Perforations:

Type perforation.....

Size perforation.....

From.....feet to.....feet

From.....feet to.....feet

From.....feet to.....feet

From.....feet to.....feet

From.....feet to.....feet

9. WATER LEVEL

Static water level 352.4 Feet below land surface 352.4'

Flow.....G.P.M.

Water temperature.....° F. Quality.....

Date started April 13, 1981

Date completed....., 19.....

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST

G.P.M. Draw down.....feethours

G.P.M. Draw down.....feethours

G.P.M. Draw down.....feethours

10. DRILLERS CERTIFICATION

This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Ivring Hullett

Address 9002 S Hardy Temp Og

Nevada contractor's license number 889

Nevada driller's license number 1289

Signed Ivring Hullett

Date 5-27-81

RECEIVED
 MAY 28 1981
 Div. of Water Resources
 Branch Office - Las Vegas, Nev.



Survey measurement point is at top of flange at the lid of 6" casing at white mark, the DTW MP

Gathering GPS data on Well DF-1 (Dutch Flat) in Coyote Spring Valley

DF-1

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 66237

Sequence No.: 44800

Permit No.:

Basin: 210

Notice of Intent#: 8995

Owner: AEROJET GENERAL CORP

Mailing/Well Address:

Location NE NW

Sec: 03

Twn: 12S

Rng: 63E

Ref: MD

State/Co. Code: 32

Waiver No:W-2043

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: X

Drilling Method H

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 170 feet

Construction Data Quality: G

Surface Casing Diameter: inches

Lithologic Data Quality: G

Cased To: feet

Aquifer Type:

Casing Reductions: 0

Date Started: 5/27/1992

Perforations:

Date Complete: 5/28/1992

From feet to feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals:

Pumping Water Level:

Depth of Seal: 150 feet

Specific Capacity:

Gravel Packed:

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: ft below LSD

General Remarks:

Water Temperature: ° F

Contractor Name: MITCHELL ENTERPRISES

Contractor License Number: 27030

Additional Remarks:

Address: 4250 S ARVILLE #262 LAS VEGAS NV

Contractor's Drlr No.:

Driller Lic.No.: 1475

Code Definitions

List of Wells in Garnet Valley

Site Name	Alias	Owner
GARNET WELL		NDOT
GV-1		Dry Lake Water, LLC
GV-2		Dry Lake Water, LLC
GV-MIRANT1	Mirant Production Well	Mirant Las Vegas, LLC
GV-PW-MW-1	Pinnacle MW-1	Gen West
GV-PW-MW-2	Pinnacle MW-2	Gen West
GV-RW1	NPC-Harvey Well Replacement	Nevada Power Company



Survey measurement point is top of aluminum lid on casing at pink mark, the DTW MP

Gathering GPS data on GARNET WELL in Garnet Valley



Carnet Well
210

Log No. 60605
Permit No. _____
Basin _____

WELL DRILLERS REPORT

Please complete this form in its entirety

1. OWNER State of Nevada ADDRESS Nevada St. Highway Dept.
P.O. Box 930
Reno, Nevada 89054

2. LOCATION N 1/4 NW 1/4 Sec. 7 T. 18 N/S R. 64 E Clark Count _____
PERMIT NO. _____

3. TYPE OF WORK
New Well Recondition
Deepen Other

4. PROPOSED USE
Domestic Irrigation Test
Municipal Industrial Stock

5. TYPE WELL
Cable Rotary
Other R.C.

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
clay & gravel		0	50	50
clay		50	150	100
clay & gravel		150	275	125
clay with streaks of limestone		275	335	60
clay & gravel		335	350	15
sandy clay		350	375	25
cemented gravel		375	500	125

8. WELL CONSTRUCTION
Diameter hole 18 inches Total depth 500 feet
Casing record _____
Weight per foot _____ Thickness _____

Diameter	From	To
<u>8</u> inches	<u>+1</u> feet	<u>500</u> feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet

Surface seal: Yes No Type concrete
Depth of seal 50 feet
Gravel packed: Yes No
Gravel packed from 50 feet to 500 feet

Perforations:
Type perforation Machine Cut
Size perforation 1/8" x 3" 8 rows 6" center
From 350 feet to 500 feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

RECEIVED

SEP 13 1972

DIV. OF WATER RESOURCES
BRANCH OFFICE
LAS VEGAS, NEVADA

9. WATER LEVEL
Static water level 240 Feet below land surface
Flow _____ G.P.M.
Water temperature _____ ° F. Quality salty

Date started August 28 19 72
Date completed September 10 19 72

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
<u>2150</u>	<u>60</u>	<u>140</u>	<u>24</u>
_____	_____	_____	_____
_____	_____	_____	_____

Name PATRICK H. THOMPSON
Address 3215 Cinder Lane-Las Vegas, N
Nevada contractor's license number 4286
Nevada driller's license number 581
Signed Patrick H. Thompson
Date September 11, 1972

BAILER TEST
G.P.M. _____ Draw down _____ feet _____ hours
G.P.M. _____ Draw down _____ feet _____ hours
G.P.M. _____ Draw down _____ feet _____ hours

Survey measurement point is an 'X' on top of flange on vault casing, below the DTW MP; DTW MP is the top of inside casing



Well GV-1 in Garnet Valley prior to setting up a GPS data gathering station. The well has since been fenced.



Survey measurement point is top of casing at the DTW MP

Well GV-2 in Garnet Valley prior to setting up GPS data gathering station



Survey measurement point
is the top of 2" access
port at the DTW MP

Sean, taking notes during GPS data gathering on GV MIRANT1 (MIRANT-1) in Garnet Valley

PW - Production Well

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N	Log No.: 85894
Sequence No.: 65528	Permit No.: 68161T
	Basin: 216
	Notice of Intent#: 21092
Owner: LVVWD	
Mailing/Well Address: I-15 & HWY 93	
Location SE NE	Sec: 05 Twn: 18S Rng: 63E Ref: MD State/Co. Code: 32
Waiver No:	Parcel No.: Lot No.: Block No.:
Type of Work: N	Proposed Use: P Drilling Method R Subdiv. Name:
Source Agency: NV003	Well Construction
Depth to Bedrock:	Hole Depth: 2007 feet
Construction Data Quality: G	Surface Casing Diameter: 12 inches
Lithologic Data Quality: G	Cased To: 1979 feet
Aquifer Type:	Casing Reductions: 0
Date Started: 12/5/2001	Perforations:
Date Complete: 3/1/2002	From 1197 feet to 1979 feet
Yield 1000 G.P.M.	Perforation Length:
Draw Down: 138.64	Perforation Intervals: 6
After Hours Pump: 72	Depth of Seal: 300 feet
Pumping Water Level:	Gravel Packed: Y
Specific Capacity:	from 300 feet to 1979 feet
Test Method: P	Static Water Level: 754.95 ft below LSD
Work Type Remarks:	Water Temperature: 80.4° F
General Remarks:	Contractor Name: LANG EXPLORATORY DRILL
Additional Remarks:	Contractor License Number: 21976
	Address: 2286 W 1500 S SALT LAKE CITY UT 84119
	Contractor's Drlr No.:
	Driller Lic.No.: 1826

Code Definitions

MIRANT WEN

WHITE-DIVISION OF WATER RESOURCES
 OWNER-CLIENT'S COPY
 PINK-WELL DRILLER'S COPY

STATE OF NEVADA
 DIVISION OF WATER RESOURCES

OFFICE USE ONLY

PRINT OR TYPE ONLY
 DO NOT WRITE ON BACK

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

Log No. _____
 Permit No. _____
 Basin _____

NOTICE OF INTENT NO. 21092

1. OWNER Las Vegas Valley Water District ADDRESS AT WELL LOCATION I-15 & Hwy 93
 MAILING ADDRESS P.O. Box 34089 Apex Industrial Complex
Las Vegas, NV 89133

2. LOCATION SE 1/4 NE 1/4 Sec 5 T 18 N/R 63 E Clark County
 PERMIT NO. 68161-T N/A N/A
Issued by Water Resources Parcel No. Subdivision Name

3. WORK PERFORMED
 New Well Replace Recondition
 Deepen Abandon Other _____

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal/Industrial Monitor Stock

5. WELL TYPE
 Cable Rotary RVC
 Air Other _____

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Gravel, Limestone, Sand		0	100	100
Limestone, Silty Sand		100	160	60
Gravel, Limestone, Silty Sand		160	270	110
Limestone, Silty Sand		270	300	30
Gravel, Silty Sand		300	320	20
Fine Grain Gravel, Sand		320	330	10
Gravel, Limestone, silty Sand		330	410	80
Limestone, Silty Sand		410	480	70
Silty Clay & Gravel		480	530	50
Silty Clay & Limestone		530	540	10
Limestone & Silty Sand		540	580	40
Silty Clay		580	610	30
Limestone Bedrock		610	620	10
Brown Limestone		620	770	150
Gray Limestone		770	810	40
Limestone, Clay Stringer		810	890	80
Fractured Limestone		890	970	80
Dolomitized Limestone		970	1200	230
Fractured Limestone calcare veins		1200	1250	50
Black Limestone		1250	1355	105
Fractured black limestone		1355	1600	245
Brown Limestone calcare veins		1600	1620	20
Dark Brown Limestone		1620	1670	50
Brown Limestone calcare veins		1670	1745	75
Black Limestone		1745	1805	60
Gray Limestone calcare veins		1805	1885	80
Black Limestone calcare veins		1885	1935	50
Black Limestone		1935	2007	72

8. WELL CONSTRUCTION
 Depth Drilled 2007 Feet Depth Cased 1992 Feet

HOLE DIAMETER (BIT SIZE)

From	To
48 Inches	0 Feet 77 Feet
31 Inches	77 Feet 635 Feet
19 Inches	635 Feet 2007 Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight/Pt. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
36		375	0	77
26		375	0	635
12		375	+2	1197

Perforations:
 Type perforation Lowered Screen
 Size perforation 100 inch slot

From	feet to	feet
From 1197	feet to 1257	feet
From 1337	feet to 1397	feet
From 1437	feet to 1638	feet
From 1678	feet to 1738	feet
From 1798	feet to 1879	feet
From 1939	feet to 1979	feet

Surface Seal: Yes No Seal Type:
 Near Cement
 Cement Grout
 Concrete Grout

Depth of Seal 300

Placement Method: Pumped
 Poured

Gravel Packed: Yes No
 From 300 feet to 1979 feet

9. WATER LEVEL
 Static water level 754.95 feet below land surface
 Artesian flow N/A G.P.M. N/A P.S.I.
 Water temperature 80.4 °F Quality _____

10. DRILLER'S CERTIFICATION
 This well was drilled under my supervision and the report is true to the best of my knowledge.
 Name Lang Exploratory Drilling
Contractor
 Address 2745 W. California Ave.
Contractor
Salt Lake City, UT 84104
 Nevada contractor's license number 0021976
 issued by the State Contractor's Board
 Nevada driller's license number issued by the 1826
 Division of Water Resources, the on-site driller
 Signed Russell Carlson
By driller performing actual drilling on site or contractor
 Date MARCH 8, 2002

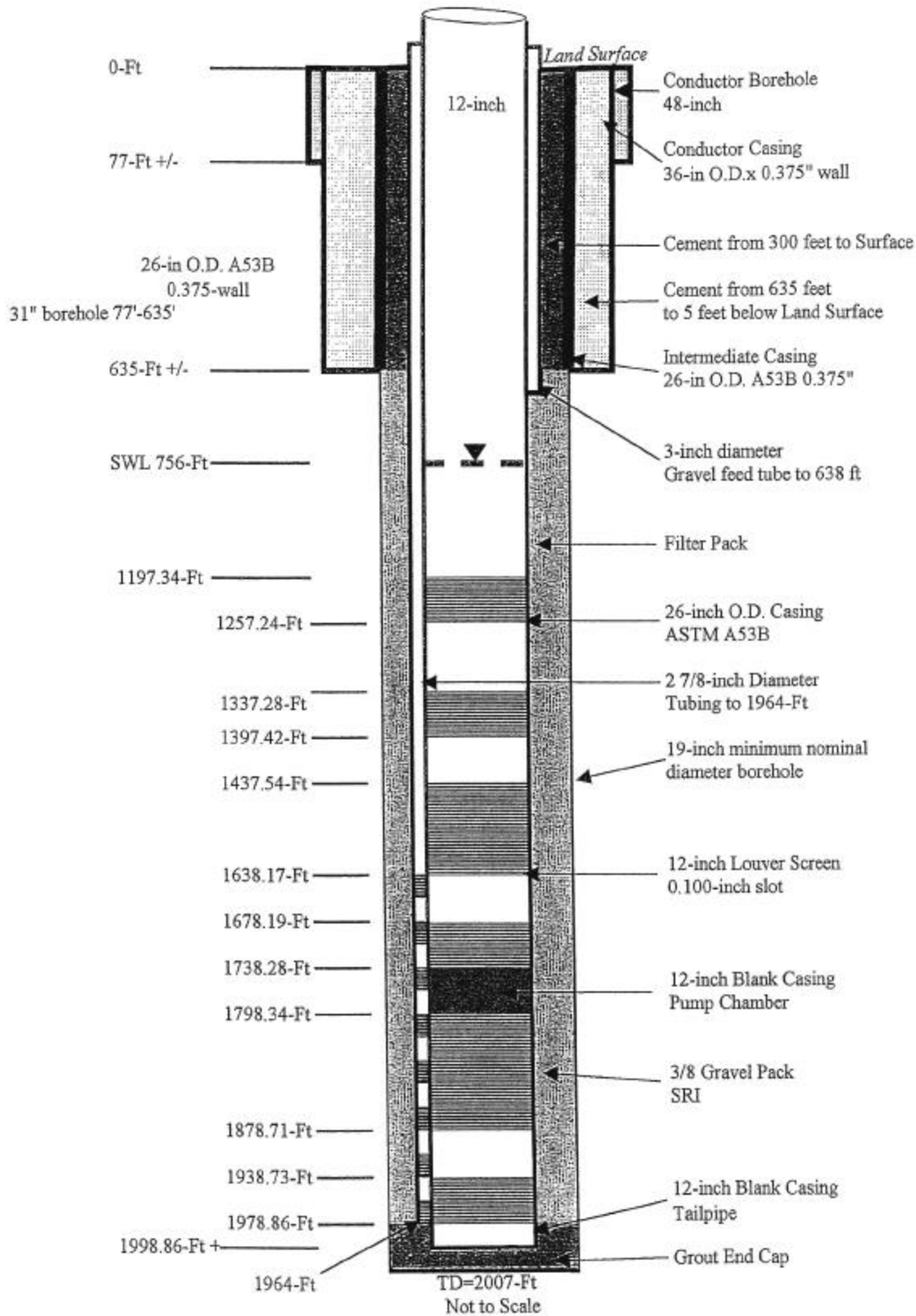
Date started December 5
 Date completed March 1

7. WELL TEST DATA

TEST METHOD: Bailor Pump Air Lift

	G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
Pumped	1000	138.64	72

MIRANT LAS VEGAS, LLC
GARNET VALLEY WELL No. 3
PRODUCTION WELL SCHEMATIC
 NE 1/4 of the NE 1/4 of Section 5, Township 18 South, Range 63 East





Survey measurement point is an "X" on west side of concrete pad; DTW MP is top of 2" casing inside vault

Preparing to set up a GPS data gathering station on Well GV-PW-MW1 in Garnet Valley

STATE OF NEVADA
DIVISION OF WATER RESOURCES
WELL DRILLER'S REPORT

OFFICE USE ONLY
Log No. _____
Permit No. _____
Basin _____

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

NOTICE OF INTENT NO. 22192

1. OWNER GEN WEST LLC ADDRESS AT WELL LOCATION 4 MILES W. OF I-15 ON HWY 93 1/2 MILES S. OF HWY 93
MAILING ADDRESS P.O. Box 52299 MS 8707 Phoenix, AZ 85072-3999
2. LOCATION NW 1/4 SW 1/4 Sec 4 T 18 N R 63 E CLARK County
PERMIT NO. 54073

3. WORK PERFORMED
 New Well Replace Recondition
 Deepen Abandon Other _____

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal/Industrial Monitor Stock

5. WELL TYPE
 Cable Rotary RVC
 Air Other _____

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
ALLUVIAL GRAVEL		0'	10'	10'
CLAY LIMESTONE		10'	50'	40'
GRAY MARGINAL LIMESTONE		50'	180'	130'
SANDY LIMESTONE		150'	210'	60'
WHALEBONE LIMESTONE		210'	340'	130'
SLT. LIMESTONE		340'	520'	180'
SANDY LIMESTONE WITH CONCH SHELLS	927'	520'	920'	400'
MARGINAL LIMESTONE		950'	1050'	100'
BLUE GRAY LIMESTONE		1050'	1180'	130'
GRAY MARGINAL LIMESTONE		1120'	1470'	350'
1" DIAMETER & WATER LIMESTONE	1470'	1470'	1500'	30'

8. WELL CONSTRUCTION
Depth Drilled 1500 Feet Depth Cased 1500 Feet

HOLE DIAMETER (BIT SIZE)
From To
12" Inches 0' Feet 50' Feet
8" Inches 50' Feet 980' Feet
7 7/8" Inches 980' Feet 1500' Feet

CASING SCHEDULE

Size O.D. (Inches)	Weight (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
<u>2"</u>		<u>1CS</u>	<u>0'</u>	<u>1500'</u>

Perforations:
Type perforation SLOTTED
Size perforation 0.30
From 900' feet to 1500' feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet
From _____ feet to _____ feet

Surface Seal: Yes No Seal Type:
Depth of Seal 30' Neat Cement
Placement Method: Pumped Concrete Grout
 Poured Concrete Grout

Gravel Packed: Yes No
From 860' feet to 1200' feet

9. WATER LEVEL
Static water level 692' feet below land surface
Artesian flow _____ G.P.M. _____ P.S.I.
Water temperature _____ °F Quality _____

Date started 12-19-01
Date completed 1-22-02

7. WELL TEST DATA

TEST METHOD: Bailer Pump Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)
<u>50</u>		<u>1 HR</u>

10. DRILLER'S CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.

Name LAYNE CHRISTENSEN Contractor
Address 12030 E. RIVER RD CHANDLER, AZ 85249
Nevada contractor's license number issued by the State Contractor's Board: 0019101 C-23
Nevada driller's license number issued by the Division of Water Resources, the on-site driller: 2133
Signed Nellie Kibel By driller performing actual drilling on site or contractor
Date 1-22-02



Survey measurement point is an "X" on west of concrete pad; DTW Mp is top of 2" casing inside vault

Well GV-PW-MW2 in Garnet Valley prior to setting up a GPS data gathering station

CrV - PW - MW - 2

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 85526

Sequence No.: 65157

Permit No.:

Basin: 216

Notice of Intent#: 22193

Owner: GEN WEST L L C

Mailing/Well Address: 4 MI W OF I15 & .8 MI S OF HWY 93

Location NW SE

Sec: 05

Twn: 18S

Rng: 63E

Ref: MD

State/Co. Code: 321

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: G

Drilling Method A

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 1500 feet

Construction Data Quality: G

Surface Casing Diameter: 2 inches

Lithologic Data Quality: G

Cased To: 1500 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 11/27/2001

Perforations:

Date Complete: 12/14/2001

From 940 feet to 1500 feet

Yield 75 G.P.M.

