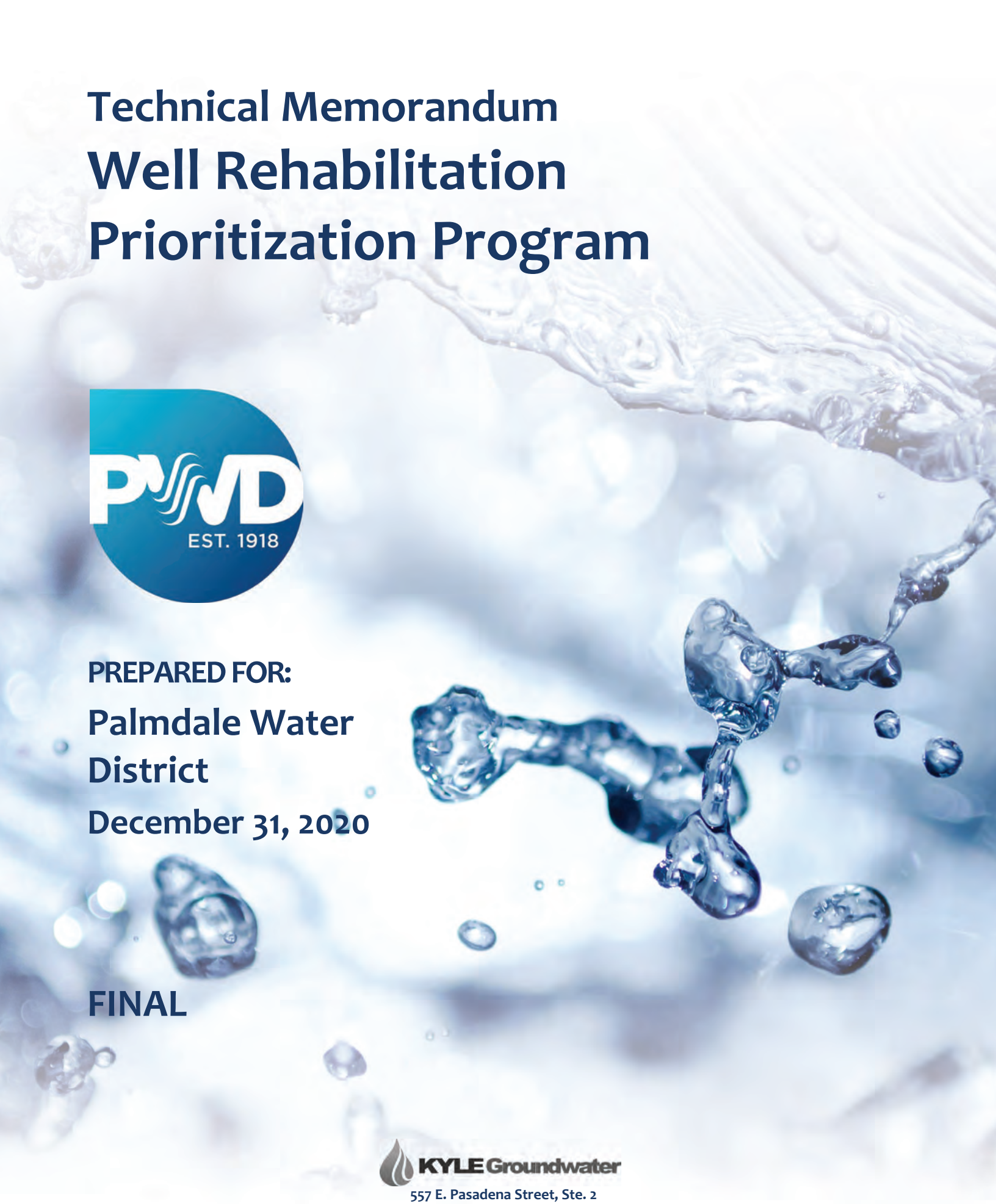
Technical Memorandum
Well Rehabilitation Prioritization Program



PREPARED FOR:

Palmdale Water District

December 31, 2020

FINAL

KYLE Groundwater
557 E. Pasadena Street, Ste. 2
Pomona, CA 91767 | 626-379-7569
www.kylegroundwater.com

Well Rehabilitation Prioritization Program

Final Report

Prepared For:

Palmdale Water District

Russell J. Kyle, PG, CHG
KYLE Groundwater, Inc.

TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

AFY	Acre-Feet per Year
APN	Assessor's Parcel Number
ASTM	American Society for Testing and Materials
bgs	Below Ground Surface
bRP	Below Reference Point
DWR	California Department of Water Resources
DR	Direct Circulation Rotary Drilling
CITM	Casing Inspection Thickness Measurement
gpm	Gallons per Minute
HP	Horsepower
HSLA	High Strength Low Alloy
ID	Inside Diameter
MS	Mild Steel
OD	Outside Diameter
PWD	Palmdale Water District
RC	Reverse Circulation Rotary Drilling
SS	Stainless Steel
SWP	State Water Project

1.0 INTRODUCTION

1.1 BACKGROUND

Palmdale Water District (PWD) meets the water demand of its almost 28,000 service connections through a combination of treated surface water from the State Water Project (SWP), and groundwater pumped from water supply wells. PWD's 22 active groundwater production wells account for approximately 40 percent of water supplied to its customers, the majority of which is pumped directly into the distribution system following disinfection. The remainder is disinfected, pumped into storage tanks, and boosted to four (4) nearby pressure zones. In addition to the wells, PWD's water storage and distribution system consists of 21 reservoirs, 17 booster stations, 14 pressure-reducing stations, and several hundred miles of pipeline.

Under the December 2015 adjudication of the Antelope Valley Groundwater Basin, PWD is assigned a native groundwater production right of approximately 2,770 acre-feet per year (AFY). Additionally, PWD benefits from a share of unused water rights from the Federal Government's 7,600 AFY of native groundwater rights of approximately 1,370 AFY. PWD is also entitled to a return flow credit equal to all imported water utilized by PWD, estimated to range from between 4,900 and 6,000 AFY.

1.2 PROJECT LOCATION

PWD is located within the southern central part of the Antelope Valley Groundwater Basin, Los Angeles County, California (see Figure 1). Well locations are shown on Figure 2.

1.3 PURPOSE & SCOPE

It is our understanding that PWD's primary goal for this project is to prepare a roadmap to maximize local water supply sources and reduce reliance on costly imported water. This planning document will guide PWD in decision making for future well maintenance and well replacement projects designed to optimize and maintain production capacity. It will identify those wells that are in most need of rehabilitation and that offer the best chance for success at the lowest cost. It will also identify wells that should be operated to failure while planning for replacement. The scope of work for achieving this objective include:

- Acquisition and review of well data and reports.
- Preparation of well histories and condition assessments for each well.
- Ranking of each well based on condition.
- Identification of wells in need of replacement.
- Ranking of wells by highest likelihood of successful rehabilitation at least cost.
- Ranking of wells by system needs.
- Preparation of this well rehabilitation prioritization report.

1.4 DATA SOURCES

Data obtained from PWD for purposes of this study included the following:

- Well locations.
- Downhole video survey logs and reports.
- Well driller's logs.
- Well construction details.
- Well modification details.
- Historical water levels.
- Historical instantaneous pumping rates.
- Sand production records.
- Prior well rehabilitation records.
- Pumping plant equipment details.
- Pump efficiency test results.

2.0 WELL HISTORIES

Well records and performance data were collected from PWD, and compiled, processed, and reviewed to assemble a detailed well history for each of the 22 active wells, and to assist with identification of factors that may be affecting useful service life, well performance, and possible rehabilitation and/or repair methodologies that may be required.

Detailed well construction and testing information extracted from available Well Driller's Reports (included in Appendix A) and downhole video surveys are summarized in Table 1. In most cases, only the most recent downhole video surveys were reviewed for each active well, supplemented with review of prior surveys as necessary to clarify well condition, construction details, and well modification details. An inventory of all 142 available downhole video surveys in DVD and VHS format is included in Appendix B and available video survey reports for active wells are included in Appendix C. Detailed notes taken during video survey review are included in Appendix D and snapshots are included in digital format in Appendix E. As-built construction diagrams for each active well were prepared using well construction and modification information gathered during data review and are included in Appendix F. The Casing Inspection Thickness Measurement (CITM) survey log conducted at Well No. 7A is included in Appendix G.

Well performance details, including static and pumping water levels, instantaneous pumping rate, specific capacity, and prior well rehabilitation events were used to prepare historical groundwater level and performance charts for each active well (see Figures 3 to 24).

2.1 WELL 2A

Well 2A was drilled and constructed to a depth of approximately 900 feet below ground surface (bgs) in 1968 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 450 feet bgs, and from 462 to 480 feet bgs. The well screen consists of mild steel casing with 0.125-inch louvered openings extending from 450 to 462 feet bgs and from 480 to 900 feet bgs, differing considerably from as-built construction details observed during the downhole video survey conducted on June 22, 2010. That video survey indicated the well screen to begin at 450 feet below reference point (bRP) and extending all the way to 852.6 feet bRP, terminating in fill. The water level in the well was reported to occur at a depth of 370 feet bgs at time of construction (i.e., 1968). The instantaneous production rate recorded at the time of construction was approximately 2,100 gallons per minute (gpm). The DWR Well Driller's Report is included in Appendix A.

The steel casing patch extending from 581 to 586 feet bRP was presumably installed to repair hole(s) within the blank well casing, possibly in 2010.

June 22, 2010 Video Survey

On June 22, 2010, a downhole video survey was performed as part of a rehabilitation event to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 568 feet bRP. Small bubbles were observed entering the well screen below the static water level, evidence of aquifer dewatering followed by recovery. The blank well casing and louvered well screen above the static water level were observed to be in relatively good condition, exhibiting only mild spalling and corrosion. The existing well patch appeared to be in fair condition. The louvered well screen was observed to be clogged with light-colored mineral encrustation and bacterial growth, becoming increasingly severe and almost completely obscured below approximately 580 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 852.6 feet bRP indicating approximately 47 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey, including the locations of well modifications, are shown graphically in Appendix F.

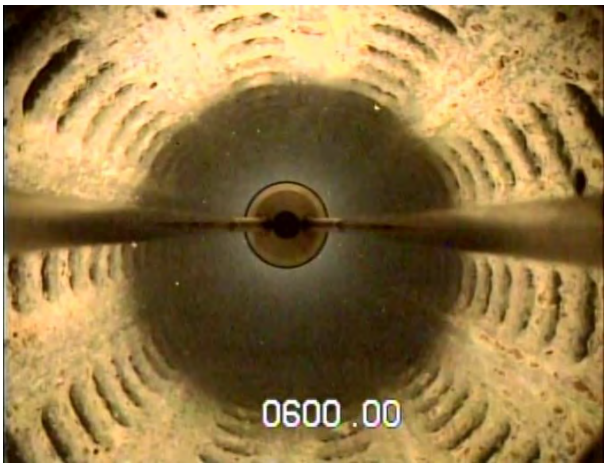
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water elevations and well performance data are shown on Figure 3 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 511 feet bgs in April 1992 and December 1993 to a maximum of 581 feet bgs in December 2001 while pumping water levels range from approximately 531 feet bgs in December 2019 to 614 feet bgs in February 2016. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and show generally decreasing trends over the period of record from 1992 to 2015. Since that time, static water levels have shown an increasing trend.