Perforation Length:

Draw Down:

After Hours Pump: 1

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 50 feet

Specific Capacity:

Gravel Packed: Y

Test Method: A

from 900 feet to 1500 feet

Work Type Remarks:

Static Water Level: 716 ft below LSD

General Remarks:

Water Temperature: ° F

Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

Additional Remarks:

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Drlr No.:

Driller Lic.No.: 2133

Code Definitions



Survey measurement point is top of 2" access port east of big casing taped at the DTW MP

Gathering GPS data on Well GV-RW1 (Harvey Well Replacement) in Garnet Valley

Permit No. 60022
Basin 216

PRINT OR TYPE ONLY
DO NOT WRITE ON BACK

WELL DRILLER'S REPORT

Please complete this form in its entirety in accordance with NRS 534.170 and NAC 534.340

NOTICE OF INTENT NO. 22189

1. OWNER Nevada Power Co ADDRESS AT WELL LOCATION I 15 and
 MAILING ADDRESS 622 West Sahara Av. New Highway 93
Las Vegas NV 17283 N Las Vegas Blvd

2. LOCATION NW 1/4 SW 1/4 Sec. 21 T. 19 N. R. 64 E Clark County
 PERMIT NO. 60022 083-20-000-002 parcel # covers sections 20 + 21
 Issued by Water Resources Parcel No. Subdivision Name

3. WORK PERFORMED
 New Well Replace Recondition
 Deepen Abandon Other _____

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal/Industrial Monitor Stock

5. WELL TYPE
 Cable Rotary RVC
 Air Other _____

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thickness
Hard clay + Gravel		0	10	10
clay		10	60	50
clay with gravel		60	70	10
clay		70	120	50
clay		120	170	50
clay		170	220	50
clay		220	270	50
clay		270	320	50
clay		320	370	50
clay		370	420	50
clay		420	470	50
clay		470	500	30
clay and limestone		500	520	20
limestone		520	570	50
lime stone with clay		570	580	10
limestone		580	670	90
limestone		670	680	10
limestone		680	730	50
limestone with some clay		730	780	50
limestone		780	830	50
limestone		830	850	20
limestone		850	870	20
limestone		870	890	20
lime stone		890	903	13

decide to abandon
see log # 83302 for abandonment

8. WELL CONSTRUCTION
 Depth Drilled 903 Feet Depth Cased _____ Feet

HOLE DIAMETER (BIT SIZE)

Inches	From	To	Feet
<u>30"</u>	<u>0</u>	<u>45</u>	<u>45</u>
<u>17 1/2"</u>	<u>45</u>	<u>903</u>	<u>903</u>

CASING SCHEDULE

Size O.D. (Inches)	Weight/Ft. (Pounds)	Wall Thickness (Inches)	From (Feet)	To (Feet)
<u>20"</u>		<u>.275</u>	<u>0</u>	<u>45</u>
<u>12</u>			<u>45</u>	<u>903</u>

descend to abandon

Perforations:
 Type perforation _____
 Size perforation _____

From	feet to	feet
From _____	feet to _____	feet
From _____	feet to _____	feet
From _____	feet to _____	feet
From _____	feet to _____	feet
From _____	feet to _____	feet

Surface Seal: Yes No Seal Type: Neat Cement
 Cement Grout
 Concrete Grout

Depth of Seal _____

Placement Method: Pumped
 Poured

Gravel Packed: Yes No
 From _____ feet to _____ feet

9. WATER LEVEL
 Static water level _____ feet below land surface
 Artesian flow _____ G.P.M. _____ P.S.I.
 Water temperature _____ °F Quality _____

10. DRILLER'S CERTIFICATION
 This well was drilled under my supervision and the report is true to the best of my knowledge.

Name Hayne Contractor
 Address 12030 East Riggs Road
Chandler AZ. 85249
 Nevada contractor's license number 19101
 issued by the State Contractor's Board.
 Nevada driller's license number issued by the 1339
 Division of Water Resources, the on-site driller.
 Signed Roy Miller
 By driller performing actual drilling on site or contractor
 Date 5-19-01

Date started April 22 2001
 Date completed May 17 2001

7. WELL TEST DATA

TEST METHOD: Bailer Pump Air Lift

G.P.M.	Draw Down (Feet Below Static)	Time (Hours)

Stamp: JUL 4 2001

Nevada Division of Water Resources

Well Log Database

RW-1

Query Results

Type of Site: N

Log No.: 83508

Sequence No.: 62251

Permit No.: 60022

Basin: 216

Notice of Intent#: 22197

Owner: NEVADA POWER COMPANY

Mailing/Well Address: 17283 N LAS VEGAS BLVD

Location NW SW

Sec: 21

Twn: 17S

Rng: 64E Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.: 083-20-000-002

Lot No.:

Block No.:

Type of Work: S

Proposed Use: P

Drilling Method R

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 870 feet

Construction Data Quality: G

Surface Casing Diameter: 12 inches

Lithologic Data Quality: G

Cased To: 833 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 6/7/2001

Perforations:

Date Complete: 7/3/2001

From 553 feet to 833 feet

Yield 90 G.P.M.

Perforation Length:

Draw Down: 2

After Hours Pump: 45

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: 500 feet

Specific Capacity:

Gravel Packed: Y

Test Method: A

from 500 feet to 870 feet

Work Type Remarks:

Static Water Level: 260 ft below LSD

General Remarks:

Water Temperature: 83° F

Additional Remarks:

Contractor Name: LAYNE CHRISTENSEN CO

Contractor License Number: 19101

Address: 12030 E RIGGS RD CHANDLER AZ 85

Contractor's Dlr No.:

Driller Lic.No.: 1339

Code Definitions

List of Wells in Hidden Valley

Site Name	Alias	Owner
SHV-1*	363308114553001	Dry Lake Water

* Could not obtain drill log



Survey measurement point is an 'X' on southeast corner of concrete pad; DTW MP is top of casing inside vault.

Well SHV-1 in Hidden Valley prior to setting up a GPS data gathering station

SHV-1

Well SHV-1 in Hidden Valley, Clark County, is adjacent to U.S. Highway 93, approximately 16.5 miles south of the intersection of U.S. Highway 93 and State Route 168 (figure 1).

This well was drilled sometime before 1958 on U.S. Bureau of Land Management land, apparently for use as a stock well, and is now abandoned. The well was plugged above the water table until the Geological Survey redrilled it to a depth of 920 feet in December 1985. The water table is 832.3 feet below the land surface. The caliper log indicates 5-inch-diameter casing to a depth of 45 feet and 6-inch uncased hole below. The drilling history and well construction are unknown. Geophysical well logs of this well are shown in figure 28.

(Source: Berger and others, 1988).

List of Wells and Stream Gages in the Muddy River Springs Area

Site Name	Alias	Owner
ABBOTT	UM7	Nevada Power Company
BEHMER-MW	Behmer monitoring well	Nevada Power Company
CSV-1	364601114554401	USGS
CSV-2	364650114432001	USGS
EH-4		Nevada Power Company
EH-5B		Nevada Power Company
IVERSON FLUME	09415927	Joint*
LDS CENTRAL	UM49	Nevada Power Company
LDS EAST	UM50	Nevada Power Company
LDS WEST	UM18	Nevada Power Company
LEWIS 1 OLD	NPC Old; UM55	Nevada Power Company
LEWIS 2M	UM74	Nevada Power Company
LEWIS NORTH	UM45	Nevada Power Company
LEWIS SOUTH	UM43	Nevada Power Company
MUDDY SPRING GAGE	09415900	Joint*
MX-6	CE-DT-6; 364604114471301	Moapa Valley Water District
PEDERSON SPRING GAGE	09415910	Joint*
PERKINS OLD	UM15	Nevada Power Company
PEDERSON EAST GAGE	Playboy Pool Gage; 09415908	Joint*
WARM SPRINGS WEST GAGE	09415920	Joint*

* Funded and installed by any combination of these agencies:

Moapa Valley Water District
 Nevada Division of Water Resources
 Nevada Power Company
 Southern Nevada Water Authority
 U.S. Fish and Wildlife Service
 U.S. Geological Survey



Survey measurement point is top of brass monument on concrete pad; DTW MP is top of well casing inside vault

ABBOTT Well in Muddy River Springs Area prior to setting up GPS station

DIVISION OF WATER RESOURCES

WELL DRILLERS REPORT

Please complete this form in its entirety

Log No.
Permit No. 28523
Basin

1. OWNER: Stowell Abbott ADDRESS: Moapa, Nevada

2. LOCATION: NE 1/4 SW 1/4 Sec. 14 T. 14 N/S R. 65 E
PERMIT NO. 28523

3. TYPE OF WORK: New Well [X] Recondition []
4. PROPOSED USE: Domestic [] Irrigation [X] Test []
5. TYPE WELL: Cable [] Rotary [X]

LITHOLOGIC LOG table with columns: Material, Water Strata, From, To, Thickness. Includes handwritten entries like 'Top soil', 'Sand Clay', 'Clay', etc.

8. WELL CONSTRUCTION: Diameter hole 8 inches, Total depth 106 feet, Casing record, Weight per foot, Thickness 3/16, Perforations: Type slotted, Size 1/8, From 56 feet to 106 feet.

RECEIVED

MAY 1 1975

Div. of Water Resources
Branch Office - Las Vegas, Nev.

Date started: Test hole started April 1974
Date completed: May 4, 1975

7. WELL TEST DATA table with columns: Pump RPM, G.P.M., Draw Down, After Hours Pump. Includes handwritten values: 1800 RPM, 150 G.P.M.

BAILER TEST Air Compressing
G.P.M. 150 H.P.M. Draw down feet hours

9. WATER LEVEL: Static water level 8 ft, Feet below land surface, Flow G.P.M., Water temperature F, Quality

10. DRILLERS CERTIFICATION: This well was drilled under my supervision and the report is true to the best of my knowledge. Name: B. B. Drilling Co. Inc., Address: Beatty, Utah, License numbers: 7381, 739, Signed: Ronald B. ... May 11 1975

Log No. 219
Permit No. 25699
Basin 219

Abbott Well

WELL DRILLERS REPORT

Please complete this form in its entirety

NOTICE OF INTENT NO. 2255

PRINT OR TYPE ONLY

OWNER Nevada Power Co. ADDRESS AT WELL LOCATION Moapa
MAILING ADDRESS Post Office Box 230 Las Vegas, Nevada 89151

2. LOCATION SE 1/4 SW 1/4 Sec. 14 T. 14 S. R. 65 E Clark County

PERMIT NO. 25699 Issued by Water Resources Parcel No. Subdivision Name

3. TYPE OF WORK
New Well [X] Recondition []
Deepen [] Other []
4. COMMERCIAL PROPOSED USE
Domestic [] Irrigation [] Test []
Municipal [] Industrial [] Stock []
5. TYPE WELL
Cable [] Rotary [X]
Other []

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
Red clay		0	45	45
Sand, gravel & clay		45	60	15
Some clay, sand & gravel		60	80	20
Sand, gravel, boulders		80	100	20

8. WELL CONSTRUCTION
Diameter hole 17 1/2 inches Total depth 100 feet
Casing record
Weight per foot Thickness .375
Diameter 12 3/4 inches From +1 feet To 100 feet
Surface seal: Yes [X] No [] Type Cement
Depth of seal 25 feet
Gravel packed: Yes [X] No []
Gravel packed from 25 feet to 100 feet
Perforations:
Type perforation Hi-Cap Screen
Size perforation .080 slot
From 30 feet to 100 feet

RECEIVED

MAR 21 1986

Div. of Water Resources
Branch Office - Las Vegas, NV

Date started February 28, 19 86
Date completed March 19, 19 86

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump
	200	52	12

BAILER TEST
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours
G.P.M. Draw down feet hours

9. WATER LEVEL
Static water level 12 feet below land surface
Flow G.P.M. P.S.I.
Water temperature ° F. Quality

10. DRILLERS CERTIFICATION
This well was drilled under my supervision and the report is true to the best of my knowledge.
Name THOMPSON DRILLING CO., INC. Contractor
Address 4185 W. Harmon Las Vegas, Nevada 89103 Contractor
Nevada contractor's license number 4286A
Nevada contractor's drillers number 582
Nevada driller's license number 856 (Griffiths) Actual Driller
Signed Richard K. Thompson Contractor
Date March 20, 1986



Survey measurement
point is top of well
casing at DTW MP

Gathering GPS data on BEHMER-MW WELL in the Muddy River Springs Area

WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

Log No. 2737
 Date Jan 23 1958
 Well No. _____
 Permit No. 12244
 Do not fill in

Behmer Monitoring Well?

Owner Wale Perkins Driller Darrell Free

Address Mojave, Nevada Address Pioche, Nevada It. No. 30

Location of well: 23 14 65 Sec. 2, T. 15 N, R. 15 E, in Clark County

or Permit 12244 Certificate no. 4016 Field map no. 4

Water will be used for Irrigation Total depth of well 80'

Size of drilled hole 10" Weight of casing per linear foot _____

Thickness of casing 8 gauge Temp. of water _____

Diameter and length of casing 10" 80'
(Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter)

If flowing well give flow in c.f.m. or g.p.m. and pressure _____

If nonflowing well give depth of standing water from surface 8' 2"

If flowing well describe control works _____
(Type and size of valve, etc.)

Date of commencement of well January 17, 1958 Date of completion of well January 22, 1958

Type of well rig Behmer Drill

LOG OF FORMATIONS

From foot	To foot	Thickness foot	Type of material
0	20	20	sandy silt
20	32	12	blue clay
32	45	13	sandy clay - grey in color
45	80	35	gravel

Water-bearing Formation, Casing Perforations, Etc.

Chief aquifer (water-bearing formation)
 from 45 to 80 ft.

Other aquifers _____

First water at 10' 2" feet.

Casing perforated
 from 48 to 80 ft.

Size of perforations
5/8" x 2"

Co
 Cou
 ELL
 ry
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Survey measurement point is at the DTW MP, the top of broken 4" casing inside vault

Sean, setting up GPS station on Well CSV-1 in the Muddy River Springs Area

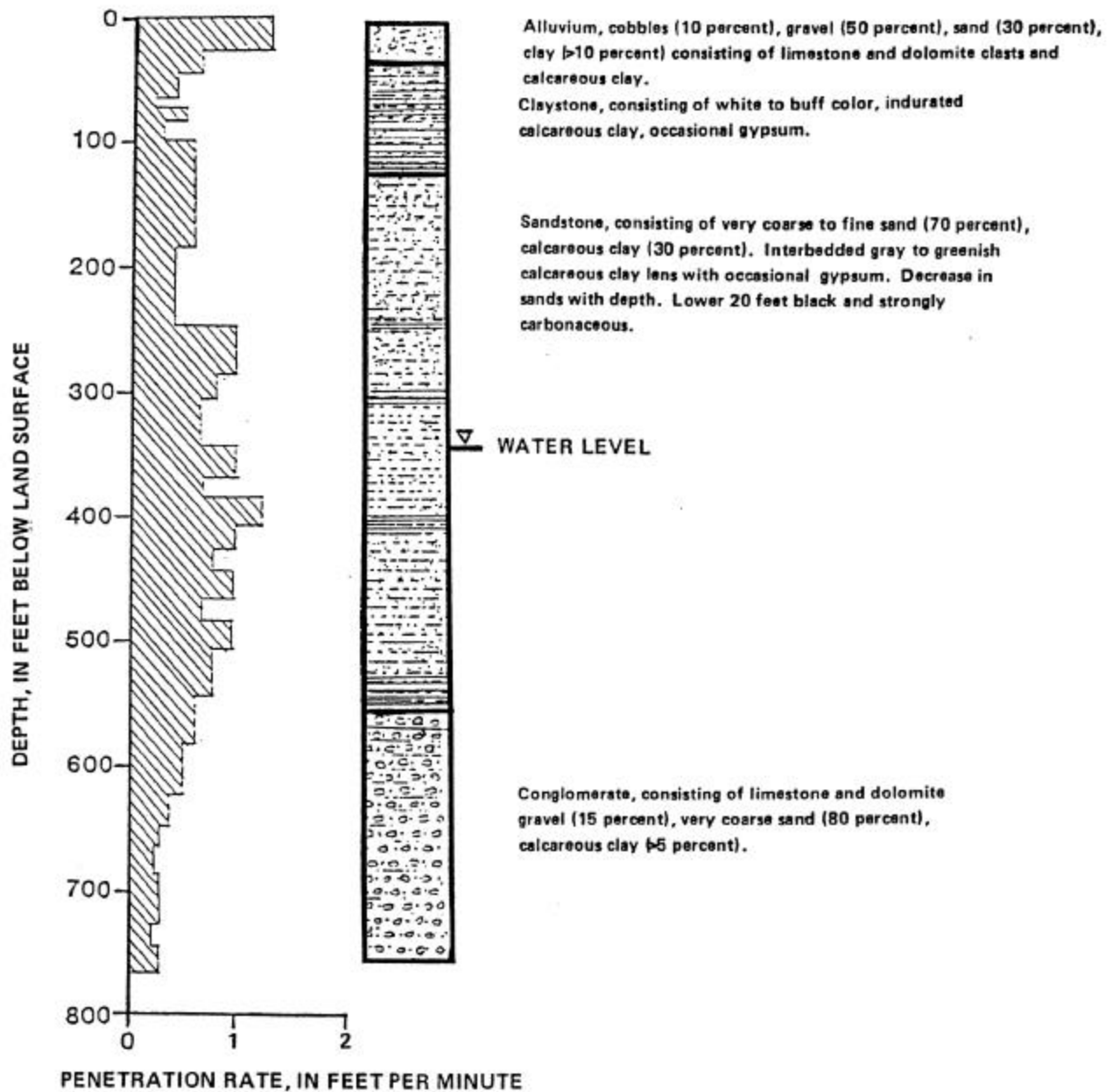
GEOHYDROLOGIC DATA FROM THE EIGHT WELLS

CSV-1

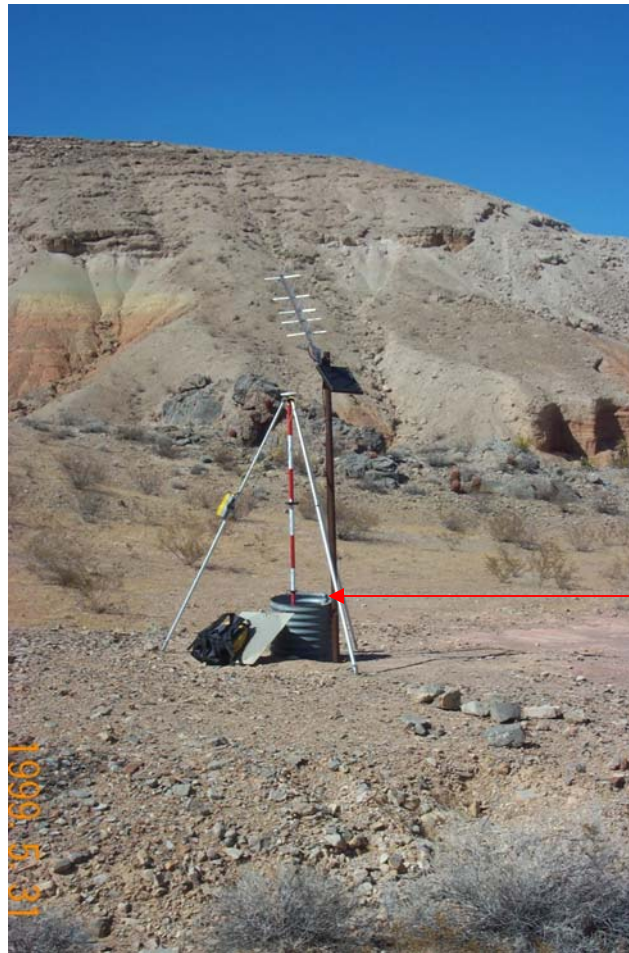
Well CSV-1 is in Moapa Valley, Clark County, and is approximately 1.5 miles south of the intersection of State Route 168 and an abandoned highway (figure 1). The well site is near the intersection of Wildcat Wash and Pahrangat Wash east of the northern edge of the Arrow Canyon Range.

The Geological Survey began drilling on October 10, 1985. The drill penetrated 765 feet of basin-fill sediments and reached ground water at approximately 344 feet below land surface. The drilling penetration rate and lithologic log are shown in figure 2. A shift in the natural gamma and neutron logs near 550 feet indicated possible bedrock and gave reason to attempt a core sample from the well bottom; however, no sample was recovered due to core-barrel damage. The well was cased with two polyvinyl chloride (PVC) piezometers: a 2-inch-diameter piezometer and a 4-inch-diameter piezometer (table 2). A bentonite plug was installed at a depth interval of 362 to 369 feet to prevent leakage along the 4-inch casing. The annulus was then filled with clean gravel pack from 362 feet to the surface plug. Geophysical logs for this well are presented in figure 3.

(Source: Berger and others, 1988).



Drilling penetration rate and lithology for U.S. Geological Survey test well CSV-1. (Source: Berger and others, 1988).



Survey measurement point is at top of 12" casing inside vault at green mark, the DTW MP

Gathering GPS data at Well CSV-2 in the Muddy River Springs Area

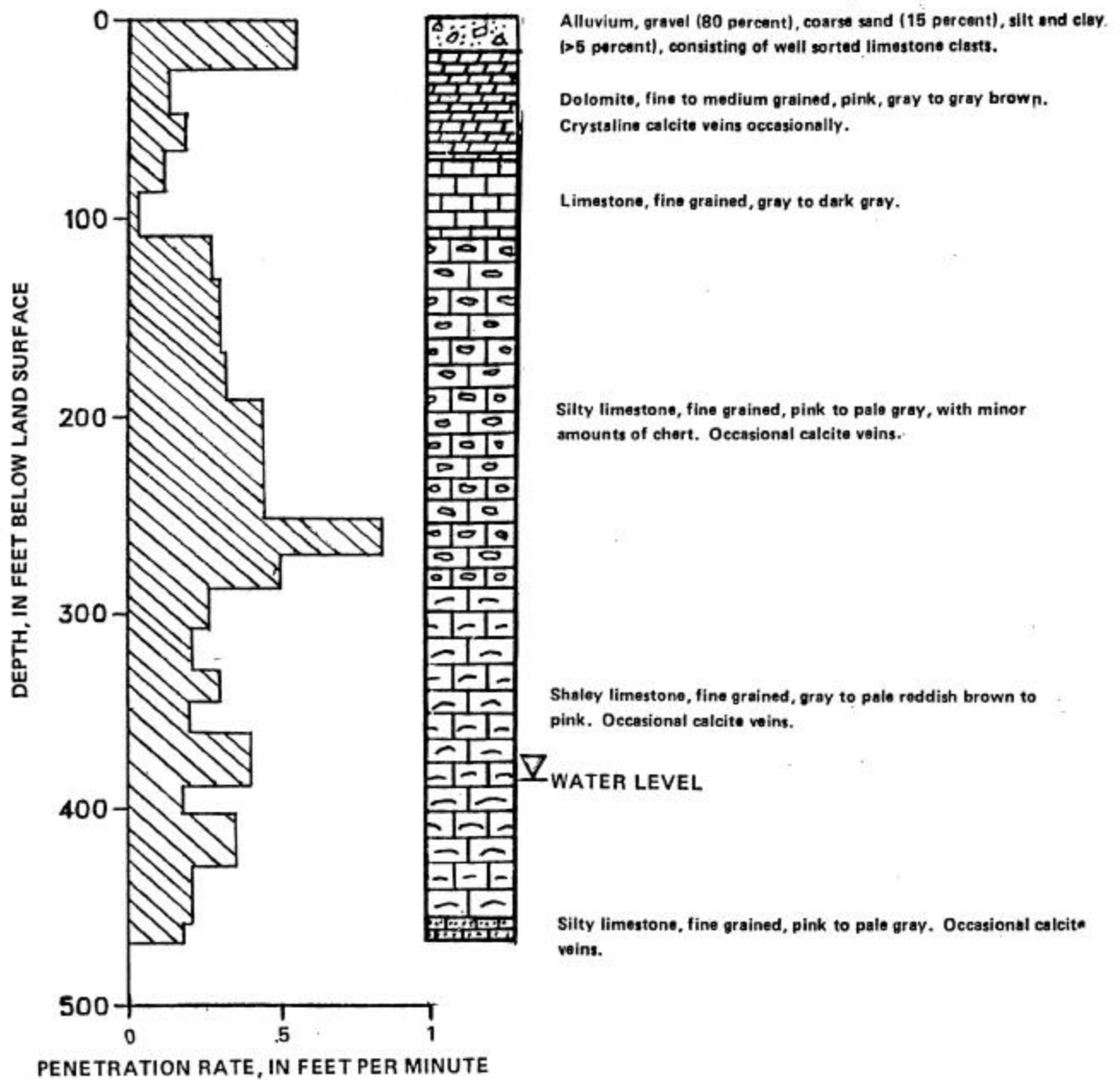
CSV-2

Well CSV-2 is in Moapa Valley, Clark County, and is approximately 3.2 miles north of the intersection of State Route 168 and Warm Springs Road (figure 1). The well site is in an unnamed drainage on the southwestern flank of the Meadow Valley Mountains and south of Farrier Wash.

The U.S. Geological Survey began drilling on October 23, 1985. Limestone bedrock was penetrated at 17 feet and the water table was reached at approximately 390 feet below land surface. Drilling continued through the limestone section until October 26, when the 8-foot-long drill bit and stem broke off at a depth of 478 feet, after penetrating a large fracture and dropping several feet. Numerous attempts to retrieve the bit and stem were unsuccessful. The well was cased to bedrock with 10-inch-diameter PVC. The drilling penetration rate and lithologic log are shown in figure 4. Geophysical logs are presented in figure 5.

An aquifer test for CSV-2 was made by the Geological Survey in June 1986. Prior to this test, the well was developed by pumping for 2 days at approximately 5,500 gal/d. A 20-horsepower, 6-inch-diameter submersible pump with a 3-inch-diameter discharge pipe was used for the test. The intake was set at 430 feet. A combined total-discharge and sweep-hand flow meter was installed in-line to measure well discharge. Discharge was piped 60 feet from the well to a small wash that transported flow from the site. Water levels were measured in the well with a recording pressure transducer set at 420 feet and calibrated on site. The drawdown test lasted 21 hours with a constant discharge of about 100 gal/min. Total recovery was observed within 1 hour of stopping the pump. Tables 5 and 6 and figures 6 and 7 present the test data.

(Source: Berger and others, 1988).



--Drilling penetration rate and lithology for U.S. Geological Survey test well CSV-2.
 (Source: Berger and others, 1988).



Survey measurement point is an 'X' etched on the flange at the DTW MP

Survey team setting up GPS data gathering station on Well EH-4 in the Muddy River Springs Area

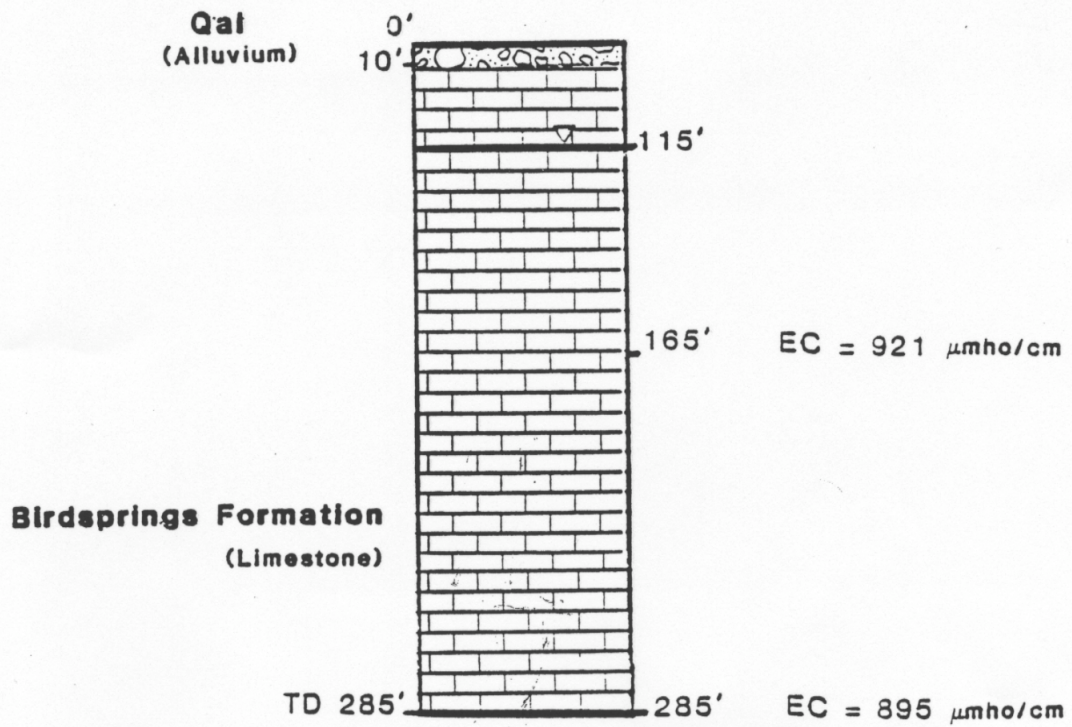
Exploration Hole EH-4

EH-4 was commenced on March 17, 1986. The purpose of this hole was to provide a monitoring well near the Muddy Springs in the carbonate aquifers. The hole was completed on March 19, 1986. The geologic formation encountered was limestone underlying fourteen-feet of limestone alluvium. The limestone unit is believed to be the Bird Spring formation. The total depth of the hole is 285 feet (see Figure 10).

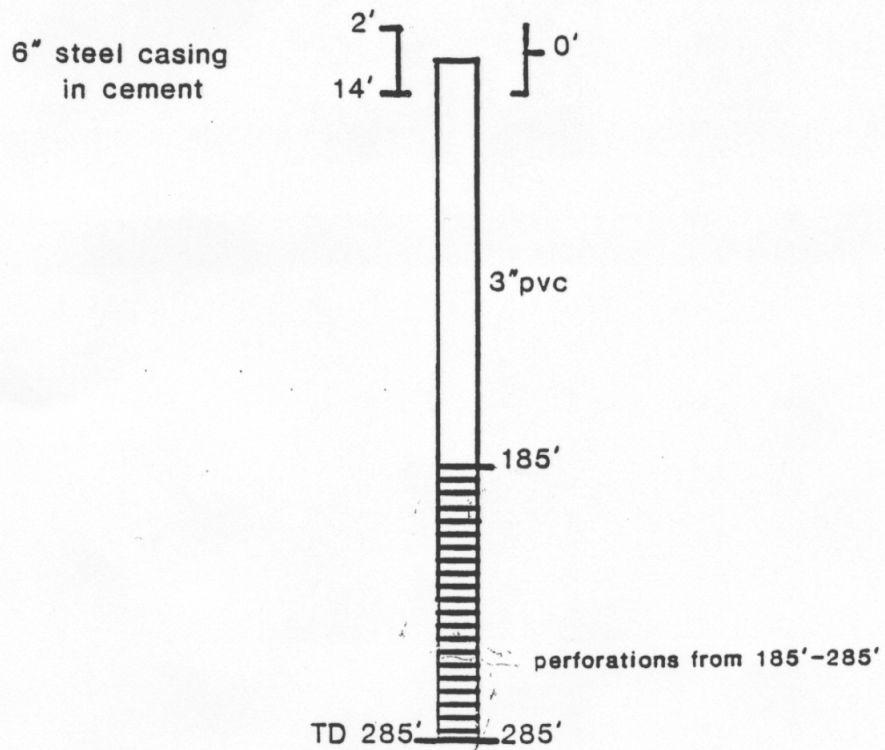
Static water level was measured at 115 feet below land surface. Ground water, during drilling operations, was first sampled at 165 feet. The entire hole was cased with three-inch PVC to 285 feet. The top fourteen-feet of the hole consists of cemented six-inch steel casing. Perforations are in the bottom 100 feet of the PVC casing (see Figure 11). Water quality was good throughout the hole. Electrical conductivity ranged from 895 to 921 μ -mhos. pH ranged from 8.15 to 8.46. Airlift flow rates ranged from 10 to 50 gpm.

The hole was drilled without mud, using reverse circulation as the drilling method. The hole is now being monitored for water level changes with a chart recorder.

(Source: Desert Research Institute, 1986)



Well Log for EH-4.
 (after Desert Research Institute, 1986)



Well Diagram of EH-4.