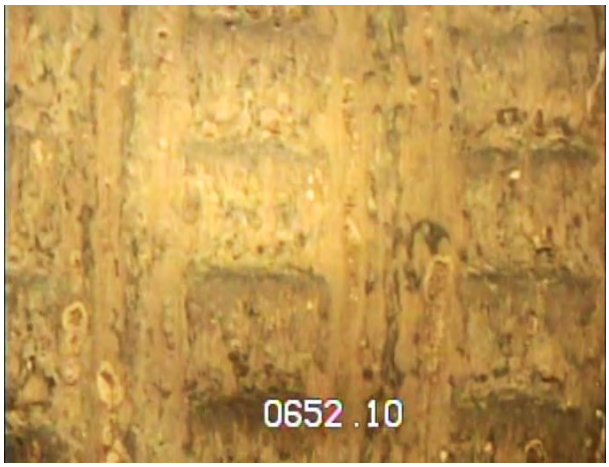
Instantaneous pumping rates exhibit a decrease from a high of approximately 2,100 gpm in 1968 (i.e., immediately following construction) to a low of 591 gpm in May 2014 with an average of approximately 1,365 gpm. Specific capacity ranges from a low of approximately 23 gpm/foot in May 2014 to a high of 94 gpm/foot in December 2012, averaging approximately 60 gpm/foot. The overall trend in specific capacity has fluctuated considerably over the period of record, primarily mirroring increases and decreases in instantaneous pumping rate.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), both static and pumping water levels have exhibited a generally increasing trend of approximately 12 feet per year (see Figure 3). Instantaneous pumping rates have fluctuated considerably while specific capacity has increased by approximately 6 gpm/foot per year (see Figure 3).



Mineral encrustation upon louvered well screen.



Louvers completely obscured by mineral encrustation.

2.2 WELL 3A

Well 3A was drilled and constructed to a depth of approximately 848 feet bgs in 1960 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 396 feet bgs. The well screen consists of mild steel louvered casing with estimated 0.125-inch openings extending from 396 to 848 feet bgs, differing somewhat from as-built construction details observed during the downhole video survey conducted on August 25, 2004. That video survey indicated that the well screen extends from 399 to 540 feet bRP, and from 581 to 807 feet bRP, terminating in fill. The DWR Well Driller's Report is included in Appendix A.

The steel casing patches extending from 705 to 715 feet bRP were presumably installed to repair hole(s) within the blank well casing.

August 25, 2004 Video Survey

On August 25, 2004, a downhole video survey was performed following installation of the casing patches and to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 587 feet bRP. Small bubbles were observed entering the well screen below the static water level, evidence of aquifer dewatering followed by recovery. The blank well casing and louvered well screen above the static water level were observed to be in relatively good condition, exhibiting only mild spalling and corrosion. The existing well patch appeared to be in fair condition. The louvered well screen was observed to be open and possibly enlarged, becoming partially clogged with encrusting materials and biological growth below approximately 735 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 807 feet bRP indicating approximately 41 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey, including the locations of well modifications, are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

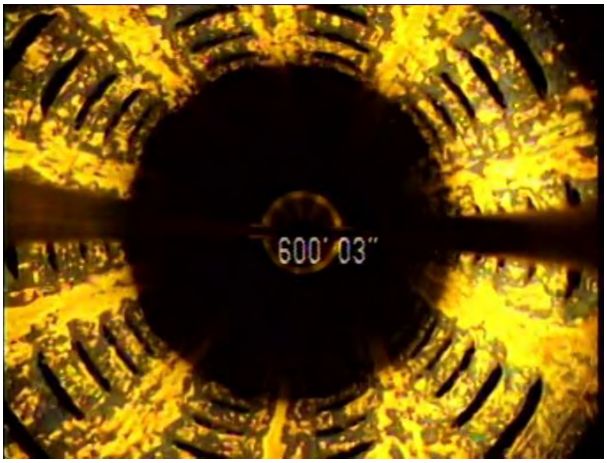
Historical static and pumping water elevations and well performance data are shown on Figure 4 for the period of record from July 1992 to March 2020. Static water levels range from a minimum of approximately 519 feet bgs in December 1993 to a maximum of 610 feet bgs in October 2015 while pumping water levels range from approximately 520 feet bgs in May 2003 to 603 feet bgs in August 2007. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and show generally decreasing trends over the period of record from 1992 to 2015. Since that time, static water levels have shown an increasing trend.

Instantaneous pumping rates exhibit a decrease from a high of approximately 1,617 gpm in February 2003 to a low of 983 gpm in April 2017 with an average of approximately 1,300 gpm.

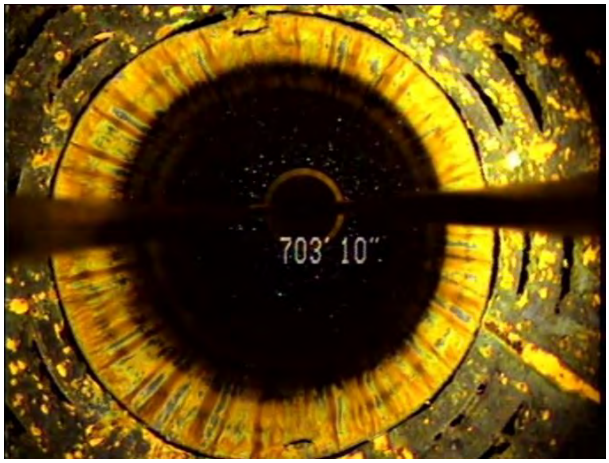
Specific capacity ranges from a low of approximately 20 gpm/foot in August 2007 to a high of 67 gpm/foot in April 2013, averaging approximately 47 gpm/foot. The very high specific capacity value reported in December 2008 is assumed to be anomalous. Despite fluctuations due to seasonal and operational changes, the overall trend in specific capacity has been relatively stable over the period of record.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), both static and pumping water levels have exhibited a generally increasing trend of approximately 12 feet per year (see Figure 4). Instantaneous pumping rates have remained stable while specific capacity has increased by approximately 3 gpm/foot per year (see Figure 4).



Open and possibly enlarged louvered openings.



Top of well casing patch.

2.3 WELL 6A

Well 6A was drilled and constructed to a depth of approximately 1,010 feet bgs in 1983 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 480 feet bgs. The well screen consists of mild steel casing with 0.080-inch louvered[1] openings extending from 480 to 1,010 feet bgs. The water level in the well was reported to occur at a depth of 600 feet bgs at time of construction (i.e., 1983). The instantaneous production rate recorded at the time of construction was approximately 800 gpm. The DWR Well Driller's Report is included in Appendix A.

May 15, 2018 Video Survey

On May 15, 2018, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 535 feet bRP. The blank well casing and louvered well screen above the static water level were observed to exhibit mild to severe spalling and corrosion, increasing with depth. The louvered well screen below the static water level to approximately 600 feet bRP was observed be coated with mild mineral encrustation, nodules, and bacteriological growth. Biological growth increased considerably below 600 feet bRP with the well screen openings becoming obscured with heavy bacterial growth and slime buildup (see photograph on following page).

Fill was encountered at a depth of approximately 995 feet bRP indicating approximately 15 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water elevations and well performance data are shown on Figure 5 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 495 feet bgs in September 2008 to a maximum of 607 feet bgs in July 2005 while pumping water levels range from approximately 521 feet bgs in January 1999 to 575 feet bgs in June 2014. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and show generally decreasing trends over the entire period of record.

Instantaneous pumping rates exhibit a decrease from a high of approximately 343 gpm in February 2017 to a low of 176 gpm in February 2019, with an average of approximately 265 gpm. Specific capacity ranges from a low of approximately 2 gpm/foot in June 2014 to a high of 8 gpm/foot in April 2008, averaging approximately 3 gpm/foot. Despite fluctuations due to seasonal and operational changes, the overall trend in specific capacity has been relatively stable over the period

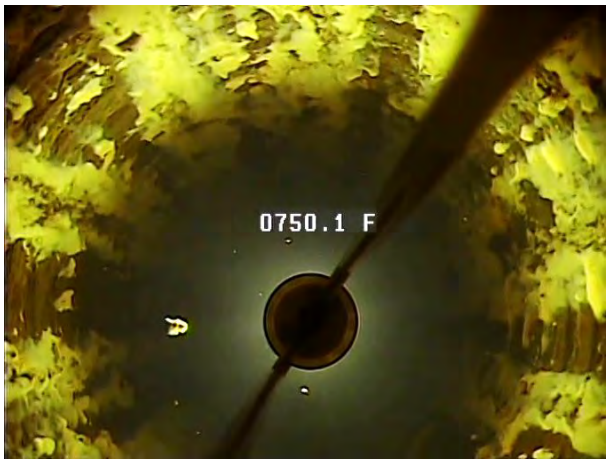
[1] It should be noted that the DWR Well Driller's Log for Well 6A indicates the well screen to be mill-slotted although the video survey clearly indicates louvered well screen.

of record. In early-2017 the instantaneous pumping rate decreased sharply with no corresponding change in static water levels or specific capacity.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static water levels have exhibited a generally stable trend (see Figure 5). Pumping water levels exhibit a slight increasing trend of approximately 7 feet per year (see Figure 5), likely due to the sharp decline in pumping rate in early-2017. Instantaneous pumping rates sharply decreased by approximately 75 gpm in 2017, presumably due to a change in pumping equipment and/or operations at that time. Specific capacity remained generally stable over that same period of time (see Figure 4).

Mild encrustation and bacterial growth above 600 feet bRP.



Heavy bacterial growth below 600 feet bRP.

2.4 WELL 7A

Well 7A was drilled and constructed to a depth of approximately 920 feet bgs in 1985 using the reverse circulation rotary drilling method. The blank well casing reportedly consists of 16-inch diameter by 1/4-inch wall thickness mild steel extending from ground surface to 570 feet bgs, and from 900 to 920 feet bgs. The well screen reportedly consists of mild steel wire-wrap with 0.050-inch openings extending from 570 to 900 feet bgs, differing slightly from as-built construction details observed during the downhole video survey conducted on May 4, 2020. The water level in the well was reported to occur at a depth of 485 feet bgs at time of construction (i.e., mid- to late-1985). The instantaneous production rate recorded at the time of construction was approximately 2,000 gpm with an associated specific capacity of approximately 37 gpm per foot. The DWR Well Driller's Report is included in Appendix A.

Holes within the blank well casing were repaired in 2018 with the installation of two stainless steel patches extending from 542.2 to 546.3 feet bRP, and from 547.4 to 552.4 feet bRP. At this time, a concrete plug was also installed at the bottom of the well from 832.5 to 860 feet bRP to seal a breach in the well screen at a depth of approximately 860 feet bRP. An inflatable packer was also installed on the pump column at a depth of approximately 627 to 632 feet bRP in an effort to mitigate entrained air from cascading water.