(after Desert Research Institute, 1986)



Survey measurement point is an 'X' on flange of welded metal plate at DTW MP

Gathering GPS data on Well EH-5B in Muddy River Springs Area

Exploration Holes EH-5a and b

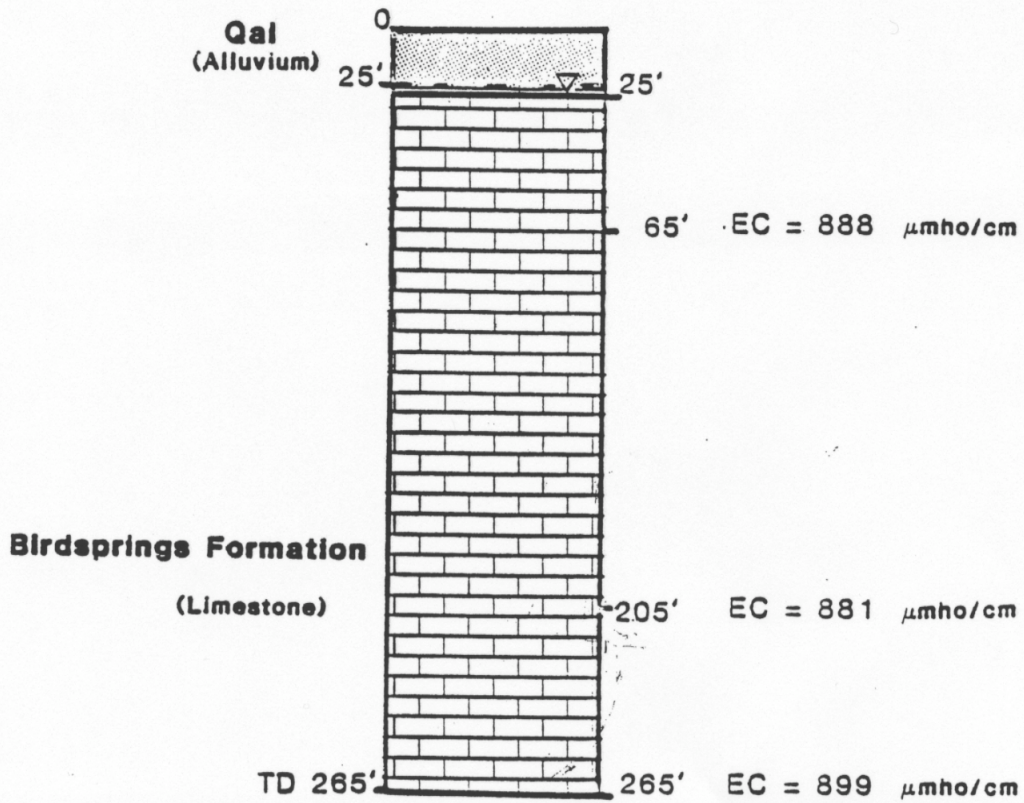
EH-5a was commenced on March 4, 1986. The purpose of the hole was also to monitor water levels in the carbonate aquifers. The hole was abandoned due to the large amount of drilling mud in the hole on March 11, 1986. EH-5b was commenced on March 11, 1986. The hole was completed on March 12, 1986. EH-5b is located 10 to 15 feet north of EH-5a. EH-5b is free of drilling mud and was drilled completely with air.

The lithology encountered is shown in Figure 12. The formation encountered is the Bird Spring formation. It consists of red to grey limestone with calcite vugs. Limestone alluvium was present from the surface to a depth of 25 feet. The total depth of the hole was 265 feet.

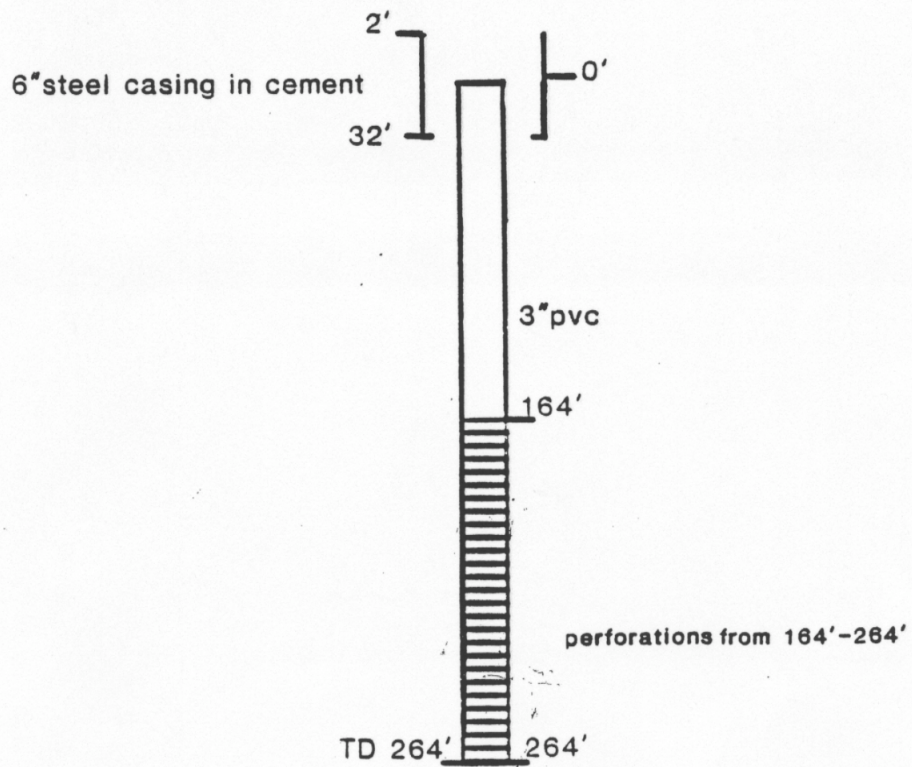
First water was encountered at 65 feet. Water quality was good throughout the hole. Electrical conductivity ranged from 881 to 899 μ -mhos. pH ranged from 8.10 to 8.32. Airlift rates ranged from 15 to 80 gpm.

Three-inch PVC was used in casing this hole. The casing is perforated from 164 feet to 264 feet (see Figure 13). Static water level was 25 feet below land surface.

(Source: Desert Research Institute, 1986)



Well Log for EH-5b.
 (after Desert Research Institute, 1986)



Well Diagram of EH-5b.
(after Desert Research Institute, 1986)

Survey measurement point is top of monument on south west of concrete pad; DTW MP is top of 2" access port on south side of big casing



Prior to setting up GPS data gathering station on LDS CENTRAL WELL in Muddy River Springs Area

WELL DRILLERS REPORT

Please complete this form in its entirety

Log No. 61450
 Permit No. 219
 Basin. MOB

Central?

in Booth

1. OWNER L.P.S. Welfare Farm ADDRESS 7700apa run

2. LOCATION NW 1/4 NW 1/4 Sec 23 T. 14 N. R. 65 E. Clark Count
 PERMIT NO. 26315 MOB

3. TYPE OF WORK
 New Well Recondition
 Deepen Other

4. PROPOSED USE
 Domestic Irrigation Test
 Municipal Industrial Stock

5. TYPE WELL
 Cable Rotary
 Other

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
Clay	⊙	0	52	52
Fine sand		52	54	2
Hard pan		54	58	4
3/8 gravel	X	58	69	11
Hard pan		69	76	7
3/8 gravel	X	76	83	7
Gravel + Clay		83	106	23

8. WELL CONSTRUCTION
 Diameter hole 2 1/2 inches Total depth 106 feet
 Casing record.....
 Weight per foot..... Thickness 1/4"

Diameter	From	To
<u>1 1/2</u> inches	<u>0</u> feet	<u>106</u> feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet
..... inches	..... feet	..... feet

Surface seal: Yes No Type.....
 Depth of seal..... feet
 Gravel packed: Yes No
 Gravel packed from..... feet to..... feet

Perforations:
 Type perforation Face cut
 Size perforation 18 x 6
 From 15 feet to 106 feet
 From..... feet to..... feet
 From..... feet to..... feet
 From..... feet to..... feet
 From..... feet to..... feet

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JUN 17 1980

Div. of Water Resources
 Branch Office — Las Vegas, Nev.

Date started 3-10, 1980
 Date completed 3-30, 1980

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
 G.P.M. 160 Draw down 10 feet 4 hours
 G.P.M. Draw down..... feet hours
 G.P.M. Draw down..... feet hours

9. WATER LEVEL
 Static water level 10 Feet below land surface 10
 Flow..... G.P.M.
 Water temperature 68 F. Quality Good

10. DRILLERS CERTIFICATION
 This well was drilled under my supervision and the report is true the best of my knowledge.

Name C. M. Robinson Jr.
 Address Box 470 Paradise
 Nevada contractor's license number 10791
 Nevada driller's license number 904
 Signed C. M. Robinson Jr.
 Date 4-19-80



Survey measurement point is top of brass monument on south west corner of concrete pad. DTW MP is top of 2" access port on west side of casing

LDS EAST WELL in Muddy River Springs Area prior to setting up GPS data gathering station.

OFFICE USE ONLY
 Log No. 52483
 Permit No. _____
 Basin. 219

LDS EAST WELL?

WELL DRILLERS REPORT

Please complete this form in its entirety

1. OWNER L.D.S. CHURCH FARM ADDRESS _____

2. LOCATION NW 1/4 NW 1/4 Sec. 16 T. 14 N/S R. 65 E CLARK County
 PERMIT NO. _____

3. TYPE OF WORK		4. PROPOSED USE			5. TYPE WELL	
New Well <input checked="" type="checkbox"/>	Recondition <input type="checkbox"/>	Domestic <input checked="" type="checkbox"/>	Irrigation <input type="checkbox"/>	Test <input type="checkbox"/>	Cable <input checked="" type="checkbox"/>	Rotary <input type="checkbox"/>
Deepen <input type="checkbox"/>	Other <input type="checkbox"/>	Municipal <input type="checkbox"/>	Industrial <input type="checkbox"/>	Stock <input type="checkbox"/>	Other <input type="checkbox"/>	

6. LITHOLOGIC LOG

Material	Water Strata	From	To	Thick-ness
GRAVEL & CALICHE		0'	22'	22'
WHITE CLAY & GRAVEL	20'	22'	40'	18'
RED CLAY & GRAVEL		40'	95'	55'
WHITE CLAY & GRAVEL		95'	140'	45'
RED CLAY		140'	195'	55'

8. WELL CONSTRUCTION

Diameter hole 12 in EIGHT inches Total depth 195 feet
 Casing record 195 FT OF 8" CASING
 Weight per foot 12.15 Thickness 10 GAUGE

Diameter	From	To
<u>EIGHT</u> inches	<u>0</u> feet	<u>195</u> feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet
_____ inches	_____ feet	_____ feet

Surface seal: Yes No Type CONCRETE
 Depth of seal FIFTY feet
 Gravel packed: Yes No
 Gravel packed from _____ feet to _____ feet
 Perforations: CASING NOT PERFORATED
 Type perforation _____
 Size perforation _____
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet
 From _____ feet to _____ feet

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 JAN 8 1987
 Div. of Water Resources
 Branch Office - Las Vegas, Nev.

9. WATER LEVEL

Static water level 22 Feet below land surface 20
 Flow _____ G.P.M.
 Water temperature WARM F. Quality _____

10. DRILLERS CERTIFICATION

This well was drilled under my supervision and the report is true to the best of my knowledge.

Name BILL RAY BLOOD
 Address 1610 E. LAMADRE WAY
N.L.V. NEV. 89030
 Nevada contractor's license number 13264
 Nevada driller's license number 798
 Signed Bill Blood
Jan 8 1987

Date started _____, 19____
 Date completed _____, 19____

7. WELL TEST DATA

Pump RPM	G.P.M.	Draw Down	After Hours Pump

BAILER TEST
 G.P.M. 30 Draw down 0 feet 2 hours



Survey measurement point is top of monument in concrete N of flume

Muddy Spring Gage at LDS Farm in Muddy River Springs Area prior to setting up GPS station



Survey measurement point is the top of brass monument in northeast corner of concrete pad. DTW MP is 2" access port west of big casing

Gathering GPS data on Well LDS WEST in the Muddy River Springs Area

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 62880

Sequence No.: 40773

Permit No.: 13074

Basin: 219

Notice of Intent#: 0

Owner: HUGHES TOOL COMPANY

Mailing/Well Address: WARM SPRINGS RANCH

Location SW SW

Sec: 09

Twn: 14S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: S

Proposed Use: I

Drilling Method C

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 80 feet

Construction Data Quality: G

Surface Casing Diameter: inches

Lithologic Data Quality: G

Cased To: 80 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 10/7/1968

Perforations:

Date Complete: 11/26/1968

From 10 feet to 80 feet

Yield 1300 G.P.M.

Perforation Length:

Draw Down: 5

After Hours Pump: 15

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: feet

Specific Capacity:

Gravel Packed: N

Test Method: U

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 16 ft below LSD

Water Temperature: ° F

General Remarks:

Contractor Name: DARELL H FREE

Contractor License Number: 3422

Additional Remarks:

Address: P O BOX 122 PANACA NV 89042

Contractor's Drlr No.:

Driller Lic.No.: 30



Survey measurement point is an 'X' etched in casing at DTW MP above white mark

Lewis 1 OLD Well in Muddy River Springs Area prior to setting up GPS station

WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

Log No. 885
 Rec. 7/8 1949
 Well No. 12576
 Permit No. 12576
 Do not fill in

Owner Clarence & Clarvid A. Lewis Driller Clarence Lewis
 Address Moapa Address Moapa Lic. No. _____
 Location of well: NW 1/4, NE 1/4 Sec. 8, T. 14 N/S, R. 65 E, in Clark County
 or Well 6.36' N.E. of Pt. of Div. shown on map.
 Water will be used for irrigation & dom. Total depth of well 57 1/2'
 Size of drilled hole 12" Weight of casing per linear foot _____
 Thickness of casing _____ Temp. of water 70°
 Diameter and length of casing 12" - 57 1/2'
(Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter.)
 If flowing well give flow in c.f.s. or g.p.m. and pressure _____
 If nonflowing well give depth of standing water from surface 23'
 If flowing well describe control works _____
(Type and size of valve, etc.)
 Date of commencement of well 5/3 1949 Date of completion of well 7/16 1949
 Type of well rig 5CS rig.

LOG OF FORMATIONS

From feet	To feet	Thickness feet	Type of material
0	7'	7	silt
7	28	21	clay & rocks
28	28 1/2	1/2	gravel with water
28 1/2	31	2 1/2	clay & rocks
31	55	24	gravel - water
55	57 1/2	2 1/2	clay - stopped on big white boulder

Water-bearing Formation, Casing Perforations, Etc.

Chief aquifer (water-bearing formation)
 from 31 to 55 ft.

Other aquifers _____
28 - 28 1/2

First water at 28 1/2 feet.

Casing perforated
 from 42 1/2 to 54 1/2 ft.

Size of perforations
1/4" x 10"
8 around casing.





Survey measurement point is top of brass monument southwest of concrete pad. DTW MP is top of casing inside vault

Gathering GPS data at LEWIS 2M (monitoring) Well in the Muddy River Springs Area

LEWIS 2 WELL

Nevada Division of Water Resources

Well Log Database

Query Results

Type of Site: N

Log No.: 5154

Sequence No.: 40756

Permit No.: 17754

Basin: 219

Notice of Intent#: 0

Owner: LEWIS, CLARVID

Mailing/Well Address:

Location SE NE

Sec: 08

Twn: 14S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: I

Drilling Method C

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 66 feet

Construction Data Quality: G

Surface Casing Diameter: inches

Lithologic Data Quality: G

Cased To: 66 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 7/7/1959

Perforations:

Date Complete: 7/15/1959

From 20 feet to 66 feet

Yield 600 G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: feet

Specific Capacity:

Gravel Packed:

Test Method: T

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 16 ft below LSD

Water Temperature: ° F

General Remarks:

Contractor Name:

Contractor License Number:

Additional Remarks:

Address:

Contractor's Drlr No.:

Driller Lic.No.: 192

Code Definitions

Survey measurement point is an "X" on top of casing flange at pink mark, the DTW MP



Gathering GPS data on LEWIS NORTH WELL in Muddy River Springs Area

WELL LOG AND REPORT TO THE STATE ENGINEER OF NEVADA

PLEASE COMPLETE THIS FORM IN ITS ENTIRETY

Rec..... 19.....
Well No.....
Permit No.....

Do not fill in.

Owner..... NEVADA POWER CO..... Driller..... Patrick H. Thompson.....

Address..... Las Vegas, Nevada..... Address..... Las Vegas, Nevada..... Lic. No. 192.....

Location of well: 1/4..... 1/4 Sec. 8, T4 N/S, R6E, in..... Clark..... County
or..... Clarvid Lewis property near Glendale, Nevada.....

Water will be used for..... observation..... Total depth of well..... 70'

Size of drilled hole..... 8 5/8"..... Weight of casing per linear foot..... 12#

Thickness of casing..... 10 guage..... Temp. of water..... cool

Diameter and length of casing..... 8 5/8" X 71'
(Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter.)

If flowing well give flow in c.f.s. or g.p.m. and pressure.....

If nonflowing well give depth of standing water from surface..... 28'

If flowing well describe control works.....
(Type and size of valve, etc.)

Date of commencement of well..... April 23, 1964..... Date of completion of well..... April 29, 1964

Type of well rig..... cable tools

LOG OF FORMATIONS

From feet	To feet	Thickness feet	Type of material
0	4	4	Brown clay and gravel
4	50	46	Gravel
50	70	20	Cemented gravel

Water-bearing Formation, Casing Perforations, etc.

Chief aquifer (water-bearing formation)
from..... 32..... to..... 50..... ft

Other aquifers..... 50 - 70.....

First water at..... 32..... feet.