<u>May 4, 2020 Video Survey</u>

On May 4, 2020, a downhole video survey was performed to evaluate the physical condition of the well following a reported pump failure after installation of a new motor. At the time that survey was conducted, the static water level was observed at a depth of approximately 528 feet bRP with only a slight sheen of turbine oil present floating on the water surface. The blank well casing above the static water level was observed to be in relatively good condition, exhibiting only general corrosion and pitting, and isolated areas of spalling. The blank well casing below static water level exhibited a greater degree of corrosion and evidence of nodule growth. The existing well patches appear to be in good condition. The wire-wrap well screen was observed to be in relatively poor condition, exhibiting some heavily corroded rods, and appearing moderately to heavily clogged with corrosion byproducts and bacterial growth (see photograph on following page).

A large vertical rupture was evident within the well screen between the depths of 629 and 630.9 feet bRP, the same depth as the aforementioned inflatable packer assembly (see photograph on following page). Some grains of gravel were visible settled within certain sections of well screen above the rupture and no gravel was observed behind the rupture, suggesting gravel envelope material was evacuated from this section by the pump. Damaged and corroded screen wire was observed at depths of approximately 652.1 and 652.5 feet bRP, further evidence of possible structural deficiencies in the well screen.

The well screen appears intermittently clogged below the depth of the large rupture at 630.9 feet bRP to approximately 700 feet bRP, with minor to moderate amounts of corrosion and bacterial growth present. The degree of clogging becomes heavier below approximately 705 feet bRP to approximately 800 feet bRP, with the well screen becoming almost completely obscured below that depth. Fill was encountered at a depth of approximately 823.7 feet bRP indicating approximately 9 feet of fill above the reported top of the cement plug at 832.5 feet bRP. The as-built details verified by the downhole video survey, including the locations of well modifications and damage, are included in Appendix F.

May 29, 2020 Casing Inspection Thickness Measurement (CITM) Survey

On May 29, 2020, a CITM survey (see Appendix G) was conducted by Pacific Surveys, LLC to assess the structural condition of the well in response to evaluation of the May 4, 2020 video survey and subsequent condition assessment. It should be noted that results of the survey suggest that the blank well casing consists of High-Strength Low-Alloy (HSLA) steel rather than the mild steel assumed from the DWR Well Driller's Report.

The CITM survey suggests that moderate metal loss of up to 20% has occurred within the blank well casing above the well screen, with the majority of the loss occurring below approximately 200 feet bRP. There are three areas within the well screen that suggest some degree of damage: 1) at the depth of the reported rupture at approximately 630 feet bRP, 2) at approximately 682 feet bRP, and 3) at approximately 765 feet bRP. At the time that survey was conducted, the static water level was observed at a depth of approximately 530 feet bRP.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 6 for the period of record from March 1992 to November 2019. Static water levels range from a minimum of approximately 478 feet bgs in April 1992 to a maximum of 568 feet bgs in September 2009 and March 2016 while pumping water levels range from approximately 538 feet bgs in March 1996 to 633 feet bgs in February, September, and October 2019. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and show generally decreasing trends over the period of record from 1992 to 2015. Since that time, static water levels have shown a slight increasing trend. Decreasing pumping water levels observed since 2018 are likely due to increased pumping rates.

Instantaneous pumping rates exhibit a decrease from a high of approximately 2,000 gpm in September 1985 (i.e., immediately following construction) to a low of 870 gpm in March 2017 with an average of approximately 1,180 gpm. Specific capacity ranges from a low of approximately 14 gpm/foot in September 2017 to a high of 38 gpm/foot in February 2017, averaging approximately 28 gpm/foot. The overall trend in specific capacity has remained relatively stable over the period of

record. In late-2018 the instantaneous pumping rate increased considerably with a corresponding decrease in specific capacity, likely due to rehabilitation of the pumping equipment in 2018.

Performance Characteristics (Prior 5 Years)

Pumping water levels and specific capacity exhibited a sharp decrease beginning in 2018, corresponding to a sharp increase in instantaneous pumping rate, despite relatively stable static water levels (see Figure 6). This is likely the result of increased pumping following a well rehabilitation event completed that same year.

Heavily clogged well screen.

Large rupture from 629-630.9 feet bRP.

Well Repair and Rehabilitation

The well condition assessment conducted in May 2020 resulted in the observation that the well casing and screen is in generally poor condition, beyond its estimated useful life of 20 to 30 years, and likely to experience additional structural failure within the near future. Installation of well patches to stabilize the current structural issues were deemed unlikely to result in a significant extension in the life of the well and highly likely to cause further structural problems, including catastrophic casing collapse. As such, it was recommended that the well replaced as soon as possible. Installation of a partial well liner with gravel envelope was recommended to extend the useful service life of the well until such time that the well can be replaced. As of the date of this report, the well liner had been installed and the well is undergoing rehabilitation and redevelopment.

2.5 WELL 8A

Well 8A was drilled and constructed to a depth of approximately 960 feet bgs in 1988 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 560 feet bgs. The blank well casing from 740 to 820 feet bgs, 880 to 920 feet bgs, and 940 to 960 feet bgs reportedly consists of 16-inch by 3/8-inch wall thickness steel (presumably mild steel). The 16-inch diameter wire-wrap well screen reportedly extends from 560 to 740 feet bgs, 820 to 880 feet bgs, and 920 to 940 feet bgs with 0.050-inch openings. The well screen steel material type is not reported on the DWR log but appears to be stainless steel. The water level in the well was reported to occur at a depth of 461 feet bgs at time of construction (i.e., 1988). The instantaneous production rate recorded at the time of construction was approximately 2,500 gpm. The Well Driller's Report is included in Appendix A.

February 22, 2017 Video Survey

On February 22, 2017, a downhole video survey was performed to evaluate the physical condition of the well following a well rehabilitation event. At the time that survey was conducted, the static water level was observed at a depth of approximately 546 feet bRP. The blank well casing above the static water level was observed to be in relatively good condition, exhibiting only mild spalling and corrosion. The wire-wrap well screen was observed to be open and in excellent condition (see photograph on following page) although the intermediate blank sections appeared corroded with some occurrence of nodule growth and bleeding of corrosion byproducts into adjacent well screen sections (see photograph on following page).

Fill was encountered at a depth of approximately 892 feet bRP, obscuring the lowermost well screen section and indicating approximately 68 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 7 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 473 feet bgs in October 2008 to a maximum of 588 feet bgs in August 2004 while pumping water levels range from approximately 515 feet bgs in October 2008 to 651 feet bgs in July 2005. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and have shown several periods of increasing and decreasing trends over the period of record from 1992 to 2020. Water levels have exhibited a generally increasing trend since 2015.

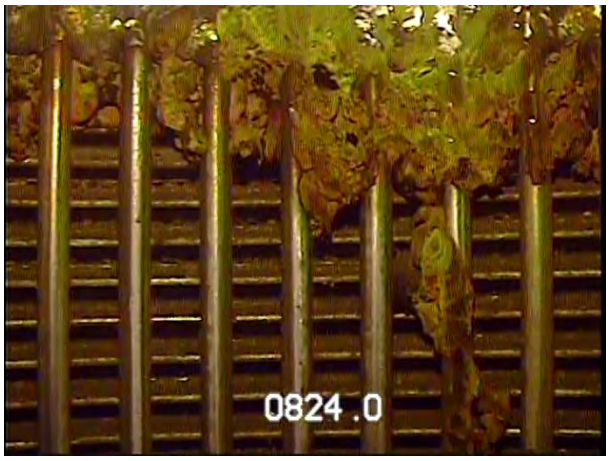
Instantaneous pumping rates have averaged approximately 1,570 gpm over the period of record from September 2009 through November 2016. However, these data appear suspect and the flowmeter equipped on the well was reported questionable. Following a rehabilitation event in 2017, the pumping rate averaged 1,911 gpm and exhibited a generally stable trend. Specific capacity ranges

from a low of approximately 34 gpm/foot in September 2014 to a high of 72 gpm/foot in October 2017, averaging approximately 50 gpm/foot. Despite fluctuations due to seasonal and operational changes, the overall trend in specific capacity has been relatively stable over the period of record. In mid-2017, following a rehabilitation event, there was a marked increase in specific capacity coincident with an increase in water levels and instantaneous pumping rate.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited generally increasing trends of approximately 10 feet per year (see Figure 7). Instantaneous pumping rates increased sharply by approximately 300 gpm following a rehabilitation event in 2017, possibly in part due to erroneous readings from a questionable flowmeter in use prior to 2017. Specific capacity increased by approximately 15 gpm/foot following the 2017 rehabilitation event and has remained generally stable since that time (see Figure 7).

Clean and open well screen with visible gravel material.



Corrosion byproducts bleeding from blank into well screen.

2.6 WELL 10

Well 10 was drilled and constructed to a depth of approximately 282 feet bgs in 1928, likely using the cable tool drilling method. The well was deepened in 1946 to a reported depth of 600 feet bgs, although subsequent information suggests that the well was extended to a greater depth at that time[2]. The original 1928 well casing consisted of 16-inch diameter steel. The well casing installed in 1946 reportedly consisted of 12-inch diameter steel although subsequent information suggests that the well casing was 14-inch diameter with perforations of unknown type extending from 280 to 527 feet bgs[3]. A 12-inch diameter liner was reportedly installed in 1987 extending to an unknown total depth and perforated with vertical mills knife openings from 500 to 610 feet bgs and louvered openings extending from 624 feet bgs and terminating in fill material at a depth of 658 feet bgs. A second 8-inch diameter well liner was installed in 2017 to a depth of 640 feet bgs with machine cut openings extending from 340 to 640 feet bgs. The DWR Well Driller's Report is included in Appendix A.

September 8, 2017 Video Survey

On September 8, 2017, a downhole video survey was performed to evaluate the physical condition of the well prior to installation of the second well liner. Subsequent video surveys following installation of the well liner, if in existence, were not available for review. At the time the September 8, 2017 survey was conducted, the static water level was observed at a depth of approximately 439 feet bRP. The 1987 liner above the static water level was observed to be in poor condition, exhibiting several areas of structurally compromised casing, the most severe section occurring between the depths of 334 and 346 feet bRP (see photograph on following page). The liner had been previously repaired with steel casing patches extending from 309 to 329 feet bRP, presumably to repair hole(s) within the liner. The mill-slotted well screen was observed to be generally open with minor buildup (see photograph on following page) while the louvered section of well liner below 624 feet bRP exhibited heavier buildup of material.

Fill was encountered at a depth of approximately 628 feet bRP within the louvered section of the well liner indicating at least 30 feet of fill above the estimated bottom of the well liner. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 8 for the period of record from March 1992 to March 2020. Static water levels range from a minimum of

[2] A subsequent well liner installed in 1987 extended to a depth of at least 658 feet bgs, terminating in fill at that depth and suggesting that the 600-foot depth reported in 1946 was erroneous.

[3] The well liner installed in 1987 was 12 inches in diameter, suggesting that the casing installed in 1946 could not have been 12 inches in diameter. The 1946 well casing could be seen behind the 1987 well casing and is presumed to be one nominal pipe diameter larger than the 1987 liner.