Casing perforated
from..... 28..... to..... 68..... ft

Size of perforations
3/16 X 3" 4 rows

Nevada Division of Water Resources

Well Log Database

Lewis North

Query Results

Type of Site: N

Log No.: 62873

Sequence No.: 40764

Permit No.:

Basin: 219

Notice of Intent#: 0

Owner: NEVADA POWER COMPANY

Mailing/Well Address:

Location

Sec: 08

Twn: 14S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: X

Drilling Method C

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 70 feet

Construction Data Quality: G

Surface Casing Diameter: 8.62 inches

Lithologic Data Quality: G

Cased To: 70 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 4/23/1964

Perforations:

Date Complete: 4/29/1964

From 28 feet to 68 feet

Yield 70 G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: feet

Specific Capacity:

Gravel Packed:

Test Method: B

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 28 ft below LSD

General Remarks:

Water Temperature: ° F

Contractor Name:

Contractor License Number:

Additional Remarks:

Address:

Contractor's Dlr No.:

Driller Lic.No.: 192

Code Definitions



An offset survey measurement was made to the top of a brass monument on the north side of Warm Springs Road. A level was used to measure from there to the base of the welded metal on top of well, the DTW MP.

LEWIS SOUTH WELL in Muddy River Springs Area. An offset measurement was made on this well from Warm Springs Road; a level was later used to measure to the base of the welded plate.



OF NEVADA

PLEASE COMPLETE THIS FORM IN ITS ENTIRETY

Well No. _____
Permit No. _____

Do not fill in.

Owner. NEVADA POWER CO. Driller. Patrick H. Thompson

Address. Las Vegas, Nevada Address. Las Vegas, Nevada Lic. No. 192

✓ Location of well: 1/4 1/4 Sec. 8, T. 14 N/S, R. 6 E, in Clark County
or Clarvid Lewis property near Glendale, Nevada

Water will be used for. ~~Water~~ observation Total depth of well 115'

Size of drilled hole. 8 5/8" Weight of casing per linear foot. ~~122~~ 12#

Thickness of casing. 10 gauge Temp. of water. cool

Diameter and length of casing. 8 5/8" X 111'
(Casing 12" in diameter and under give inside diameter; casing 12" in diameter give outside diameter.)

If flowing well give flow in c.f.s. or g.p.m. and pressure. _____

If nonflowing well give depth of standing water from surface. 17'

If flowing well describe control works. _____
(Type and size of valve, etc.)

Date of commencement of well. April 16, 1964 Date of completion of well. April 22, 1964

Type of well rig. Cable tools

LOG OF FORMATIONS

From feet	To feet	Thickness feet	Type of material
0	20	20	Brown sandy clay
20	44	25	Sand and gravel
44	85	41	Brown clay
85	100	15	Blue clay
100	105	5	Red clay
105	115	10	Limestone

Water-bearing Formation, Casing Perforations, etc.

Chief aquifer (water-bearing formation)
from 20 to 44 ft.

Other aquifers. none

First water at 20 feet.

Casing perforated
from _____ to _____ ft.

Size of perforations
3/16 X 3" 4 rows



Survey measurement point is the top of brass monument in concrete pad inside building; DTW MP is top of 2" access port beside big casing.

Gathering GPS data on Well MX-6 (CE-DT-6) in the Muddy River Springs Area

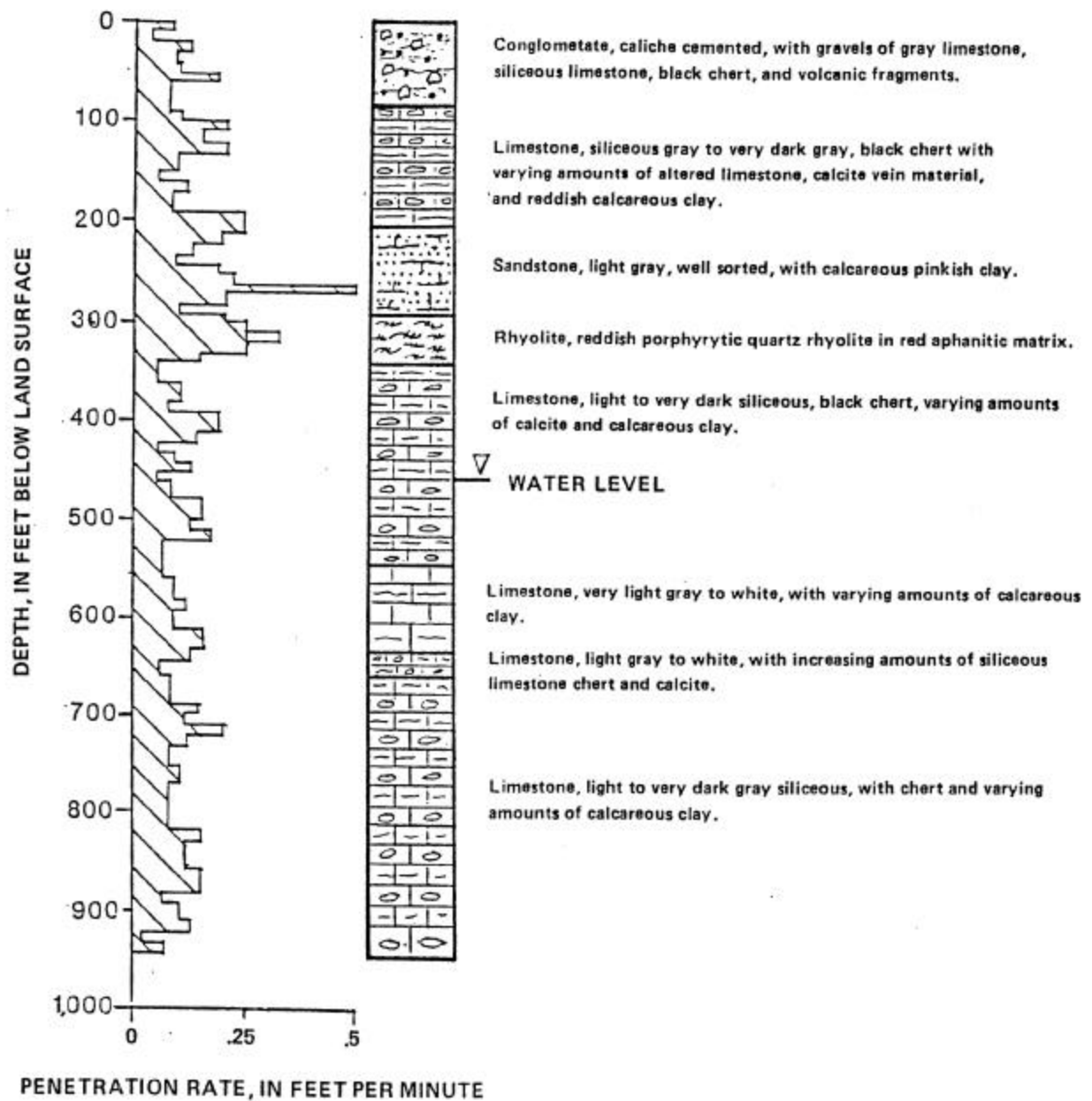
CE-DT-6

Well CE-DT-6 is in Moapa Valley, Clark County, adjacent to State Route 168 approximately 6.7 miles east of CE-DT-5 (figure 1). The well site is in the southern portion of the Meadow Valley Mountains and was drilled as an observation well for use during aquifer tests at CE-DT-5. Limestone bedrock and the water table were reached at 78 and 457.4 feet below the land surface, respectively.

Drilling began on May 21, 1981, and was completed on June 3, 1981. A total depth of 937 feet was attained. Eighty-seven feet of 12-3/4-inch surface casing was cemented into place and 8-5/8-inch well casing was installed from land surface to the bedrock. The drilling penetration rate and lithologic log are shown in figure 19. Temperature and caliper logs are shown in figure 20.

Water levels measured from October 28, 1985, to January 28, 1986, for this well are presented in graphic form in figure 21. The Geological Survey made a 66-hour constant-discharge aquifer test December 6-12, 1986. Drawdown data are listed in table 10 and shown in figure 22. Recovery data are listed in table 11 and shown in figure 23. Water levels were measured with a recording pressure transducer calibrated onsite. Total recovery occurred within 5 minutes after the pump was turned off.

(Source: Berger and others, 1988).



-Drilling penetration rate and lithology for MX test well CE-DT-6.
 (Source: Berger and others, 1988).

Survey measurement point is the top of a 5/8-inch hex bolt in the concrete rim (north) of the pool



PEDERSON GAGE in Muddy River Springs Area prior to setting up GPS station

Survey
measurement
point is the top
of casing inside
concrete
vault at DTW MP



Gathering GPS data on PERKINS OLD Well in the Muddy River Springs Area

Nevada Division of Water Resources

Well Log Database

Perkins Old

Query Results

Type of Site: N

Log No.: 327

Sequence No.: 39218

Permit No.: 12679

Basin: 219

Notice of Intent#: 0

Owner: PERKINS, U V

Mailing/Well Address:

Location NE NW

Sec: 22

Twn: 14S

Rng: 65E

Ref: MD

State/Co. Code: 32

Waiver No:

Parcel No.:

Lot No.:

Block No.:

Type of Work: N

Proposed Use: I

Drilling Method C

Subdiv. Name:

Source Agency: NV003

Well Construction

Depth to Bedrock:

Hole Depth: 150 feet

Construction Data Quality: G

Surface Casing Diameter: 10 inches

Lithologic Data Quality: G

Cased To: 70 feet

Aquifer Type:

Casing Reductions: 0

Date Started: 12/16/1947

Perforations:

Date Complete: 12/21/1947

From 27 feet to 48 feet

Yield G.P.M.

Perforation Length:

Draw Down:

After Hours Pump:

Perforation Intervals: 1

Pumping Water Level:

Depth of Seal: feet

Specific Capacity:

Gravel Packed:

Test Method:

from 0 feet to 0 feet

Work Type Remarks:

Static Water Level: 21 ft below LSD

General Remarks:

Water Temperature: ° F

Additional Remarks:

Contractor Name:

Contractor License Number:

Address:

Contractor's Drlr No.:

Driller Lic.No.: 43

Code Definitions



Survey measurement point is the top of brass monument on southwest corner of flume.

PEDERSON EAST GAGE (Playboy Pool Gage) in Muddy River Springs Area



An offset measurement was made at this site due to tree cover; Survey measurement point is the top of gage in flume at the 3.0 feet mark.

WARM SPRINGS WEST GAGE in Muddy Springs Area

APPENDIX B

**NATIONAL GEODETIC SURVEY OPUS SOLUTION REPORT FOR THE
VARIOUS SURVEYED POINTS**

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: apx21371.02o
 BM-DL-2 (Apex-2)

DATE: June 20, 2002
 TIME: 00:15:52 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.426

START: 2002/05/17 18:42:00
 STOP: 2002/05/17 20:44:00
 OBS USED: 5228 / 5334 : 98%
 # FIXED AMB: 35 / 37 : 95%
 OVERALL RMS: 0.015(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3749)

X:	-2166325.790 (m)	0.002 (m)	-2166326.436 (m)	0.003 (m)
Y:	-4668647.768 (m)	0.015 (m)	-4668646.462 (m)	0.015 (m)
Z:	3755750.167 (m)	0.019 (m)	3755750.148 (m)	0.020 (m)

LAT:	36 18 9.91305	0.017 (m)	36 18 9.93009	0.018 (m)
E LON:	245 6 28.65754	0.006 (m)	245 6 28.61201	0.007 (m)
W LON:	114 53 31.34246	0.006 (m)	114 53 31.38799	0.007 (m)
EL HGT:	730.675 (m)	0.016 (m)	729.928 (m)	0.016 (m)
ORTHO HGT:	758.207 (m)	0.030 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4019590.988 (m)
 EASTING: 689269.518 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8172482.955 (m)
 EASTING: 262084.731 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	31257
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	187512
AM7015	king KINGMAN CORS ARP	N351150	W1140229	144797

NEAREST NGS PUBLISHED CONTROL POINT

GR1885	APEX	N361920	W1145543	3932
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: apx11370.02o
 BM-DL-1 (Apex-1)

DATE: June 20, 2002
 TIME: 00:16:46 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.207

START: 2002/05/17 18:20:00
 STOP: 2002/05/17 20:24:00
 OBS USED: 5293 / 5470 : 97%
 # FIXED AMB: 36 / 37 : 97%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3748)

X:	-2165758.049 (m)	0.012 (m)	-2165758.695 (m)	0.013 (m)
Y:	-4668979.073 (m)	0.018 (m)	-4668977.767 (m)	0.018 (m)
Z:	3755656.215 (m)	0.007 (m)	3755656.197 (m)	0.008 (m)

LAT:	36 18 6.27382	0.018 (m)	36 18 6.29087	0.019 (m)
E LON:	245 6 54.88526	0.004 (m)	245 6 54.83975	0.005 (m)
W LON:	114 53 5.11474	0.004 (m)	114 53 5.16025	0.005 (m)
EL HGT:	724.696 (m)	0.013 (m)	723.950 (m)	0.013 (m)
ORTHO HGT:	752.229 (m)	0.028 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4019493.118 (m)
 EASTING: 689926.208 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8172375.488 (m)
 EASTING: 262739.856 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	31767
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	187428
AM7015	king KINGMAN CORS ARP	N351150	W1140229	144353

NEAREST NGS PUBLISHED CONTROL POINT

GR0624	P 171	N361945	W1145538	4882
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: cev11421.02o
 CE-VF1

DATE: June 20, 2002
 TIME: 00:19:34 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 0.924

START: 2002/05/22 18:20:00
 STOP: 2002/05/23 00:21:00
 OBS USED: 15438 / 15540 : 99%
 # FIXED AMB: 55 / 55 : 100%
 OVERALL RMS: 0.014(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3887)

X:	-2154774.562 (m)	0.005 (m)	-2154775.210 (m)	0.007 (m)
Y:	-4632226.416 (m)	0.007 (m)	-4632225.116 (m)	0.007 (m)
Z:	3806791.851 (m)	0.015 (m)	3806791.837 (m)	0.015 (m)
LAT:	36 52 32.05953	0.014 (m)	36 52 32.07678	0.016 (m)
E LON:	245 3 12.76539	0.002 (m)	245 3 12.71953	0.004 (m)
W LON:	114 56 47.23461	0.002 (m)	114 56 47.28047	0.004 (m)
EL HGT:	726.106 (m)	0.005 (m)	725.373 (m)	0.005 (m)
ORTHO HGT:	752.350 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4083038.012 (m)
 EASTING: 683024.807 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8236009.852 (m)
 EASTING: 256776.581 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	168367
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	82447
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	130298

NEAREST NGS PUBLISHED CONTROL POINT

GR1913 HIGHWAY 93 STA A 24+69.47 POT N365136 W1145725 1969

This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: bemr1351.02o
 Behmer-MW

DATE: June 20, 2002
 TIME: 00:20:29 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 1.237

START: 2002/05/15 20:49:00
 STOP: 2002/05/15 23:05:00
 OBS USED: 4498 / 6261 : 72%
 # FIXED AMB: 47 / 53 : 89%
 OVERALL RMS: 0.022 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3696)

X:	-2138784.121 (m)	0.019 (m)	-2138784.767 (m)	0.020 (m)
Y:	-4651480.771 (m)	0.013 (m)	-4651479.468 (m)	0.013 (m)
Z:	3792017.285 (m)	0.007 (m)	3792017.268 (m)	0.007 (m)

LAT:	36 42 39.17119	0.006 (m)	36 42 39.18846	0.006 (m)
E LON:	245 18 24.08454	0.012 (m)	245 18 24.03895	0.015 (m)
W LON:	114 41 35.91546	0.012 (m)	114 41 35.96105	0.015 (m)
EL HGT:	496.730 (m)	0.020 (m)	495.987 (m)	0.020 (m)
ORTHO HGT:	523.614 (m)	0.032 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065280.181 (m)
 EASTING: 706030.703 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217915.107 (m)
 EASTING: 279514.388 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75758
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	139027
AM7015	king KINGMAN CORS ARP	N351150	W1140229	177953

NEAREST NGS PUBLISHED CONTROL POINT

GR0789	K 301	N364305	W1144133	802
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: cev21421.02o
 CE-VF-2

DATE: June 20, 2002
 TIME: 00:24:01 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.298

START: 2002/05/22 18:36:00
 STOP: 2002/05/22 23:47:00
 OBS USED: 12185 / 12336 : 99%
 # FIXED AMB: 45 / 47 : 96%
 OVERALL RMS: 0.014 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3887)

X:	-2154830.280 (m)	0.008 (m)	-2154830.927 (m)	0.010 (m)
Y:	-4632296.774 (m)	0.011 (m)	-4632295.473 (m)	0.010 (m)
Z:	3806675.487 (m)	0.018 (m)	3806675.472 (m)	0.019 (m)

LAT:	36 52 27.34114	0.019 (m)	36 52 27.35840	0.020 (m)
E LON:	245 3 11.92384	0.003 (m)	245 3 11.87799	0.005 (m)
W LON:	114 56 48.07616	0.003 (m)	114 56 48.12201	0.005 (m)
EL HGT:	726.109 (m)	0.011 (m)	725.375 (m)	0.011 (m)
ORTHO HGT:	752.353 (m)	0.027 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4082892.145 (m)
 EASTING: 683007.099 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8235864.274 (m)
 EASTING: 256756.711 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	168494
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	82301
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	130436

NEAREST NGS PUBLISHED CONTROL POINT

GR1913	HIGHWAY 93 STA A 24+69.47 POT	N365136	W1145725	1832
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: csv11420.02o
 CSV-1