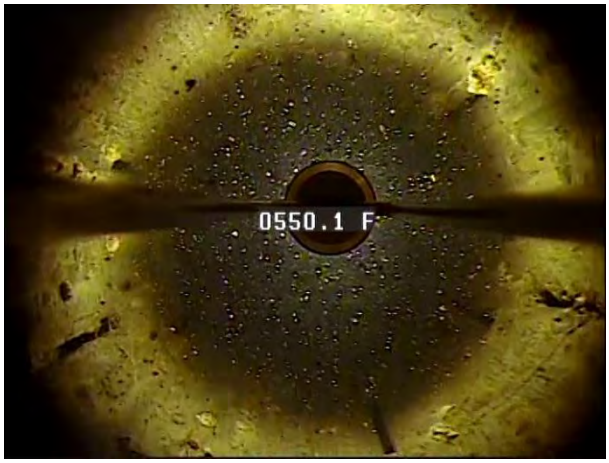
approximately 403 feet bgs in March 2013 to a maximum of 499 feet bgs in February 1996 while pumping water levels range from approximately 431 feet bgs in late-2012/early-2013 to 608 feet bgs in July 1993. Static and pumping water levels have exhibited an increasing trend during the period between the early 1990s to early-2013 and then a decreasing trend through late-2016 at which time the well was rehabilitated. Since early-2018, water levels have been generally stable.

Instantaneous pumping rates and specific capacity exhibit a generally stable trend over the period of record from January 2008 through March 2020 and have averaged approximately 189 gpm and 7 gpm/foot, respectively. Static and pumping water levels, and instantaneous pumping rates exhibited a sharp decrease in early-2018 along with a corresponding decrease in specific capacity. This is likely due to additional head losses imparted by installation of the well liner in 2017.

Performance Characteristics (Prior 5 Years)

Instantaneous pumping rates and specific capacity have been generally stable over the past five (5) years (i.e., 2015 through 2020) but exhibited a sharp decrease in early-2018 due to increased head losses from installation of the second well liner in 2017 (see Figure 8). Static and pumping water levels exhibited a similar decrease in early-2018 but have remained generally stable since that time (see Figure 8).

Numerous holes within the 1987 well liner.



Minor mineral encrustation upon the mill-slotted liner.

2.7 WELL 11A

Well 11A was drilled and constructed to a depth of approximately 900 feet bgs in 1963 using the direct circulation rotary drilling method. The blank well casing reportedly consists of 16-inch diameter by 1/4-inch wall thickness mild steel extending from ground surface to 504 feet bgs. The well screen reportedly consists of mild steel casing with 0.125-inch louvered openings extending from 504 to 900 feet bgs. The DWR Well Driller's Report is included in Appendix A.

A 12-inch diameter liner was installed in 2012 extending to a depth of 875 feet bgs and perforated with 0.060-inch louvered openings from 665 to 865 feet bgs.

March 14, 2012 Video Survey

On March 14, 2012, a downhole video survey was performed to evaluate the physical condition of the well following a well rehabilitation event that included installation of a 12-inch liner. At the time that survey was conducted, the static water level was observed at a depth of approximately 552 feet bRP. The blank well liner above the static water level was observed to be clean and in relatively good condition. The blank casing and screen below static water level exhibited minor to moderate biological growth throughout, and evidence of filamentous bacterial growth below approximately 775 feet bRP (see photographs on following page). Fill was encountered at a depth of approximately 861 feet bRP indicating approximately 14 feet of fill above the reported bottom of the 12-inch well liner. The as-built details verified by the downhole video survey, including the locations of well modifications and damage, are included in Appendix F.

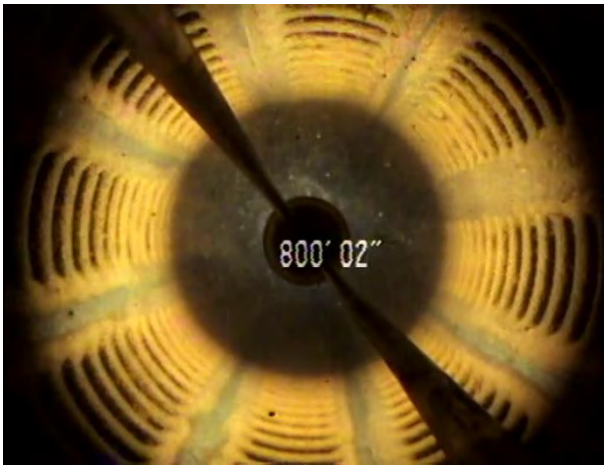
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 9 for the period of record from January 1999 to March 2020 although there are no water levels reported beyond September 2015. Static water levels range from a minimum of approximately 476 feet bgs in November 2004 to a maximum of 616 feet bgs in September 2001and March 2016 while pumping water levels range from approximately 512 feet bgs in August 2007 to 653 feet bgs in September 2001 and October 2003. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and show several periods of increasing and decreasing trends.

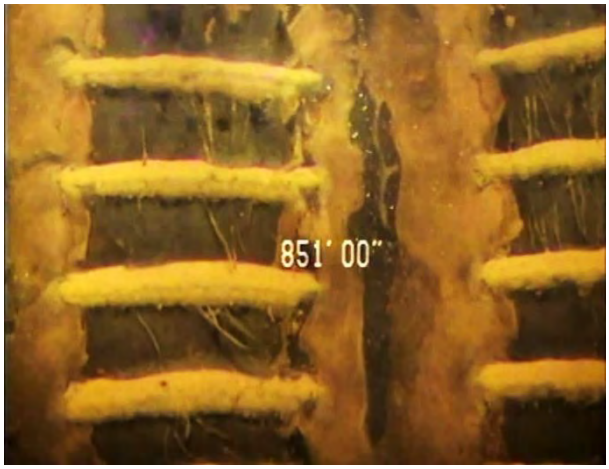
Instantaneous pumping rates exhibit a generally decreasing trend from a high of approximately 1,175 gpm in March 2000 to a low of 456 gpm in February 2002, with an average of approximately 832 gpm. Specific capacity ranges from a low of approximately 13 gpm/foot in September 2004 to a high of 30 gpm/foot in April 2001, averaging approximately 24 gpm/foot. The overall trend in specific capacity has remained relatively stable over the period of record.

Performance Characteristics (Prior 5 Years)

Instantaneous pumping rates exhibited a sharp increase in early-2016 followed by a sharp decrease in early-2017 due to unknown reasons, and has since exhibited a stable trend (see Figure 9). There are insufficient data for other performance parameters to enable meaningful analyses of this event.



Moderate bacterial growth upon well screen.



Filamentous bacteria growth below ~775 feet bRP.

2.8 WELL 14A

Well 14A was drilled and constructed to a depth of approximately 900 feet bgs in 1965 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 450 feet bgs. The 16-inch diameter louvered well screen reportedly extends from 450 to 900 feet bgs with unknown opening size. The DWR Well Driller's Report is included in Appendix A.

May 20, 2014 Video Survey

On May 20, 2014, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 576 feet bRP. The blank well casing above the static water level was observed to be in poor condition, exhibiting moderate to severe spalling, sheeting, and corrosion, and possible holes within the casing at 449 feet bRP (see photograph on following page). The louvered well screen appeared partially clogged with moderate to severe mineral encrustation, bacterial growth, and nodule formation (see photograph on following page). The camera appeared not centered within the well toward the end of the survey, a possible indication that the well has alignment issues.

Fill was encountered at a depth of approximately 809 feet bRP, obscuring the lowermost well screen section and indicating approximately 91 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

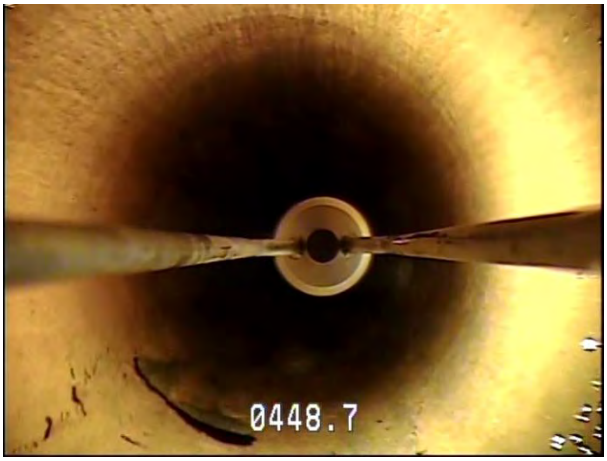
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 10 for the period of record from May 2002 to March 2020. Static water levels range from a minimum of approximately 515 feet bgs in May 2003 to a maximum of 623 feet bgs in August and September 2010 while pumping water levels range from approximately 543 feet bgs in December 2019 to 654 feet bgs in September 2008. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, and have shown a decreasing trend from 2002 to 2010 followed by an increasing trend from 2010 to 2020.

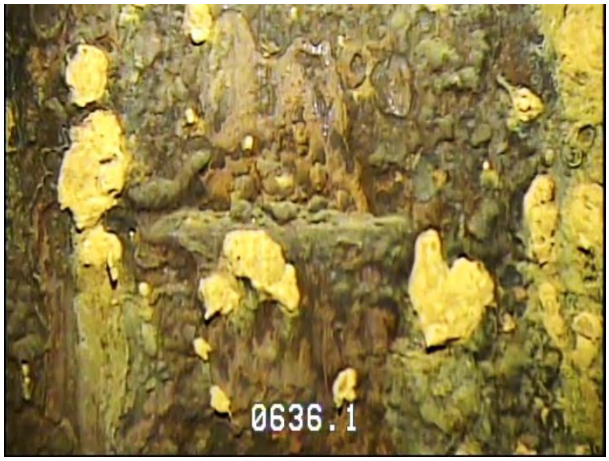
Instantaneous pumping rates have averaged approximately 938 gpm over the period of record from January 2008 through March 2020. Pumping rates were generally stable at approximately 1,000 gpm during the period from early-2008 to late-2017. They have since been on a declining trend and are at a historic low of approximately 750 gpm. Specific capacity ranges from a low of approximately 21 gpm/foot in March 2015 to a high of 77 gpm/foot in January 2011, averaging approximately 41 gpm/foot. The overall trend in specific capacity has been decreasing.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited generally increasing trends of approximately 13 feet per year (see Figure 10). Instantaneous pumping rates decreased sharply by approximately 230 gpm beginning in early-2017, coincident with a decrease in specific capacity of 4 gpm/foot over that same period of time (see Figure 10). Based upon information obtained from PWD, this change in performance is related to unsuccessful efforts made to reduce excessive sand production.



Possible hole in blank well casing.



Heavily buildup of bacterial growth on louvered well screen.

2.9 WELL 15

Well 15 was drilled and constructed to a depth of approximately 800 feet bgs in 1960 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 420 feet bgs. The well screen consists of mild steel with 0.125-inch machine-cut openings extending from 420 to 800 feet bgs, differing considerably from as-built construction details observed during the downhole video survey conducted on December 12, 2016. That video survey indicated the well screen to begin at approximately 320 feet bRP and extending all the way to 764 feet bRP, terminating in fill. The water level in the well was reported to occur at a depth of 325 feet bgs at time of construction (i.e., 1960). The instantaneous production rate recorded at the time of construction was approximately 1,750 gpm. The DWR Well Driller's Report is included in Appendix A.