DATE: June 20, 2002
 TIME: 00:24:46 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM33429.20+GP
 ARP HEIGHT: 2.064

START: 2002/05/22 20:01:00
 STOP: 2002/05/22 23:33:00
 OBS USED: 8214 / 8322 : 99%
 # FIXED AMB: 37 / 38 : 97%
 OVERALL RMS: 0.012 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3888)

X:	-2150319.306 (m)	0.004 (m)	-2150319.954 (m)	0.004 (m)
Y:	-4641869.341 (m)	0.007 (m)	-4641868.039 (m)	0.007 (m)
Z:	3797458.440 (m)	0.019 (m)	3797458.424 (m)	0.020 (m)

LAT:	36 46 16.14798	0.020 (m)	36 46 16.16522	0.020 (m)
E LON:	245 8 39.62450	0.004 (m)	245 8 39.57874	0.004 (m)
W LON:	114 51 20.37550	0.004 (m)	114 51 20.42126	0.004 (m)
EL HGT:	631.942 (m)	0.006 (m)	631.204 (m)	0.007 (m)
ORTHO HGT:	658.443 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4071630.410 (m)
 EASTING: 691377.996 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8224480.661 (m)
 EASTING: 264959.032 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	182168
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	74255
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137420

NEAREST NGS PUBLISHED CONTROL POINT

GR0799	W 301	N364736	W1145120	2469
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: csv21420.02o
 CSV-2

DATE: June 20, 2002
 TIME: 00:28:02 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/22 20:52:00
 STOP: 2002/05/22 22:54:00
 OBS USED: 3970 / 4664 : 85%
 # FIXED AMB: 39 / 44 : 89%
 OVERALL RMS: 0.021(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3888)

X:	-2139281.919 (m)	0.037 (m)	-2139282.566 (m)	0.037 (m)
Y:	-4646273.725 (m)	0.003 (m)	-4646272.423 (m)	0.003 (m)
Z:	3798314.602 (m)	0.025 (m)	3798314.586 (m)	0.025 (m)

LAT:	36 46 50.61146	0.017 (m)	36 46 50.62876	0.018 (m)
E LON:	245 16 38.12854	0.035 (m)	245 16 38.08287	0.043 (m)
W LON:	114 43 21.87146	0.035 (m)	114 43 21.91713	0.043 (m)
EL HGT:	640.522 (m)	0.025 (m)	639.782 (m)	0.025 (m)
ORTHO HGT:	667.110 (m)	0.035 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4072966.777 (m)
 EASTING: 703217.083 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8225641.415 (m)
 EASTING: 276815.215 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	80733
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	132361
AM7015	king KINGMAN CORS ARP	N351150	W1140229	186139

NEAREST NGS PUBLISHED CONTROL POINT

GR0793	Q 301	N364528	W1144533	4132
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: csv31421.02o
 CSV-3

DATE: June 20, 2002
 TIME: 00:28:59 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 1.100

START: 2002/05/22 17:52:00
 STOP: 2002/05/22 22:28:00
 OBS USED: 10921 / 11056 : 99%
 # FIXED AMB: 50 / 50 : 100%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3886)

X:	-2158352.161 (m)	0.002 (m)	-2158352.808 (m)	0.003 (m)
Y:	-4644085.438 (m)	0.002 (m)	-4644084.136 (m)	0.002 (m)
Z:	3790364.161 (m)	0.018 (m)	3790364.145 (m)	0.019 (m)

LAT:	36 41 27.13392	0.016 (m)	36 41 27.15111	0.017 (m)
E LON:	245 4 23.57166	0.002 (m)	245 4 23.52593	0.003 (m)
W LON:	114 55 36.42834	0.002 (m)	114 55 36.47407	0.003 (m)
EL HGT:	709.969 (m)	0.008 (m)	709.231 (m)	0.009 (m)
ORTHO HGT:	736.376 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4062583.292 (m)
 EASTING: 685222.199 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8215526.400 (m)
 EASTING: 258670.638 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	63570
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	148093
AM7015	king KINGMAN CORS ARP	N351150	W1140229	183983

NEAREST NGS PUBLISHED CONTROL POINT

GR1910	HIDDEN	N364117	W1145233	4559
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: eh401350.02o
 EH-4

DATE: June 20, 2002
 TIME: 00:33:19 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.198

START: 2002/05/15 19:22:00
 STOP: 2002/05/15 21:15:00
 OBS USED: 5239 / 5338 : 98%
 # FIXED AMB: 32 / 33 : 97%
 OVERALL RMS: 0.018(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3694)

X:	-2140849.743 (m)	0.043 (m)	-2140850.389 (m)	0.044 (m)
Y:	-4650913.164 (m)	0.055 (m)	-4650911.861 (m)	0.056 (m)
Z:	3791661.212 (m)	0.038 (m)	3791661.195 (m)	0.038 (m)
LAT:	36 42 23.17034	0.035 (m)	36 42 23.18762	0.036 (m)
E LON:	245 16 58.92512	0.020 (m)	245 16 58.87952	0.025 (m)
W LON:	114 43 1.07488	0.020 (m)	114 43 1.12048	0.025 (m)
EL HGT:	562.610 (m)	0.071 (m)	561.868 (m)	0.071 (m)
ORTHO HGT:	589.461 (m)	0.076 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4064736.407 (m)
 EASTING: 703929.261 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217402.539 (m)
 EASTING: 277405.434 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	74124
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	140088
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178207

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	2144
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: df101420.02o
 DF-1 (Dutch Flat-1)

DATE: June 20, 2002
 TIME: 00:33:27 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11673.eph [precise]
 NAV FILE: brdc1420.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 1.012

START: 2002/05/22 19:20:00
 STOP: 2002/05/22 23:55:00
 OBS USED: 10648 / 10861 : 98%
 # FIXED AMB: 42 / 43 : 98%
 OVERALL RMS: 0.013(m)

REF FRAME: NAD83(CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3888)

X:	-2152370.648 (m)	0.002 (m)	-2152371.296 (m)	0.003 (m)
Y:	-4636213.322 (m)	0.005 (m)	-4636212.021 (m)	0.005 (m)
Z:	3803198.357 (m)	0.019 (m)	3803198.342 (m)	0.019 (m)

LAT:	36 50 8.16231	0.017 (m)	36 50 8.17956	0.018 (m)
E LON:	245 5 48.57737	0.001 (m)	245 5 48.53154	0.003 (m)
W LON:	114 54 11.42263	0.001 (m)	114 54 11.46846	0.003 (m)
EL HGT:	653.112 (m)	0.009 (m)	652.377 (m)	0.009 (m)
ORTHO HGT:	679.466 (m)	0.027 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4078687.004 (m)
 EASTING: 686980.163 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8231600.990 (m)
 EASTING: 260666.643 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	173933
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	79356
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	132569

NEAREST NGS PUBLISHED CONTROL POINT

GR0803	T 302	N365058	W1145218	3202
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: gv101370.02o
 GV-1

DATE: June 20, 2002
 TIME: 00:37:16 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/17 18:19:00
 STOP: 2002/05/17 20:36:00
 OBS USED: 6084 / 6192 : 98%
 # FIXED AMB: 38 / 39 : 97%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3748)

X:	-2168093.512 (m)	0.006 (m)	-2168094.159 (m)	0.007 (m)
Y:	-4658279.430 (m)	0.006 (m)	-4658278.125 (m)	0.006 (m)
Z:	3767611.927 (m)	0.015 (m)	3767611.910 (m)	0.015 (m)

LAT:	36 26 6.27594	0.017 (m)	36 26 6.29302	0.017 (m)
E LON:	245 2 29.09201	0.003 (m)	245 2 29.04637	0.005 (m)
W LON:	114 57 30.90799	0.003 (m)	114 57 30.95363	0.005 (m)
EL HGT:	793.229 (m)	0.005 (m)	792.487 (m)	0.005 (m)
ORTHO HGT:	820.260 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4034143.074 (m)
 EASTING: 682983.423 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8187124.446 (m)
 EASTING: 256013.261 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	37052
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	175521
AM7015	king KINGMAN CORS ARP	N351150	W1140229	160422

NEAREST NGS PUBLISHED CONTROL POINT

GR1892	BIBLE	N362524	W1145540	3053
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: eh5b1350.02o
 EH-5B

DATE: June 20, 2002
 TIME: 00:38:08 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.198

START: 2002/05/15 18:18:00
 STOP: 2002/05/15 21:54:00
 OBS USED: 9529 / 10224 : 93%
 # FIXED AMB: 44 / 55 : 80%
 OVERALL RMS: 0.018(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3694)

X:	-2142187.171 (m)	0.024 (m)	-2142187.818 (m)	0.024 (m)
Y:	-4648339.453 (m)	0.036 (m)	-4648338.151 (m)	0.036 (m)
Z:	3793999.895 (m)	0.013 (m)	3793999.879 (m)	0.012 (m)

LAT:	36 43 58.46560	0.023 (m)	36 43 58.48287	0.024 (m)
E LON:	245 15 26.59487	0.007 (m)	245 15 26.54924	0.009 (m)
W LON:	114 44 33.40513	0.007 (m)	114 44 33.45076	0.009 (m)
EL HGT:	535.574 (m)	0.039 (m)	534.834 (m)	0.038 (m)
ORTHO HGT:	562.296 (m)	0.046 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4067619.135 (m)
 EASTING: 701568.783 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8220319.470 (m)
 EASTING: 275088.164 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75291
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137956
AM7015	king KINGMAN CORS ARP	N351150	W1140229	181759

NEAREST NGS PUBLISHED CONTROL POINT

GR0791	N 301	N364418	W1144420	689
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ldsc1360.02o
 LDS Central

DATE: June 20, 2002
 TIME: 00:40:42 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/16 16:53:00
 STOP: 2002/05/16 18:57:00
 OBS USED: 4610 / 4718 : 98%
 # FIXED AMB: 35 / 37 : 95%
 OVERALL RMS: 0.020 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3719)

X:	-2140174.849 (m)	0.054 (m)	-2140175.496 (m)	0.053 (m)
Y:	-4649991.542 (m)	0.052 (m)	-4649990.240 (m)	0.053 (m)
Z:	3793074.672 (m)	0.038 (m)	3793074.655 (m)	0.039 (m)

LAT:	36 43 21.63168	0.013 (m)	36 43 21.64895	0.013 (m)
E LON:	245 17 8.10027	0.029 (m)	245 17 8.05467	0.035 (m)
W LON:	114 42 51.89973	0.029 (m)	114 42 51.94533	0.035 (m)
EL HGT:	510.296 (m)	0.079 (m)	509.555 (m)	0.079 (m)
ORTHO HGT:	537.104 (m)	0.083 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4066543.636 (m)
 EASTING: 704113.959 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8219206.588 (m)
 EASTING: 277616.810 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75733
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	138296
AM7015	king KINGMAN CORS ARP	N351150	W1140229	179821

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	431
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: garn1372.02o
 Garnet Well

DATE: June 20, 2002
 TIME: 00:42:20 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.021

START: 2002/05/17 19:12:00
 STOP: 2002/05/17 22:51:00
 OBS USED: 9108 / 9306 : 98%
 # FIXED AMB: 48 / 49 : 98%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3750)

X:	-2158355.598 (m)	0.009 (m)	-2158356.245 (m)	0.010 (m)
Y:	-4661313.460 (m)	0.010 (m)	-4661312.155 (m)	0.009 (m)
Z:	3769132.496 (m)	0.012 (m)	3769132.479 (m)	0.012 (m)

LAT:	36 27 11.93793	0.014 (m)	36 27 11.95506	0.015 (m)
E LON:	245 9 15.00605	0.004 (m)	245 9 14.96046	0.007 (m)
W LON:	114 50 44.99395	0.004 (m)	114 50 45.03954	0.007 (m)
EL HGT:	611.805 (m)	0.007 (m)	611.060 (m)	0.007 (m)
ORTHO HGT:	639.068 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4036386.571 (m)
 EASTING: 693046.348 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8189219.653 (m)
 EASTING: 266107.159 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	45018
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	170325
AM7015	king KINGMAN CORS ARP	N351150	W1140229	157189

NEAREST NGS PUBLISHED CONTROL POINT

GR0643	B 1	N362716	W1145039	195
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ldsg1340.02o
 LDS Gage

DATE: June 20, 2002
 TIME: 00:44:33 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11662.eph [precise]
 NAV FILE: brdc1340.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/14 17:58:00
 STOP: 2002/05/14 21:24:00
 OBS USED: 7792 / 8875 : 88%
 # FIXED AMB: 51 / 54 : 94%
 OVERALL RMS: 0.020 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3666)

X:	-2140313.027 (m)	0.013 (m)	-2140313.673 (m)	0.013 (m)
Y:	-4650051.452 (m)	0.025 (m)	-4650050.149 (m)	0.025 (m)
Z:	3792916.802 (m)	0.002 (m)	3792916.786 (m)	0.003 (m)
LAT:	36 43 15.35091	0.019 (m)	36 43 15.36821	0.019 (m)
E LON:	245 17 4.05180	0.005 (m)	245 17 4.00620	0.006 (m)
W LON:	114 42 55.94820	0.005 (m)	114 42 55.99380	0.006 (m)
EL HGT:	505.831 (m)	0.021 (m)	505.089 (m)	0.021 (m)
ORTHO HGT:	532.642 (m)	0.033 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4066347.663 (m)
 EASTING: 704018.131 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8219012.081 (m)
 EASTING: 277518.107 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75517
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	138510
AM7015	king KINGMAN CORS ARP	N351150	W1140229	179674

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	635
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ivrf1340.02o
 Iverson Flume

DATE: June 20, 2002
 TIME: 00:45:56 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11662.eph [precise]
 NAV FILE: brdc1340.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.064

START: 2002/05/14 18:19:00
 STOP: 2002/05/14 21:32:00
 OBS USED: 6548 / 8503 : 77%
 # FIXED AMB: 56 / 88 : 64%
 OVERALL RMS: 0.031(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3667)

X:	-2140100.670 (m)	0.040 (m)	-2140101.316 (m)	0.039 (m)
Y:	-4650849.449 (m)	0.039 (m)	-4650848.146 (m)	0.039 (m)
Z:	3792063.111 (m)	0.035 (m)	3792063.095 (m)	0.035 (m)

LAT:	36 42 40.81624	0.043 (m)	36 42 40.83353	0.044 (m)
E LON:	245 17 25.26635	0.045 (m)	245 17 25.22076	0.056 (m)
W LON:	114 42 34.73365	0.045 (m)	114 42 34.77924	0.056 (m)
EL HGT:	505.380 (m)	0.020 (m)	504.638 (m)	0.020 (m)
ORTHO HGT:	532.232 (m)	0.032 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065295.862 (m)
 EASTING: 704569.942 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217952.382 (m)
 EASTING: 278054.227 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	74945
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	139381
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178493

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144235	1521
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: lew21350.02o
 Lewis-2M

DATE: June 20, 2002
 TIME: 00:48:11 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 1.576

START: 2002/05/15 18:00:00
 STOP: 2002/05/15 20:33:00
 OBS USED: 6413 / 6884 : 93%
 # FIXED AMB: 39 / 43 : 91%
 OVERALL RMS: 0.018(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3693)

X:	-2141407.956 (m)	0.019 (m)	-2141408.603 (m)	0.019 (m)
Y:	-4648506.302 (m)	0.037 (m)	-4648505.000 (m)	0.037 (m)
Z:	3794223.897 (m)	0.006 (m)	3794223.881 (m)	0.006 (m)
LAT:	36 44 7.67514	0.029 (m)	36 44 7.69242	0.030 (m)
E LON:	245 15 57.92994	0.005 (m)	245 15 57.88431	0.007 (m)
W LON:	114 44 2.07006	0.005 (m)	114 44 2.11569	0.007 (m)
EL HGT:	529.668 (m)	0.030 (m)	528.927 (m)	0.030 (m)
ORTHO HGT:	556.398 (m)	0.039 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4067921.338 (m)
 EASTING: 702339.403 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8220610.200 (m)
 EASTING: 275863.069 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75949
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137450
AM7015	king KINGMAN CORS ARP	N351150	W1140229	181753

NEAREST NGS PUBLISHED CONTROL POINT

GR0791	N 301	N364418	W1144420	547
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ldse1360.02o
 LDS East

DATE: June 20, 2002
 TIME: 00:49:18 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/16 16:39:00
 STOP: 2002/05/16 18:48:00
 OBS USED: 4462 / 4699 : 95%
 # FIXED AMB: 29 / 31 : 94%
 OVERALL RMS: 0.020 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3719)

X:	-2139830.827 (m)	0.012 (m)	-2139831.473 (m)	0.011 (m)
Y:	-4650119.731 (m)	0.041 (m)	-4650118.428 (m)	0.041 (m)
Z:	3793106.491 (m)	0.028 (m)	3793106.474 (m)	0.028 (m)

LAT:	36 43 22.98995	0.028 (m)	36 43 23.00722	0.028 (m)
E LON:	245 17 22.85263	0.007 (m)	245 17 22.80702	0.009 (m)
W LON:	114 42 37.14737	0.007 (m)	114 42 37.19298	0.009 (m)
EL HGT:	507.381 (m)	0.045 (m)	506.639 (m)	0.045 (m)
ORTHO HGT:	534.195 (m)	0.051 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4066594.241 (m)
 EASTING: 704478.975 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8219251.782 (m)
 EASTING: 277982.483 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75976
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	138151
AM7015	king KINGMAN CORS ARP	N351150	W1140229	179736

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	218
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: lewol1353.02o
 Lewis 1 (Old)

DATE: June 20, 2002
 TIME: 00:52:44 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.064

START: 2002/05/15 21:19:00
 STOP: 2002/05/15 23:18:00
 OBS USED: 5208 / 5417 : 96%
 # FIXED AMB: 34 / 42 : 81%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3697)

X:	-2141561.502 (m)	0.012 (m)	-2141562.148 (m)	0.011 (m)
Y:	-4648229.717 (m)	0.084 (m)	-4648228.414 (m)	0.084 (m)
Z:	3794476.074 (m)	0.066 (m)	3794476.058 (m)	0.066 (m)

LAT:	36 44 17.85803	0.022 (m)	36 44 17.87532	0.023 (m)
E LON:	245 15 47.64524	0.031 (m)	245 15 47.59962	0.041 (m)
W LON:	114 44 12.35476	0.031 (m)	114 44 12.40038	0.041 (m)
EL HGT:	530.676 (m)	0.101 (m)	529.935 (m)	0.102 (m)
ORTHO HGT:	557.392 (m)	0.105 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4068229.143 (m)
 EASTING: 702076.857 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8220921.815 (m)
 EASTING: 275605.140 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	76076
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137228
AM7015	king KINGMAN CORS ARP	N351150	W1140229	182136

NEAREST NGS PUBLISHED CONTROL POINT

GR0791	N 301	N364418	W1144420	190
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ldsw1351.02o
 LDS West

DATE: June 20, 2002
 TIME: 00:53:35 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.064

START: 2002/05/15 19:00:00
 STOP: 2002/05/15 21:07:00
 OBS USED: 5917 / 5978 : 99%
 # FIXED AMB: 35 / 40 : 88%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3694)

X:	-2141266.696 (m)	0.022 (m)	-2141267.342 (m)	0.021 (m)
Y:	-4649124.419 (m)	0.064 (m)	-4649123.116 (m)	0.064 (m)
Z:	3793541.436 (m)	0.056 (m)	3793541.419 (m)	0.057 (m)

LAT:	36 43 40.18810	0.023 (m)	36 43 40.20538	0.024 (m)
E LON:	245 16 13.52206	0.013 (m)	245 16 13.47646	0.016 (m)
W LON:	114 43 46.47794	0.013 (m)	114 43 46.52354	0.016 (m)
EL HGT:	524.093 (m)	0.087 (m)	523.351 (m)	0.088 (m)
ORTHO HGT:	550.854 (m)	0.091 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4067083.341 (m)
 EASTING: 702746.277 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8219766.389 (m)
 EASTING: 276257.447 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75451
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	138143
AM7015	king KINGMAN CORS ARP	N351150	W1140229	180824

NEAREST NGS PUBLISHED CONTROL POINT

GR0790	M 301	N364354	W1144329	608
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: mir11430.02o
 GV-Mirant1 (Mirant-1)

DATE: June 20, 2002
 TIME: 00:56:51 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11674.eph [precise]
 NAV FILE: brdc1430.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 2.064

START: 2002/05/23 20:12:00
 STOP: 2002/05/23 22:25:00
 OBS USED: 5810 / 5918 : 98%
 # FIXED AMB: 37 / 38 : 97%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3915)

X:	-2168454.645 (m)	0.004 (m)	-2168455.292 (m)	0.004 (m)
Y:	-4659274.685 (m)	0.006 (m)	-4659273.380 (m)	0.006 (m)
Z:	3766119.393 (m)	0.014 (m)	3766119.375 (m)	0.015 (m)

LAT:	36 25 7.00524	0.011 (m)	36 25 7.02230	0.011 (m)
E LON:	245 2 32.80670	0.001 (m)	245 2 32.76108	0.001 (m)
W LON:	114 57 27.19330	0.001 (m)	114 57 27.23892	0.001 (m)
EL HGT:	755.594 (m)	0.009 (m)	754.851 (m)	0.009 (m)
ORTHO HGT:	782.687 (m)	0.027 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4032318.450 (m)
 EASTING: 683114.606 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8185298.227 (m)
 EASTING: 256117.624 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	35614
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	177203
AM7015	king KINGMAN CORS ARP	N351150	W1140229	158816

NEAREST NGS PUBLISHED CONTROL POINT

GR1892	BIBLE	N362524	W1145540	2718
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: lewn1350.02o
 Lewis North

DATE: June 20, 2002
 TIME: 00:57:21 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 1.219

START: 2002/05/15 17:40:00
 STOP: 2002/05/15 20:29:00
 OBS USED: 7397 / 7612 : 97%
 # FIXED AMB: 36 / 44 : 82%
 OVERALL RMS: 0.018 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3693)

X:	-2142100.691 (m)	0.015 (m)	-2142101.338 (m)	0.015 (m)
Y:	-4648213.333 (m)	0.033 (m)	-4648212.030 (m)	0.034 (m)
Z:	3794201.836 (m)	0.018 (m)	3794201.819 (m)	0.019 (m)

LAT:	36 44 6.63976	0.026 (m)	36 44 6.65703	0.027 (m)
E LON:	245 15 27.63280	0.009 (m)	245 15 27.58716	0.012 (m)
W LON:	114 44 32.36720	0.009 (m)	114 44 32.41284	0.012 (m)
EL HGT:	535.551 (m)	0.031 (m)	534.809 (m)	0.032 (m)
ORTHO HGT:	562.267 (m)	0.040 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4067871.671 (m)
 EASTING: 701588.590 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8220571.653 (m)
 EASTING: 275111.703 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75517
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137708
AM7015	king KINGMAN CORS ARP	N351150	W1140229	181986

NEAREST NGS PUBLISHED CONTROL POINT

GR0791	N 301	N364418	W1144420	466
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: mw201370.02o
 GV-PW-MW-2 (MW-2)

DATE: June 20, 2002
 TIME: 01:00:58 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.436

START: 2002/05/17 20:00:00
 STOP: 2002/05/17 23:10:00
 OBS USED: 7665 / 7724 : 99%
 # FIXED AMB: 44 / 45 : 98%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3751)

X:	-2169090.539 (m)	0.006 (m)	-2169091.186 (m)	0.006 (m)
Y:	-4659504.116 (m)	0.008 (m)	-4659502.811 (m)	0.008 (m)
Z:	3765451.633 (m)	0.028 (m)	3765451.616 (m)	0.028 (m)

LAT:	36 24 40.40116	0.017 (m)	36 24 40.41824	0.018 (m)
E LON:	245 2 13.55506	0.006 (m)	245 2 13.50942	0.009 (m)
W LON:	114 57 46.44494	0.006 (m)	114 57 46.49058	0.009 (m)
EL HGT:	742.524 (m)	0.023 (m)	741.782 (m)	0.023 (m)
ORTHO HGT:	769.627 (m)	0.034 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4031488.438 (m)
 EASTING: 682652.414 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8184475.152 (m)
 EASTING: 255643.329 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	34669
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	178138
AM7015	king KINGMAN CORS ARP	N351150	W1140229	158373

NEAREST NGS PUBLISHED CONTROL POINT

GR1892	BIBLE	N362524	W1145540	3423
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: lews1351.02o
 Lewis South

DATE: June 20, 2002
 TIME: 01:01:01 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.064

START: 2002/05/15 18:40:00
 STOP: 2002/05/15 21:09:00
 OBS USED: 6044 / 6798 : 89%
 # FIXED AMB: 28 / 32 : 88%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3694)

X:	-2141225.445 (m)	0.013 (m)	-2141226.091 (m)	0.013 (m)
Y:	-4649023.345 (m)	0.028 (m)	-4649022.042 (m)	0.028 (m)
Z:	3793688.036 (m)	0.004 (m)	3793688.020 (m)	0.004 (m)

LAT:	36 43 46.11508	0.017 (m)	36 43 46.13238	0.018 (m)
E LON:	245 16 13.32804	0.006 (m)	245 16 13.28242	0.008 (m)
W LON:	114 43 46.67196	0.006 (m)	114 43 46.71758	0.008 (m)
EL HGT:	524.353 (m)	0.025 (m)	523.612 (m)	0.025 (m)
ORTHO HGT:	551.110 (m)	0.035 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4067265.899 (m)
 EASTING: 702737.133 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8219949.037 (m)
 EASTING: 276251.005 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75601
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	137970
AM7015	king KINGMAN CORS ARP	N351150	W1140229	180997

NEAREST NGS PUBLISHED CONTROL POINT

GR0790	M 301	N364354	W1144329	501
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: m3001431.02o
 Paiutes M-3 (M-3)

DATE: June 20, 2002
 TIME: 01:04:26 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11674.eph [precise]
 NAV FILE: brdc1430.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 0.887

START: 2002/05/23 19:37:00
 STOP: 2002/05/23 21:47:00
 OBS USED: 5920 / 6027 : 98%
 # FIXED AMB: 39 / 39 : 100%
 OVERALL RMS: 0.014(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3914)

X:	-2157594.191 (m)	0.007 (m)	-2157594.838 (m)	0.008 (m)
Y:	-4656496.193 (m)	0.012 (m)	-4656494.890 (m)	0.012 (m)
Z:	3775547.410 (m)	0.016 (m)	3775547.393 (m)	0.016 (m)

LAT:	36 31 29.72946	0.021 (m)	36 31 29.74660	0.022 (m)
E LON:	245 8 21.42387	0.002 (m)	245 8 21.37827	0.003 (m)
W LON:	114 51 38.57613	0.002 (m)	114 51 38.62173	0.003 (m)
EL HGT:	655.026 (m)	0.003 (m)	654.284 (m)	0.003 (m)
ORTHO HGT:	682.048 (m)	0.025 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4044301.604 (m)
 EASTING: 691535.851 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8197155.231 (m)
 EASTING: 264713.396 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	50260
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	163187
AM7015	king KINGMAN CORS ARP	N351150	W1140229	164861

NEAREST NGS PUBLISHED CONTROL POINT

GR1894	T17 16S R63 64E SECS 7 12 36 C	N362929	W1145301	4258
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: mw101370.02o
 GV-PW-MW1 (MW-1)

DATE: June 20, 2002
 TIME: 01:09:13 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/17 19:13:00
 STOP: 2002/05/17 23:02:00
 OBS USED: 9436 / 9844 : 96%
 # FIXED AMB: 53 / 55 : 96%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3750)

X:	-2168295.326 (m)	0.008 (m)	-2168295.973 (m)	0.007 (m)
Y:	-4659721.218 (m)	0.023 (m)	-4659719.914 (m)	0.024 (m)
Z:	3765627.982 (m)	0.033 (m)	3765627.965 (m)	0.033 (m)

LAT:	36 24 47.67587	0.012 (m)	36 24 47.69295	0.012 (m)
E LON:	245 2 46.16525	0.003 (m)	245 2 46.11964	0.005 (m)
W LON:	114 57 13.83475	0.003 (m)	114 57 13.88036	0.005 (m)
EL HGT:	735.567 (m)	0.039 (m)	734.824 (m)	0.039 (m)
ORTHO HGT:	762.691 (m)	0.046 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4031729.816 (m)
 EASTING: 683459.964 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8184704.630 (m)
 EASTING: 256454.276 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	35335
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	177649
AM7015	king KINGMAN CORS ARP	N351150	W1140229	158134

NEAREST NGS PUBLISHED CONTROL POINT

GR1892	BIBLE	N362524	W1145540	2591
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: mx401361.02o
 MX-4 (CE-DT-4)

DATE: June 20, 2002
 TIME: 01:13:42 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/16 20:49:00
 STOP: 2002/05/16 22:58:00
 OBS USED: 5770 / 5979 : 97%
 # FIXED AMB: 34 / 34 : 100%
 OVERALL RMS: 0.015(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3724)

X:	-2152643.325 (m)	0.009 (m)	-2152643.972 (m)	0.010 (m)
Y:	-4638999.952 (m)	0.029 (m)	-4638998.651 (m)	0.029 (m)
Z:	3799640.438 (m)	0.037 (m)	3799640.422 (m)	0.038 (m)

LAT:	36 47 44.40893	0.017 (m)	36 47 44.42617	0.018 (m)
E LON:	245 6 25.92873	0.005 (m)	245 6 25.88296	0.007 (m)
W LON:	114 53 34.07127	0.005 (m)	114 53 34.11704	0.007 (m)
EL HGT:	636.506 (m)	0.041 (m)	635.770 (m)	0.041 (m)
ORTHO HGT:	662.935 (m)	0.048 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4074276.921 (m)
 EASTING: 688003.169 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8227176.614 (m)
 EASTING: 261624.086 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	178383
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75506
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	136218

NEAREST NGS PUBLISHED CONTROL POINT

GR0799	W 301	N364736	W1145120	3330
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: mx601360.02o
 MX-6 (CE-DT-6)

DATE: June 20, 2002
 TIME: 01:17:36 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 2.673

START: 2002/05/16 19:59:00
 STOP: 2002/05/16 22:00:00
 OBS USED: 5737 / 5804 : 99%
 # FIXED AMB: 31 / 31 : 100%
 OVERALL RMS: 0.014(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3723)

X:	-2144894.758 (m)	0.019 (m)	-2144895.405 (m)	0.021 (m)
Y:	-4644665.918 (m)	0.015 (m)	-4644664.616 (m)	0.015 (m)
Z:	3797168.942 (m)	0.022 (m)	3797168.926 (m)	0.023 (m)

LAT:	36 46 3.55722	0.016 (m)	36 46 3.57449	0.017 (m)
E LON:	245 12 45.46357	0.013 (m)	245 12 45.41786	0.019 (m)
W LON:	114 47 14.53643	0.013 (m)	114 47 14.58214	0.019 (m)
EL HGT:	667.757 (m)	0.024 (m)	667.018 (m)	0.024 (m)
ORTHO HGT:	694.315 (m)	0.035 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4071381.164 (m)
 EASTING: 697482.445 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8224141.092 (m)
 EASTING: 271058.457 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	184975
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	76597
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	135593

NEAREST NGS PUBLISHED CONTROL POINT

GR0795	S 301	N364622	W1144722	600
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: onc21440.02o
 BM-ONCO-2 (ONCO-2)

DATE: June 20, 2002
 TIME: 01:21:13 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11675.eph [precise]
 NAV FILE: brdc1440.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.064

START: 2002/05/24 17:36:00
 STOP: 2002/05/24 19:46:00
 OBS USED: 5202 / 5365 : 97%
 # FIXED AMB: 33 / 35 : 94%
 OVERALL RMS: 0.017 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.3939)

X:	-2157138.438 (m)	0.009 (m)	-2157139.084 (m)	0.009 (m)
Y:	-4678757.497 (m)	0.034 (m)	-4678756.190 (m)	0.034 (m)
Z:	3748298.109 (m)	0.016 (m)	3748298.089 (m)	0.016 (m)

LAT:	36 13 12.93647	0.021 (m)	36 13 12.95351	0.022 (m)
E LON:	245 14 52.66709	0.006 (m)	245 14 52.62169	0.008 (m)
W LON:	114 45 7.33291	0.006 (m)	114 45 7.37831	0.008 (m)
EL HGT:	611.757 (m)	0.031 (m)	611.006 (m)	0.031 (m)
ORTHO HGT:	639.523 (m)	0.040 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4010721.806 (m)
 EASTING: 702054.456 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8163428.702 (m)
 EASTING: 274737.094 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	40089
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	193105
AM7015	king KINGMAN CORS ARP	N351150	W1140229	130460

NEAREST NGS PUBLISHED CONTROL POINT

GR0458	P 168	N361320	W1144439	740
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: npc21361.02o
 CSV-RW2 (CSV-NPC)

DATE: June 20, 2002
 TIME: 01:24:26 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.743

START: 2002/05/16 21:01:00
 STOP: 2002/05/16 23:09:00
 OBS USED: 5803 / 5867 : 99%
 # FIXED AMB: 39 / 39 : 100%
 OVERALL RMS: 0.015(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3724)

X:	-2152825.928 (m)	0.008 (m)	-2152826.575 (m)	0.008 (m)
Y:	-4639048.548 (m)	0.023 (m)	-4639047.247 (m)	0.024 (m)
Z:	3799491.497 (m)	0.041 (m)	3799491.482 (m)	0.041 (m)

LAT:	36 47 38.19049	0.018 (m)	36 47 38.20773	0.019 (m)
E LON:	245 6 20.07327	0.006 (m)	245 6 20.02750	0.008 (m)
W LON:	114 53 39.92673	0.006 (m)	114 53 39.97250	0.008 (m)
EL HGT:	644.149 (m)	0.044 (m)	643.413 (m)	0.044 (m)
ORTHO HGT:	670.579 (m)	0.051 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4074082.073 (m)
 EASTING: 687862.254 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8226983.892 (m)
 EASTING: 261480.312 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AI8811	rail RAILROAD VALLEY CORS ARP	N381649	W1153953	178506
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75275
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	136452

NEAREST NGS PUBLISHED CONTROL POINT

GR0799	W 301	N364736	W1145120	3466
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: pedg1361.02o
 Pederson Spring Gage

DATE: June 20, 2002
 TIME: 01:28:15 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 2.135

START: 2002/05/16 18:15:00
 STOP: 2002/05/16 21:39:00
 OBS USED: 7290 / 9325 : 78%
 # FIXED AMB: 52 / 65 : 80%
 OVERALL RMS: 0.029(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3721)

X:	-2140670.488 (m)	0.070 (m)	-2140671.135 (m)	0.071 (m)
Y:	-4650732.165 (m)	0.088 (m)	-4650730.862 (m)	0.088 (m)
Z:	3791919.466 (m)	0.056 (m)	3791919.449 (m)	0.056 (m)