December 12, 2016 Video Survey

On December 12, 2016, a downhole video survey was performed to evaluate the physical condition of the well during a well rehabilitation event, presumably following mechanical cleaning. At the time that survey was conducted, the static water level was observed at a depth of approximately 559 feet bRP. The blank well casing above the static water level was observed to be in fair condition, exhibiting minor to moderate spalling, sheeting, and corrosion. The mill-slotted well screen openings above and below the static water level appeared moderately to heavily clogged with unknown materials (see photograph on following page) and displayed evidence of severe bacterial growth and encrusting materials that had been removed during mechanical cleaning. Cascading water was observed below 552 feet bRP. Light-colored starburst deposits observed around portions of the slots suggest high velocity flow due to reduced open area (see photograph on following page).

Fill was encountered at a depth of approximately 764 feet bRP, obscuring the lowermost well screen section and indicating approximately 36 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 11 for the period of record from January 1999 to March 2020. Static water levels range from a minimum of approximately 512 feet bgs in April 2013 to a maximum of 630 feet bgs in August 2013 while pumping water levels range from approximately 582 feet bgs in May 2011 to 694 feet bgs in October 2005. Static and pumping water levels exhibit seasonal fluctuations, likely due to cyclical pumping, display several periods of increasing and decreasing trends, and have shown a slight increasing trend from 2016 to 2020.

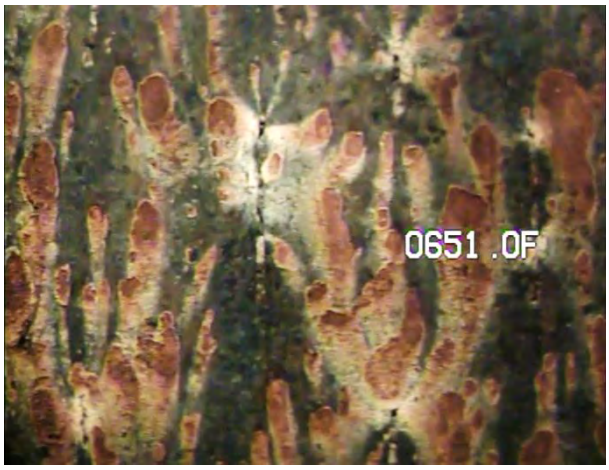
Instantaneous pumping rates have averaged approximately 982 gpm over the period of record from February 1999 through March 2020. Pumping rates were generally stable at approximately 660 gpm

during the period from early-1999 to late-2003. Since that time there was a sharp increase in pumping rate that did not correspond to significant changes to specific capacity or water levels (see Figure 11). Pumping rates began to decline beginning early-2013 are currently somewhat stable at an average of approximately 690 gpm. Specific capacity ranges from a low of approximately 7 gpm/foot in July 2000 to a high of 40 gpm/foot in September 2012, averaging approximately 16 gpm/foot. The overall trend in specific capacity has been relatively stable.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited generally stable trends (see Figure 11). Despite the sharp decrease in 2015/2016, instantaneous pumping rates have been relatively stable. Likewise, specific capacity has been relatively stable over the past 5 years (see Figure 11). Based upon information obtained from PWD, this well was severely impacted by biofouling during routine well rehabilitation and has since not operated at full capacity.

Severely clogged mill slots.



Evidence of past bacterial growth and high velocity flow.

2.10 WELL 16

Well 16 was drilled and constructed to a depth of approximately 550 feet bgs in 1960 using the direct circulation rotary drilling method. The blank well casing consists of 14-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 220 feet bgs. The well screen consists of mild steel with 0.125-inch mill-slotted openings extending from 220 to 550 feet bgs, differing slightly from as-built construction details observed during the downhole video survey conducted on March 31, 2008. That video survey indicated the well screen to begin at approximately 236 feet bRP and extending all the way to 537 feet bRP, terminating in fill. The water level in the well was reported to occur at a depth of 260 feet bgs at time of construction (i.e., 1960). The instantaneous production rate recorded at the time of construction was approximately 575 gpm. The DWR Well Driller's Report is included in Appendix A.

March 31, 2008 Video Survey

On March 31, 2008, a downhole video survey was performed to evaluate the physical condition of the well shortly after a rehabilitation event in late-2007. At the time that survey was conducted, the static water level was observed at a depth of approximately 179 feet bRP. The blank well casing above the static water level was observed to be in fair condition, exhibiting minor to moderate spalling, sheeting, and corrosion. The blank well casing below the water level exhibited moderate corrosion with a possible hole observed at 201 feet bRP. The mill-slotted well screen openings appeared heavily clogged with corrosion byproducts and bacterial growth, becoming almost completely obscured and 100% clogged below approximately 300 feet bRP (see photograph on following page). A spiral weld appears separated due to corrosion at a depth of 520 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 537 feet bRP, obscuring the lowermost well screen section and indicating approximately 13 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 12 for the period of record from January 1999 to March 2020. Static water levels range from a minimum of approximately 164 feet bgs in August and September 2010 to a maximum of 261 feet bgs in March 1995, while pumping water levels range from approximately 198 feet bgs in December 2012 and January 2013 to 363 feet bgs in December 2007. Static and pumping water levels exhibited generally increasing trend from 1998 through 2010, with the exception of a severe decline in pumping water levels in late-2007/early-2008, presumably due to drastically increased instantaneous pumping rates. Water levels have remained relatively stable from 2011 to 2020.

Instantaneous pumping rates have averaged approximately 141 gpm over the period of record from January 2002 through March 2020. Pumping rates have exhibited a generally stable trend over much of the period of record (aside from the aforementioned sharp increase in rates in 2007/2008) and began a slight declining trend beginning in 2017 (see Figure 12). Specific capacity ranges from a low of approximately 3 gpm/foot in March 2008 to a high of 7 gpm/foot in January 2005, averaging approximately 5 gpm/foot. As with pumping rate, the overall trend in specific capacity has been relatively stable over much of the period of record, aside from a slight decline beginning in 2017.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited generally stable trends (see Figure 12). Instantaneous pumping rates and specific capacity were relatively stable through 2015 and 2016 and began a slight decline beginning in 2017 (see Figure 12).

Completely obscured and clogged mill-slotted well screen.

Possible separation of spiral casing weld due to corrosion.

2.11 WELL 18

Well 18 was drilled and constructed to a depth of approximately 108 feet bgs in 1954 using the direct circulation rotary drilling method. The blank well casing consists of 8-inch diameter 8-gauge mild steel extending from ground surface to 20 feet bgs. The well screen consists of mild steel with mill slotted openings of unknown size extending from 20 to 108 feet bgs. The water level in the well was reported to occur at a depth of 37 feet bgs at time of construction (i.e., 1954). The instantaneous production rate recorded at the time of construction was approximately 171 gpm. The DWR Well Driller's Report is included in Appendix A.

December 8, 2016 Video Survey

On December 8, 2016, a downhole video survey was performed to evaluate the physical condition of the well following a rehabilitation event in 2016. At the time that survey was conducted, the static water level was observed at a depth of approximately 48 feet bRP. The blank well casing above the static water level was observed to be in poor condition, exhibiting heavy corrosion. The mill-slotted well screen was heavily corroded with numerous casing breaches, including large holes, ruptures, and massive degradation of the casing below 86 feet bRP (see photograph on following page). The mill-slotted openings were largely obscured by mineral encrustation and corrosion byproducts below approximately 60 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 93 feet bRP, covering the lower section of well screen and indicating approximately 15 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

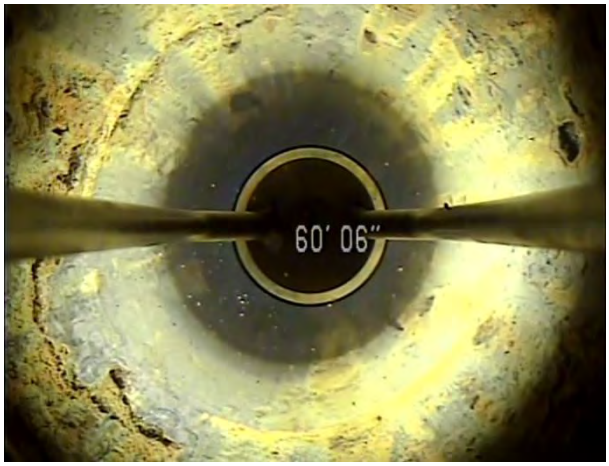
Historical static and pumping water levels and well performance data are shown on Figure 13 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 12.5 feet bgs in August 1994 to a maximum of 55 feet bgs in July 2018, while pumping water levels range from approximately 21 feet bgs in late-1994 and September 2006 to a maximum of 68 feet bgs in April 2004. Static and pumping water levels have exhibited several periods of broad-scale increasing and decreasing trends over the period of record, and have been observed to be generally stable, albeit fluctuating considerably since 2017 (see Figure 13).

Instantaneous pumping rates have averaged approximately 73 gpm over the period of record from January 2007 through March 2020. Pumping rates have exhibited several periods of increasing and decreasing trends, seemingly coincident with changes in water levels (see Figure 13). Specific capacity ranges from a low of approximately 4 gpm/foot in August 2018 to a high of 27 gpm/foot in June 2008, averaging approximately 11 gpm/foot. As with pumping rate, trends in specific capacity seem to be coincident with changes to water levels (see Figure 13).

Performance Characteristics (Prior 5 Years)

During the period from 2017 to 2020, static and pumping water levels, and specific capacity, have exhibited generally stable, and perhaps slightly increasing trends (see Figure 13). Data were not available for these parameters during the period from 2011 through 2016. Instantaneous pumping rates were generally stable over the past five (5) years with the exception of a period of decline in 2016 (see Figure 13). This well was downsized from a 5 HP motor to a 3 HP motor in 2016 due to operational impacts with Well 19.

Massive rupture in well screen showing formation cobbles.



Obscured well screen and evidence of casing degradation.

Well Repair and Rehabilitation

Based upon information provided by PWD, the well casing disintegrated during a rehabilitation event conducted in 2016. The well was then lined with blank well casing and screen consisting of 6-inch diameter SDR-21 Certa-Lok™ PVC. The screened section of the well liner is reportedly 60 feet in length and presumably extends to the total depth of the well at 108 feet bgs. A new gravel envelope of unknown gradation was added to the annular space between the well liner and original well casing.

2.12 WELL 19

Well 19 was drilled and constructed to a depth of approximately 350 feet bgs in 1961 using the direct circulation rotary drilling method. The blank well casing consists of 14-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 80 feet bgs. The well screen consists of mild steel with mill-slotted openings of unknown size extending from 80 to 350 feet bgs. The water level in the well was reported to occur at a depth of 54 feet bgs at time of construction (i.e., 1961). The instantaneous production rate recorded at the time of construction was approximately 115 gpm. The DWR Well Driller's Report is included in Appendix A.