LAT:	36 42 34.52745	0.034 (m)	36 42 34.54473	0.035 (m)
E LON:	245 17 2.43623	0.027 (m)	245 17 2.39060	0.035 (m)
W LON:	114 42 57.56377	0.027 (m)	114 42 57.60940	0.035 (m)
EL HGT:	525.078 (m)	0.110 (m)	524.336 (m)	0.110 (m)
ORTHO HGT:	551.922 (m)	0.113 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065088.514 (m)
 EASTING: 704008.048 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217753.393 (m)
 EASTING: 277489.407 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	74460
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	139728
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178506

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	1783
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: prk01351.02o
 Perkins Old well

DATE: June 20, 2002
 TIME: 01:29:08 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11663.eph [precise]
 NAV FILE: brdc1350.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.347

START: 2002/05/15 20:59:00
 STOP: 2002/05/15 22:30:00
 OBS USED: 4054 / 4168 : 97%
 # FIXED AMB: 30 / 31 : 97%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3696)

X:	-2139155.575 (m)	0.018 (m)	-2139156.221 (m)	0.018 (m)
Y:	-4651343.953 (m)	0.083 (m)	-4651342.650 (m)	0.083 (m)
Z:	3791981.288 (m)	0.051 (m)	3791981.271 (m)	0.052 (m)
LAT:	36 42 37.63618	0.025 (m)	36 42 37.65346	0.026 (m)
E LON:	245 18 8.18482	0.023 (m)	245 18 8.13923	0.030 (m)
W LON:	114 41 51.81518	0.023 (m)	114 41 51.86077	0.030 (m)
EL HGT:	499.973 (m)	0.090 (m)	499.230 (m)	0.090 (m)
ORTHO HGT:	526.851 (m)	0.093 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065223.380 (m)
 EASTING: 705637.294 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217864.137 (m)
 EASTING: 279120.240 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	75487
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	139180
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178041

NEAREST NGS PUBLISHED CONTROL POINT

GR0789	K 301	N364305	W1144133	966
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: th201431.02o
 Paiutes TH-2 (TH-2)

DATE: June 20, 2002
 TIME: 01:33:23 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11674.eph [precise]
 NAV FILE: brdc1430.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 0.853

START: 2002/05/23 18:09:00
 STOP: 2002/05/23 23:03:00
 OBS USED: 12927 / 13474 : 96%
 # FIXED AMB: 53 / 57 : 93%
 OVERALL RMS: 0.017(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3914)

X:	-2150541.937 (m)	0.004 (m)	-2150542.584 (m)	0.005 (m)
Y:	-4656194.328 (m)	0.014 (m)	-4656193.024 (m)	0.014 (m)
Z:	3779963.900 (m)	0.012 (m)	3779963.882 (m)	0.012 (m)
LAT:	36 34 27.30830	0.018 (m)	36 34 27.32547	0.019 (m)
E LON:	245 12 33.65615	0.002 (m)	245 12 33.61052	0.002 (m)
W LON:	114 47 26.34385	0.002 (m)	114 47 26.38948	0.002 (m)
EL HGT:	686.378 (m)	0.005 (m)	685.635 (m)	0.005 (m)
ORTHO HGT:	713.411 (m)	0.025 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4049916.210 (m)
 EASTING: 697684.077 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8202678.053 (m)
 EASTING: 270942.977 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	58415
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	156041
AM7015	king KINGMAN CORS ARP	N351150	W1140229	167101

NEAREST NGS PUBLISHED CONTROL POINT

GR1907	QUARRY	N363456	W1144715	931
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: shv11371.02o
 SHV-1

DATE: June 20, 2002
 TIME: 01:36:06 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11665.eph [precise]
 NAV FILE: brdc1370.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 2.045

START: 2002/05/17 21:07:00
 STOP: 2002/05/17 23:37:00
 OBS USED: 6180 / 6383 : 97%
 # FIXED AMB: 42 / 44 : 95%
 OVERALL RMS: 0.019(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3752)

X:	-2162052.736 (m)	0.004 (m)	-2162053.382 (m)	0.004 (m)
Y:	-4652517.196 (m)	0.012 (m)	-4652515.893 (m)	0.012 (m)
Z:	3778097.414 (m)	0.019 (m)	3778097.397 (m)	0.020 (m)

LAT:	36 33 9.65012	0.017 (m)	36 33 9.66725	0.018 (m)
E LON:	245 4 31.52386	0.001 (m)	245 4 31.47822	0.002 (m)
W LON:	114 55 28.47614	0.001 (m)	114 55 28.52178	0.002 (m)
EL HGT:	781.107 (m)	0.015 (m)	780.367 (m)	0.016 (m)
ORTHO HGT:	807.817 (m)	0.029 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4047255.756 (m)
 EASTING: 685751.009 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8200193.976 (m)
 EASTING: 258973.210 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	49778
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	162234
AM7015	king KINGMAN CORS ARP	N351150	W1140229	170239

NEAREST NGS PUBLISHED CONTROL POINT

GR1788	DRY	N363032	W1145529	4875
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: wrmg1360.02o
 Warm Springs West Gage

DATE: June 20, 2002
 TIME: 01:37:22 UTC

SOFTWARE: page5 0203.19
 EPHEMERIS: igs11664.eph [precise]
 NAV FILE: brdc1360.02n
 ANT NAME: TRM33429.00-GP
 ARP HEIGHT: 1.564

START: 2002/05/16 17:09:00
 STOP: 2002/05/16 21:33:00
 OBS USED: 10092 / 11071 : 91%
 # FIXED AMB: 60 / 62 : 97%
 OVERALL RMS: 0.022 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.3721)

X:	-2140432.852 (m)	0.003 (m)	-2140433.498 (m)	0.004 (m)
Y:	-4650704.288 (m)	0.002 (m)	-4650702.985 (m)	0.002 (m)
Z:	3792065.787 (m)	0.016 (m)	3792065.770 (m)	0.016 (m)

LAT:	36 42 40.75004	0.014 (m)	36 42 40.76732	0.015 (m)
E LON:	245 17 10.66370	0.002 (m)	245 17 10.61810	0.004 (m)
W LON:	114 42 49.33630	0.002 (m)	114 42 49.38190	0.004 (m)
EL HGT:	512.593 (m)	0.007 (m)	511.851 (m)	0.007 (m)
ORTHO HGT:	539.437 (m)	0.026 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065285.166 (m)
 EASTING: 704207.635 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8217947.045 (m)
 EASTING: 277691.852 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	74735
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	139486
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178615

NEAREST NGS PUBLISHED CONTROL POINT

GR1414	L 301	N364330	W1144238	1549
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf@lvvwd.com
 RINEX FILE: abbt1961.02o
 Abbott (UM7)

DATE: August 07, 2002
 TIME: 15:19:08 UTC

SOFTWARE: page5 0203.19 ./master.pl
 EPHemeris: igs11751.eph [precise]
 NAV FILE: brdc1960.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 2.0635

START: 2002/07/15 17:32:00
 STOP: 2002/07/15 19:39:00
 OBS USED: 4608 / 4943 : 93%
 # FIXED AMB: 39 / 47 : 83%
 OVERALL RMS: 0.015 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000) ITRF00 (EPOCH:2002.5364)

X:	-2138309.430 (m)	0.024 (m)	-2138310.079 (m)	0.025 (m)
Y:	-4651456.426 (m)	0.058 (m)	-4651455.123 (m)	0.058 (m)
Z:	3792309.916 (m)	0.042 (m)	3792309.898 (m)	0.042 (m)

LAT:	36 42 51.05475	0.023 (m)	36 42 51.07197	0.024 (m)
E LON:	245 18 41.05148	0.010 (m)	245 18 41.00579	0.012 (m)
W LON:	114 41 18.94852	0.010 (m)	114 41 18.99421	0.012 (m)
EL HGT:	494.975 (m)	0.072 (m)	494.233 (m)	0.072 (m)
ORTHO HGT:	521.857 (m)	0.077 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4065656.587 (m)
 EASTING: 706442.894 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8218285.322 (m)
 EASTING: 279932.039 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	76303
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	138560
AM7015	king KINGMAN CORS ARP	N351150	W1140229	178159

NEAREST NGS PUBLISHED CONTROL POINT

GR0789	K 301	N364305	W1144133	554
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ecp21911.02o
 Paiutes ECP2 (ECP-2)

DATE: August 07, 2002
 TIME: 15:49:33 UTC

SOFTWARE: page5 0203.19 ./master2.pl
 EPHEMERIS: igs11743.eph [precise]
 NAV FILE: brdc1910.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 1.414

START: 2002/07/10 17:49:00
 STOP: 2002/07/10 22:35:00
 OBS USED: 8968 / 9276 : 97%
 # FIXED AMB: 50 / 52 : 96%
 OVERALL RMS: 0.020 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.5228)

X:	-2152255.972 (m)	0.007 (m)	-2152256.621 (m)	0.007 (m)
Y:	-4657439.877 (m)	0.008 (m)	-4657438.573 (m)	0.008 (m)
Z:	3777412.272 (m)	0.025 (m)	3777412.253 (m)	0.026 (m)

LAT:	36 32 45.08730	0.024 (m)	36 32 45.10441	0.025 (m)
E LON:	245 11 52.09448	0.003 (m)	245 11 52.04880	0.005 (m)
W LON:	114 48 7.90552	0.003 (m)	114 48 7.95120	0.005 (m)
EL HGT:	652.100 (m)	0.010 (m)	651.356 (m)	0.011 (m)
ORTHO HGT:	679.194 (m)	0.027 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4046742.158 (m)
 EASTING: 696722.953 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8199518.881 (m)
 EASTING: 269935.308 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	55309
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	159357
AM7015	king KINGMAN CORS ARP	N351150	W1140229	164661

NEAREST NGS PUBLISHED CONTROL POINT

GR1906	PET	N363133	W1144830	2296
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ecp11910.02o
 Paiutes ECP-1 (ECP-1)

DATE: August 07, 2002
 TIME: 15:53:28 UTC

SOFTWARE: page5 0203.19 ./master.pl
 EPHEMERIS: igs11743.eph [precise]
 NAV FILE: brdc1910.02n
 ANT NAME: TRM39105.00
 ARP HEIGHT: 1.015

START: 2002/07/10 17:37:00
 STOP: 2002/07/10 21:33:00
 OBS USED: 8130 / 8423 : 97%
 # FIXED AMB: 49 / 51 : 96%
 OVERALL RMS: 0.019(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.5228)

X:	-2152292.157 (m)	0.013 (m)	-2152292.805 (m)	0.013 (m)
Y:	-4657524.635 (m)	0.026 (m)	-4657523.331 (m)	0.026 (m)
Z:	3777290.781 (m)	0.029 (m)	3777290.762 (m)	0.031 (m)

LAT:	36 32 40.14187	0.023 (m)	36 32 40.15899	0.025 (m)
E LON:	245 11 52.20334	0.002 (m)	245 11 52.15769	0.003 (m)
W LON:	114 48 7.79666	0.002 (m)	114 48 7.84231	0.003 (m)
EL HGT:	653.765 (m)	0.039 (m)	653.021 (m)	0.039 (m)
ORTHO HGT:	680.863 (m)	0.046 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4046589.806 (m)
 EASTING: 696729.143 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8199366.472 (m)
 EASTING: 269939.253 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	55193
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	159501
AM7015	king KINGMAN CORS ARP	N351150	W1140229	164522

NEAREST NGS PUBLISHED CONTROL POINT

GR1906	PET	N363133	W1144830	2148
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

=====

USER: timothy.wolf\@lvvwd.com
 RINEX FILE: ecp31910.02o
 Paiutes ECP-3 (ECP-3)

DATE: August 07, 2002
 TIME: 15:56:09 UTC

SOFTWARE: page5 0203.19 ./master2.pl
 EPHEMERIS: igs11743.eph [precise]
 NAV FILE: brdc1910.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 1.256

START: 2002/07/10 17:59:00
 STOP: 2002/07/10 22:29:00
 OBS USED: 8201 / 8700 : 94%
 # FIXED AMB: 57 / 59 : 97%
 OVERALL RMS: 0.020 (m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.5228)

X:	-2152200.399 (m)	0.008 (m)	-2152201.048 (m)	0.009 (m)
Y:	-4657310.557 (m)	0.013 (m)	-4657309.253 (m)	0.012 (m)
Z:	3777609.663 (m)	0.030 (m)	3777609.644 (m)	0.031 (m)
LAT:	36 32 52.94914	0.025 (m)	36 32 52.96625	0.026 (m)
E LON:	245 11 51.94166	0.004 (m)	245 11 51.89599	0.006 (m)
W LON:	114 48 8.05834	0.004 (m)	114 48 8.10401	0.006 (m)
EL HGT:	656.606 (m)	0.025 (m)	655.862 (m)	0.025 (m)
ORTHO HGT:	683.692 (m)	0.035 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4046984.366 (m)
 EASTING: 696713.616 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8199761.171 (m)
 EASTING: 269929.540 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	55495
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	159126
AM7015	king KINGMAN CORS ARP	N351150	W1140229	164883

NEAREST NGS PUBLISHED CONTROL POINT

GR1906	PET	N363133	W1144830	2532
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: gv201961.02o
 GV-2

DATE: August 07, 2002
 TIME: 15:57:22 UTC

SOFTWARE: page5 0203.19 ./master.pl
 EPHEMERIS: igs11751.eph [precise]
 NAV FILE: brdc1960.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 1.594

START: 2002/07/15 16:32:00
 STOP: 2002/07/15 21:35:00
 OBS USED: 10459 / 10900 : 96%
 # FIXED AMB: 66 / 68 : 97%
 OVERALL RMS: 0.019(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.5364)

X:	-2167421.242 (m)	0.008 (m)	-2167421.891 (m)	0.009 (m)
Y:	-4664096.000 (m)	0.023 (m)	-4664094.695 (m)	0.023 (m)
Z:	3760704.210 (m)	0.020 (m)	3760704.191 (m)	0.021 (m)

LAT:	36 21 29.85157	0.025 (m)	36 21 29.86857	0.026 (m)
E LON:	245 4 31.96879	0.005 (m)	245 4 31.92313	0.006 (m)
W LON:	114 55 28.03121	0.005 (m)	114 55 28.07687	0.006 (m)
EL HGT:	711.470 (m)	0.017 (m)	710.726 (m)	0.017 (m)
ORTHO HGT:	738.815 (m)	0.030 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4025689.631 (m)
 EASTING: 686226.491 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8178624.988 (m)
 EASTING: 259131.664 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	32593
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	182536
AM7015	king KINGMAN CORS ARP	N351150	W1140229	151563

NEAREST NGS PUBLISHED CONTROL POINT

GR0672	W 137	N362116	W1145427	1579
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

NGS OPUS SOLUTION REPORT

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USER: timothy.wolf\@lvvwd.com
 RINEX FILE: m1001931.02o
 Paiutes-M-1 (M-1)

DATE: August 07, 2002
 TIME: 16:00:31 UTC

SOFTWARE: page5 0203.19 ./master.pl
 EPHEMERIS: igs11745.eph [precise]
 NAV FILE: brdc1930.02n
 ANT NAME: TRM33429.00+GP
 ARP HEIGHT: 1.512

START: 2002/07/12 17:07:00
 STOP: 2002/07/12 19:18:00
 OBS USED: 5353 / 5463 : 98%
 # FIXED AMB: 38 / 38 : 100%
 OVERALL RMS: 0.016(m)

REF FRAME: NAD83 (CORS96) (EPOCH:2002.0000)

ITRF00 (EPOCH:2002.5281)

X:	-2142384.698 (m)	0.005 (m)	-2142385.347 (m)	0.004 (m)
Y:	-4655219.099 (m)	0.010 (m)	-4655217.796 (m)	0.010 (m)
Z:	3785527.645 (m)	0.028 (m)	3785527.626 (m)	0.029 (m)

LAT:	36 38 15.38012	0.021 (m)	36 38 15.39730	0.021 (m)
E LON:	245 17 15.27233	0.003 (m)	245 17 15.22667	0.004 (m)
W LON:	114 42 44.72767	0.003 (m)	114 42 44.77333	0.004 (m)
EL HGT:	551.476 (m)	0.025 (m)	550.732 (m)	0.025 (m)
ORTHO HGT:	578.539 (m)	0.035 (m)	[Geoid99 NAVD88]	

UTM: Zone 11
 NORTHING: 4057109.142 (m)
 EASTING: 704517.133 (m)

SPC: Zone 2701 (NV)
 NORTHING: 8209768.487 (m)
 EASTING: 277880.490 (m)

BASE STATIONS USED

PID	DESIGNATION	LATITUDE	LONGITUDE	DISTANCE (m)
AJ1826	lvwd LAS VEGAS VALLEY CORS ARP	N360934	W1151128	68277
AI8817	echo ECHO CANYON S.P. CORS ARP	N375455	W1141551	147319
AM7015	king KINGMAN CORS ARP	N351150	W1140229	170913

NEAREST NGS PUBLISHED CONTROL POINT

GR1902	BYRON	N363638	W1144128	3563
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This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.

AM7015 KING KINGMAN CORS ARP

N351150.480 W1140229.275 130176.3

NEAREST NGS PUBLISHED CONTROL POINT

GR0458

P 168

N361319.

W1144441.

185.6

This position was computed without any knowledge by the National Geodetic Survey regarding the equipment or field operating procedures used.