December 10, 2009 Video Survey

On December 10, 2009, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 41 feet bRP. The blank well casing above the static water level was observed to be in fair condition, exhibiting general corrosion. The blank well casing below the water level exhibited some bacterial growth, nodule formation, and formation of iron oxide deposits. The mill-slotted well screen appeared heavily clogged with corrosion byproducts and bacterial growth, becoming almost completely obscured from approximately 100 to 200 feet bRP (see photograph on following page). There is an apparent transition in the water quality environment at approximately 200 feet bRP with the amount of reddish iron oxide material diminishing and the bare metal of the well casing becoming visible (see photograph on following page). The degree of mineral encrustation increases below approximately 250 feet bRP, becoming heavy and obscuring slot openings below 300 feet bRP.

Fill was encountered at a depth of approximately 316 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 34 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

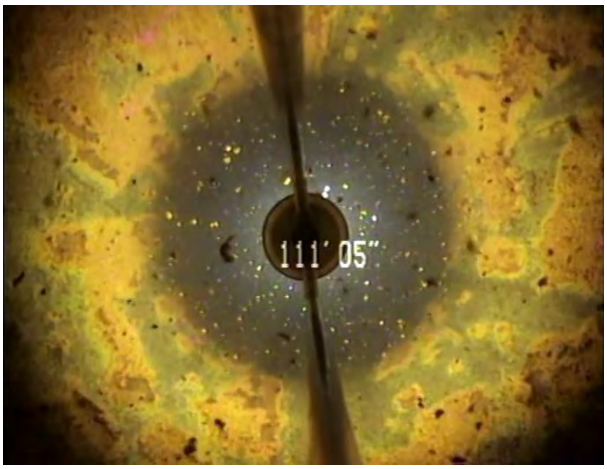
Historical static and pumping water levels and well performance data are shown on Figure 14 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 14 feet bgs in August 1994 to a maximum of 89 feet bgs in August 2014, while pumping water levels range from approximately 44 feet bgs in May 1995 to 112 feet bgs in February 2018. Static and pumping water levels exhibit an overall decreasing trend over the period of record, with the exception of a period of increasing water levels from 2004 to 2006 (see Figure 14).

Instantaneous pumping rates have averaged approximately 127 gpm over the period of record from January 2007 through March 2020. Pumping rates have exhibited a generally stable trend over the period of record, with the exception of a slight increase following a rehabilitation event in 2010/2011 (see Figure 14). Specific capacity ranges from a low of approximately 1.8 gpm/foot in February 2018 to a high of 6.8 gpm/foot in July 2012, averaging approximately 4 gpm/foot. As with pumping rate,

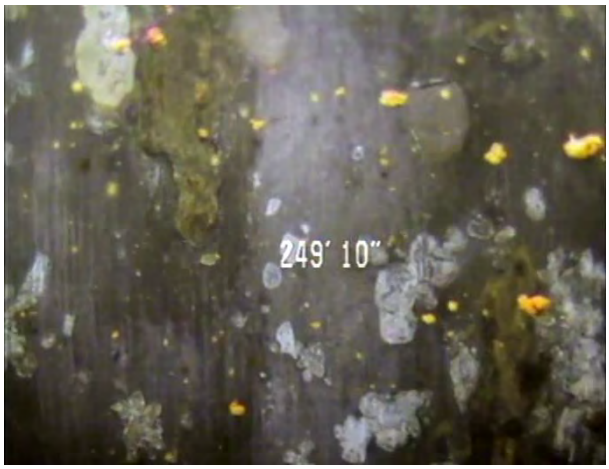
the overall trend in specific capacity has been relatively stable over much of the period of record, with the exception of a slight decline in 2011, coincident with the aforementioned increase in pumping rates following rehabilitation.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static water levels have been generally stable, and pumping water levels have exhibited a slightly increasing trend of approximately 3 feet per year beginning in 2017 (see Figure 14). Instantaneous pumping rates and specific capacity were relatively stable throughout the past five (5) years (see Figure 14). The pump motor was upsized from 5 HP to 7 HP in 2011 without PWD oversight which resulted in impacts to the overall operation of the well.



Completely obscured and clogged mill-slotted well screen.



Bare metal of well casing visible below 200 feet bRP.

2.13 WELL 21

Well 21 was drilled and constructed to a depth of approximately 170 feet bgs in 1960 using the direct circulation rotary drilling method. The blank well casing reportedly consists of open-bottom 16-inch diameter mild steel casing of unknown wall thickness extending from ground surface to 170 feet bgs, and open borehole from 170 feet bgs to 350 feet bgs. The well casing was perforated with mills knife openings of unknown size and at unknown depths.

A 10-inch diameter by ¼-inch wall thickness mild steel liner was installed in 1979[4] extending to a depth of 346 feet bgs and perforated with 0.140-inch mill slotted openings from 216.4 to 346 feet bgs. The DWR Well Driller's Report is included in Appendix A.

April 4, 2013 Video Survey

On April 4, 2013, a downhole video survey was performed to evaluate the physical condition of the well liner. At the time that survey was conducted, the static water level was observed at a depth of approximately 161 feet bRP. The blank well casing above the static water level was observed to be in poor condition, exhibiting moderate to severe spalling, sheeting, and corrosion, and possible structural issues at 98 feet bRP (see photograph on following page). The blank well casing below the water level exhibited possible bacterial growth and nodule formation. The mill-slotted well screen appeared heavily clogged and obscured with nodule growth, exhibiting heavy to massive growth below 288 feet bRP (see photograph on following page). A possible small hole was observed within the well screen at 320.5 feet bRP.

Fill was encountered at a depth of approximately 325 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 21 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 15 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 160 feet bgs in March 2013 to a maximum of 207 feet bgs in June 2007, while pumping water levels range from approximately 181 feet bgs in March 2013 to 240 feet bgs in June 2007. Static and pumping water levels are observed to be general stable and exhibit an overall slight increasing trend over the period of record (see Figure 15).

Instantaneous pumping rates have averaged approximately 245 gpm over the period of record from January 2007 through March 2020 and show a declining trend (see Figure 15). Specific capacity

[4] Based on a cost proposal for the well liner from Rottman Drilling Company and dated January 9, 1979. The exact date of liner installation is not known.

ranges from a low of approximately 5 gpm/foot in March 2017 to a high of 20 gpm/foot in October 2011, averaging approximately 10 gpm/foot. As with pumping rate, the overall trend in specific capacity has been relatively stable over much of the period of record, with the exception of an abrupt increase from mid-2011 through early-2013, coincident with an increase in water levels during that period of time (see Figure 15).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have been generally stable and show no discernable trend (see Figure 15). Instantaneous pumping rates and specific capacity show a slight decreasing trend over the past five (5) years (see Figure 15).

Severe corrosion of blank well liner above water level.

Massive nodule structures present below 288 feet bRP.

2.14 WELL 22

Well 22 was drilled and constructed to a depth of approximately 400 feet bgs in 1974 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 190 feet bgs. The well screen consists of mild steel with 0.125-inch louvered openings extending from 190 to 400 feet bgs. The water level in the well was reported to occur at a depth of 130 feet bgs at time of construction (i.e., 1974). The instantaneous production rate recorded at the time of construction was approximately 460 gpm. The DWR Well Driller's Report is included in Appendix A.

March 15, 2016 Video Survey

On March 15, 2016, a downhole video survey was performed to evaluate the physical condition of the well following a rehabilitation event. At the time that survey was conducted, the static water level was observed at a depth of approximately 114 feet bRP. The blank well casing above the static water level was observed to be in fair condition, exhibiting minor to moderate spalling, sheeting, and corrosion, and severe corrosion immediately above the water line (see photograph on following page). The louvered well screen appeared mostly open with some evidence of bacterial growth, nodule formation, corrosion, and sediment resting on the louver shelves (see photograph on following page). Bacterial growth was observed to be increasing below approximately 300 feet bRP until visibility was reduced to zero at 330 feet bRP.

Fill was encountered at a depth of approximately 395 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 5 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 16 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 104 feet bgs in March 2009 and December 2013 to a maximum of 204 feet bgs in March 2013, while pumping water levels range from approximately 149 feet bgs in February 2003 and March 2009 to 255 feet bgs in November 1992 (see Figure 16). Static and pumping water levels exhibit a generally increasing trend from 1992 to 2004 followed by two periods of decreasing water levels from 2005 to 2012 and 2013 to 2020 (see Figure 16). The cause of the sharp increase in water levels in early-2013 is unknown.

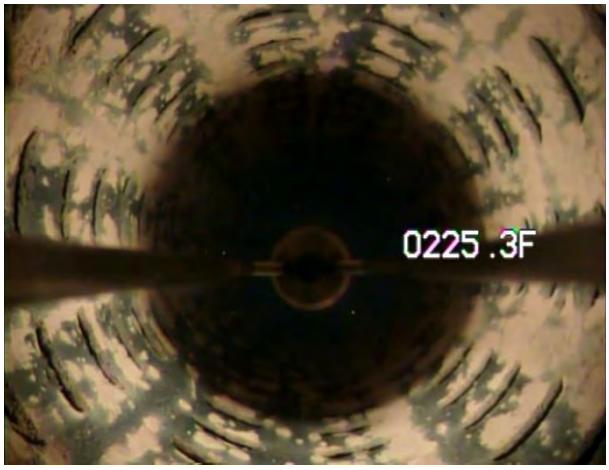
Instantaneous pumping rates have averaged approximately 355 gpm over the period of record from January 2008 through March 2020. Pumping rates have exhibited a generally decreasing trend over the period of record, with the exception of a slight increase following a rehabilitation event in 2015/2016 (see Figure 16). Specific capacity has ranged from a low of approximately 6 gpm/foot in September 2008 to a high of 15 gpm/foot in March 2013, averaging approximately 8 gpm/foot.

Specific capacity has been relatively stable over much of the period of record and shows a slight decline beginning in 2013, coincident with the aforementioned unexplained increase in water levels.

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited a declining trend of approximately 6 feet per year (see Figure 16). Instantaneous pumping rates and specific capacity were relatively stable and exhibited only slight decreasing trends (see Figure 16).

Heavy corrosion of casing immediately above water level.



Louvered well screen appears mostly open.

2.15 WELL 23A

Well 23A was drilled and constructed to a depth of approximately 840 feet bgs in 1991 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 600 feet bgs. The well screen consists of mild steel with 0.030-inch louvered openings extending from 600 to 840 feet bgs. The DWR Well Driller's Report is included in Appendix A.

April 25, 2012 Video Survey

On April 25, 2012, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 552 feet bRP. The blank well casing above the static water level was observed to be in generally good condition, exhibiting general corrosion and pitting from ground surface to approximately 215 feet bRP and minor to moderate spalling and corrosion increasing below this depth. The louvered well screen appeared mostly open with minor to moderate nodule formation and buildup of mineral encrustation, increasing somewhat below approximately 700 feet bRP (see photograph on following page).

Debris (i.e., cable and tape) was encountered at a depth of approximately 740 feet bRP (see photograph on following page), obscuring the lower portion of the well screen section and indicating approximately 100 feet of debris and/or fill may be present above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

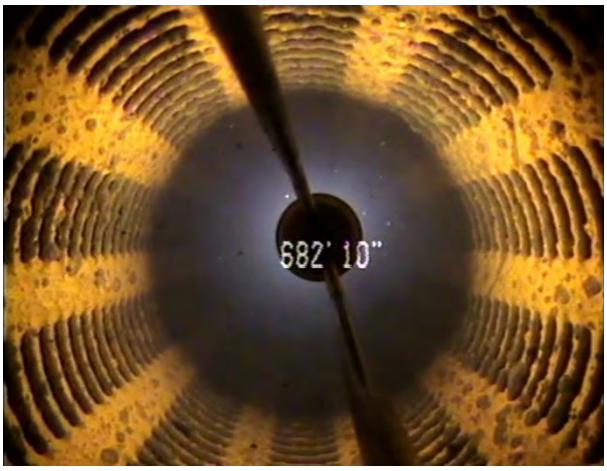
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 17 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 517 feet bgs in December 1993 to a maximum of 604 feet bgs in September 2007 and September 2015, while pumping water levels range from approximately 572 feet bgs in May 2003 to 602 feet bgs in July 2014 (see Figure 17). Static and pumping water levels show several periods of increasing and decreasing trends and have most recently exhibited an increasing trend beginning in 2015 (see Figure 17).

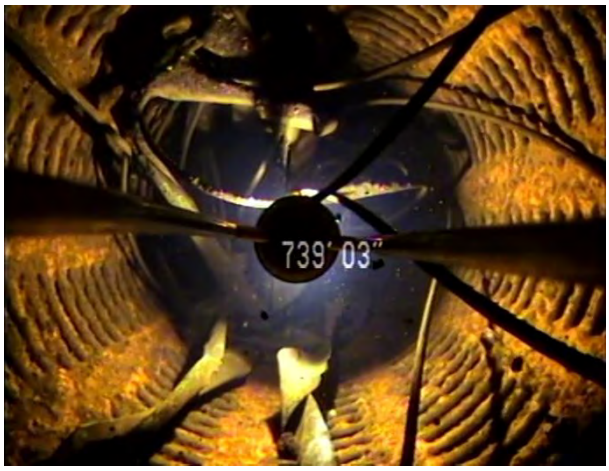
Instantaneous pumping rates have averaged approximately 647 gpm over the period of record from January 2002 through March 2020. Pumping rates have exhibited a generally stable trend over the period of record from 2008 through 2017 followed by a sharp increasing in early-2017 (see Figure 17). Specific capacity has ranged from a low of approximately 7 gpm/foot in July 2014 to a high of 21 gpm/foot in March 2018, averaging approximately 14 gpm/foot. As with pumping rate, specific capacity has been relatively stable over much of the period of record followed by a sharp increase in early-2017 (see Figure 17).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited increasing trends of approximately 10 and 15 feet per year, respectively (see Figure 17). Aside from the aforementioned sharp increase in early-2017, instantaneous pumping rates and specific capacity were relatively stable (see Figure 17).



Nodule formation and mineral encrustation on well screen.



Debris in well at approximately 740 feet bRP.

2.16 WELL 25

Well 25 was drilled and constructed to a depth of approximately 605 feet bgs in 1989 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 255 feet bgs. The well screen consists of mild steel wire-wrap with 0.060-inch openings extending from 255 to 335 feet bgs, 385 to 405 feet bgs, 435 to 595 feet bgs, differing considerably from as-built construction details observed during the downhole video survey conducted on November 13, 2005. That video survey indicated the well screen to begin at approximately 166 feet bRP. A 10.75-inch outside diameter (OD) by ¼-inch wall thickness mild steel well liner was installed in 2019 extending to an estimated depth of 580 feet bgs. The liner screen consisted of 0.040-inch vertical slotted openings extending across an unknown interval[5]. The water level in the well was reported to occur at a depth of 108 feet bgs at time of construction (i.e., 1989). The instantaneous production rate recorded at the time of construction was approximately 750 gpm. The DWR Well Driller's Report is included in Appendix A.

April 23, 2019 Video Survey

On April 23, 2019, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 118.6 feet bRP. The blank well casing above the static water level was observed to exhibit general corrosion and pitting, increasing below approximately 100 feet bRP. The blank casing below the water surface exhibited severe spalling and corrosion with minor nodule formation. The wire-wrap well screen openings appeared to be mostly open but in generally poor condition with bacterial growth, corrosion, and clogging increasing in severity with increasing depth. Numerous vertical ruptures and holes were observed throughout the well screen indicating severe structural issues (see photograph on following page). The second well screen interval (i.e., 386 to 405 feet bRP) exhibited clogging from sediment and heavy bacterial growth (see photograph on following page). The third well screen interval beginning at 436 feet bRP was observed to be heavily clogged with sediment and bacterial growth and suffering from severe structural issues, including large vertical ruptures (see photograph on following page). Fill was encountered at a depth of approximately 525 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 80 feet of debris and/or fill above the reported total depth of the well. As-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 18 for the period of record from April 1992 to March 2020. Static water levels range from a minimum of approximately 77 feet bgs in September 2007 to a maximum of 189 feet bgs in February 2011, while

[5] Video surveys conducted immediately prior to and following the 2019 liner installation were not available for review as part of this evaluation. The latest available video survey is dated April 23, 2019.

pumping water levels range from approximately 159 feet bgs in January 1994 to 319 feet bgs in February 2020 (see Figure 18). Static and pumping water levels show several periods of increasing and decreasing trends and have most recently exhibited a significant decrease following installation of the aforementioned well liner in 2019 (see Figure 18).

Instantaneous pumping rates have averaged approximately 502 gpm over the period of record from January 2006 through March 2020. Pumping rates have exhibited a generally decreasing trend over the period of record from 2006 through early-2018 followed by a sharp decrease following installation of the well liner in 2019 (see Figure 18). Specific capacity was relatively stable over the period of record from 2006 through 2011 and averaged approximately 7 gpm/foot (see Figure 18). There are no specific capacity data during the period from early-2011 through late-2016 due to the lack of water levels[6] but data reported for late-2016 through early-2018 indicate an apparent decline in specific capacity during the period without data to an average of 5 gpm/foot (see Figure 18). As with pumping rate, specific capacity declined again to an average of approximately 2 gpm/foot following installation of the well liner in 2019 (see Figure 18).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), there have been significant declines in water levels, instantaneous pumping rate, and specific capacity due to clogging of the original well casing and installation of a well liner in 2019 (see Figure 18). The instantaneous pumping rate has declined by approximately 50% from early-2015 through early-2020. Specific capacity has declined by approximately 60% from late-2017 through early-2020 (see Figure 18). There are operational constraints when running this well with Wells 29, 30, and 33 due to water level interference.

Heavy bacterial growth and severe vertical rupture.

Heavy bacterial growth and severe vertical rupture.

6 The lack of water level data collected during this period was reportedly due to malfunctioning pressure transducer(s) deployed within the well.

2.17 WELL 26

Well 26 was drilled and constructed to a depth of approximately 480 feet bgs in 1989 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 150 feet bgs. The well screen consists of mild steel wire-wrap with 0.060-inch openings extending from 150 to 270 feet bgs and 310 to 470 feet bgs. The water level in the well was reported to occur at a depth of 180 feet bgs at time of construction (i.e., 1989). The instantaneous production rate recorded at the time of construction was approximately 750 gpm. The DWR Well Driller's Report is included in Appendix A.

August 11, 2005 Video Survey

On August 11, 2005, a downhole video survey was performed to evaluate the physical condition of the well[7]. At the time that survey was conducted, the static water level was observed at a depth of approximately 106 feet bRP. The blank well casing above the static water level was observed to be in generally poor condition, exhibiting moderate to severe corrosion, pitting, and spalling. The blank casing below the water level was observed to be severely corroded with evidence of nodules that had been knocked off, presumably during a mechanical cleaning event. The uppermost wire-wrap well screen section (i.e., 151 to 271 feet bRP) appeared partially clogged and exhibited moderate to severe corrosion and deposition of iron oxide deposits, increasing with depth (see photograph on following page). The lowermost well screen interval exhibited moderate corrosion and clogging beginning at 311 feet bRP, transitioning into clean and open well screen below approximately 360 feet bRP. There is an apparent transition in the water quality environment at approximately this depth with the amount of reddish iron oxide material diminishing drastically and the bare metal of the well screen becoming visible and giving the appearance of stainless steel (see photograph on following page). Drilling mud was observed upon the well screen at 459 feet bRP.

Fill was encountered at a depth of approximately 460 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 20 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 19 for the period of record from June 1992 to March 2020. Static water levels range from a minimum of approximately 109 feet bgs in April 2006 to a maximum of 220 feet bgs in August 1994, while pumping water levels range from approximately 215 feet bgs in February 2006 to 391 feet bgs in September 2014 (see Figure 19). Static and pumping water levels show several periods of increasing and decreasing trends and have most recently exhibited an increasing trend beginning in 2015 (see

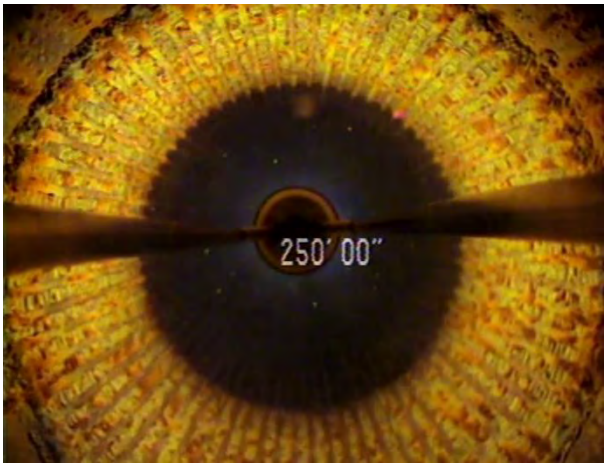
[7] There is record of a more recent video survey conducted on June 14, 2016 but that video survey was not available for review as part of this evaluation.

Figure 19). The divergence of static and pumping water levels observed during the early history of the well is evidence that the well intake structure began to clog and become inefficient shortly after construction (see Figure 19).

Instantaneous pumping rates have averaged approximately 282 gpm over the period of record from February 2009 through March 2020. Pumping rates have exhibited a generally stable trend over the period of record with the exception of a slight increase in early-2017, coincident with an increase in water levels (see Figure 19). Likewise, specific capacity has averaged approximately 2.6 gpm/foot over the period of record and has exhibited similar trending (see Figure 19).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited increasing trends of approximately 17 feet per year (see Figure 19). Aside from the aforementioned increases in early-2017, instantaneous pumping rates and specific capacity for Well 26 have been relatively stable (see Figure 19).



Severe corrosion and deposition of iron oxide on well screen.

Well screen clean and giving appearance of stainless steel.

2.18 WELL 29

Well 29 was drilled and constructed to a depth of approximately 370 feet bgs in 1989 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 190 feet bgs. The well screen consists of mild steel with 0.070-inch louvered openings extending from 190 to 370 feet bgs. The water level in the well was reported to occur at a depth of 104 feet bgs at time of construction (i.e., 1989). The instantaneous production rate recorded at the time of construction was approximately 350 gpm. The DWR Well Driller's Report is included in Appendix A.

The steel casing patch extending from 254.4 to 259.4 feet bRP was presumably installed to repair hole(s) within the blank well casing.

October 10, 2018 Video Survey

On October 10, 2018, a downhole video survey was performed to evaluate the physical condition of the well following a rehabilitation event. At the time that survey was conducted, the static water level was observed at a depth of approximately 126 feet bRP. The blank well casing was observed to be in generally fair condition, exhibiting symptoms of general corrosion and pitting. The louvered well screen appeared severely clogged and obscured with bacterial growth and scale, becoming increasing severe with increasing depth (see photograph on following page). Some isolated louvered openings appear enlarged and have gravel envelope material visible within them, an indication of erosion from high velocity flow due to reduced open area (see photograph on following page).

Fill was encountered at a depth of approximately 367 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 3 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

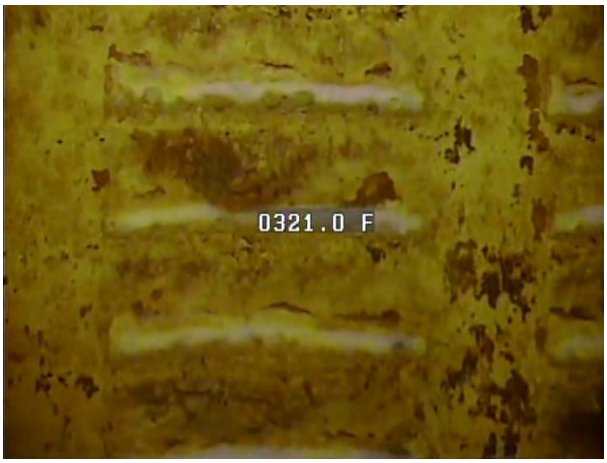
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 20 for the period of record from May 2007 to March 2020. Static water levels were generally stable from early-2007 to late-2012, and then entered into a declining trend from 2013 to late-2019 (see Figure 20). The divergence of static and pumping water levels beginning in 2013 is evidence that the well intake structure is clogging over time (see Figure 20).

Instantaneous pumping rates have averaged approximately 229 gpm over the period of record from May 2007 through March 2020. Pumping rates have exhibited a generally stable trend over the period of record from 2007 to 2012, and have since begun to decline, coincident with a decrease in water levels at that time (see Figure 20). Likewise, specific capacity has averaged approximately 2.2 gpm/foot over the period of record and has exhibited similar trending (see Figure 20).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited decreasing trends of approximately 1 to 2 per year (see Figure 20). Instantaneous pumping rates have declined by approximately 39% (see Figure 20). Specific capacity is also declining somewhat but recent data for 2019 to present was not available for review. There are operational constraints when running this well with Wells 25, 30, and 33 due to water level interference.



Severe clogging of well screen from bacterial growth.

Enlarged louvered openings showing gravel envelope.

2.19 WELL 30

Well 30 was drilled and constructed to a depth of approximately 410 feet bgs in 1989 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 200 feet bgs. The well screen consists of mild steel with 0.070-inch louvered openings extending from 200 to 410 feet bgs. The water level in the well was reported to occur at a depth of 126 feet bgs at time of construction (i.e., 1989). The instantaneous production rate recorded at the time of construction was approximately 1,400 gpm. The DWR Well Driller's Report is included in Appendix A.

January 14, 2016 Video Survey

On January 14, 2016, a downhole video survey was performed to evaluate the physical condition of the well following a rehabilitation event. At the time that survey was conducted, the static water level was observed at a depth of approximately 147 feet bRP. The blank well casing above the water level was observed to be in generally good condition. The blank casing below the water level was observed to be clean and in relatively good condition, exhibiting moderate pitting, bacterial growth, and nodule formation. The louvered well screen appeared relatively clean and open, with evidence of prior bacterial growth and nodule formation (see photograph on following page). Sediment was observed settled upon the louver shelves below 366 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 408 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 2 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

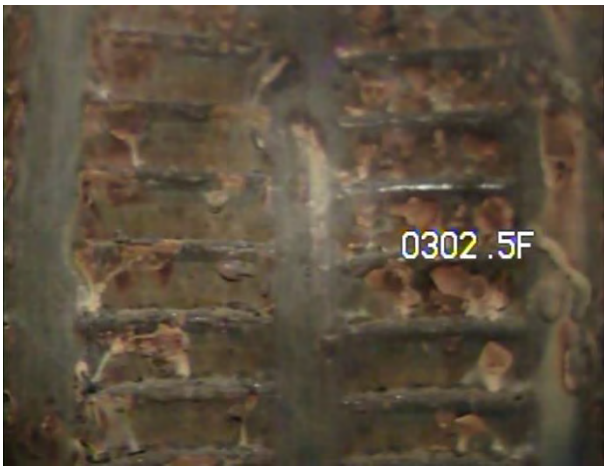
Historical Groundwater Levels and Pumping Dynamics

Historical static and pumping water levels and well performance data are shown on Figure 21 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 104 feet bgs in February 1994 to a maximum of 238 feet bgs in July 2014 and December 2016 while pumping water levels range from approximately 170 feet bgs in May 1995 to 323 feet bgs in July 2014. The water levels show a series of increasing and decreasing trends over the period of record but show an overall decreasing trend. Since early-2014, water levels have been generally stable and have exhibited a slight increasing trend (see Figure 21).

Instantaneous pumping rates have averaged approximately 512 gpm over the period of record from January 2008 through March 2020. Pumping rates have exhibited a generally stable trend over much of the period of record and have begun to decline in early-2017 (see Figure 21). Likewise, specific capacity has averaged approximately 7 gpm/foot over the period of record and has exhibited similar trending (see Figure 21).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), static and pumping water levels have exhibited generally stable trends (see Figure 21). Instantaneous pumping rates and specific capacity have both declined by approximately 20% since early-2016 (see Figure 21). There are operational constraints when running this well with Wells 25, 29, and 33 due to water level interference.



Evidence of prior bacterial growth upon the well screen.

Sediment resting upon the louver shelves.

2.20 WELL 32

Well 32 was drilled and constructed to a depth of approximately 570 feet bgs in 1989 using the direct circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 280 feet bgs. The well screen consists of mild steel with 0.094-inch louvered openings extending from 280 to 570 feet bgs, differing somewhat from the screened intervals observed on the August 12, 2013 video survey. That video survey indicated two (2) well screens sections located from 333 to 483 feet bRP and from 505 to 574 feet bgs, terminating in fill. The water level in the well was reported to occur at a depth of 238 feet bgs at time of construction (i.e., 1989). The instantaneous production rate recorded at the time of construction was approximately 450 gpm. The DWR Well Driller's Report is included in Appendix A.

August 12, 2013 Video Survey

On August 12, 2013, a downhole video survey was performed to evaluate the physical condition of the well following a rehabilitation event. At the time that survey was conducted, the static water level was observed at a depth of approximately 202 feet bRP. The blank well casing above the water level was observed to be in fair condition with general corrosion, spalling, and pitting, increasing with depth. The blank casing below the water level was observed to be in relatively good condition, exhibiting mild to moderate corrosion and evidence of nodule formation. The majority of the uppermost louvered well screen appeared relatively clean and open, with evidence of prior bacterial growth and nodule formation (see photograph on following page), with moderate buildup occurring below approximately 460 feet bRP. The lower screen interval appeared moderately to heavily clogged with sediment and growth (see photograph on following page).

Fill was encountered at a depth of approximately 574 feet bRP, below the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

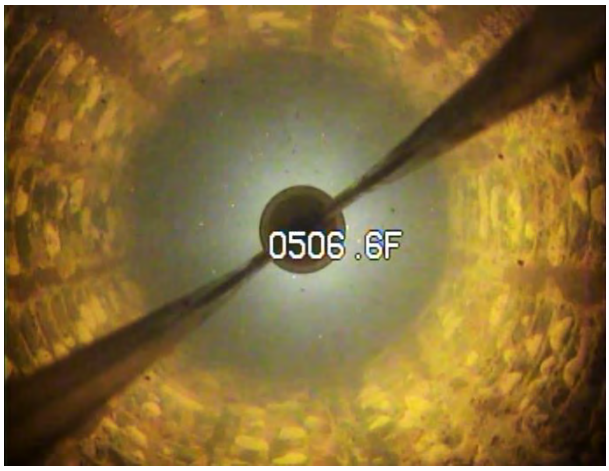
Historical static and pumping water levels and well performance data are shown on Figure 22 for the period of record from May 1992 to March 2020. Static water levels range from a minimum of approximately 201 feet bgs in March 2020 to a maximum of 327 feet bgs in July and August 1997, while pumping water levels range from approximately 295 feet bgs in March 2020 to 421 feet bgs in November 1993. Water levels exhibit seasonal fluctuations due to pumping cycles and a general overall increasing trend over the period of record (see Figure 22).

Instantaneous pumping rates have averaged approximately 238 gpm over the period of record from January 2008 through March 2020. Pumping rates have exhibited a generally stable trend over much of the period of record despite a slight decrease during the period from late-2013 through early-2017 (see Figure 22). Specific capacity has averaged approximately 2 gpm/foot over the period of record and has exhibited a generally stable trend (see Figure 22).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), both static and pumping water levels have exhibited a generally increasing trend of approximately 10 feet per year (see Figure 22). Instantaneous pumping rates and specific capacity have both exhibited generally stable trends over the same period of time (see Figure 22).

Evidence of prior bacterial growth and nodule formation.



Moderate to heavy growth upon lower well screen interval.

2.21 WELL 33

Well 33 was drilled and constructed to a depth of approximately 465 feet bgs in 1991 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by ¼-inch wall thickness mild steel extending from ground surface to 220 feet bgs, 240 to 280 feet bgs, and 460 to 465 feet bgs. The well screen consists of stainless steel wire-wrap with 0.040-inch openings extending from 220 to 240 feet bgs and 0.070-inch openings from 280 to 460 feet bgs. The water level in the well was reported to occur at a depth of 130 feet bgs at time of construction (i.e., 1991). The instantaneous production rate recorded at the time of construction was approximately 1,000 gpm. The DWR Well Driller's Report is included in Appendix A.

August 7, 2008 Video Survey

On August 7, 2008, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 152 feet bRP. The blank well casing above the water level was observed to exhibit general corrosion, spalling, and pitting, increasing with depth. The blank well casing below the water level was observed to exhibit heavy corrosion, spalling, sheeting, and pitting. The section of mild steel blank well casing between the two screen sections exhibited moderate corrosion and buildup. The uppermost well screen section appeared to be in open, clean, generally excellent condition, with gravel envelope material visible through the well screen openings (see photograph on following page). The lowermost screen appears to be partially clogged with sediment resting within the wire openings, becoming completely clogged with what appears to be drilling mud below approximately 450 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 454 feet bRP, obscuring the lower portion of the well screen section and indicating approximately 11 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

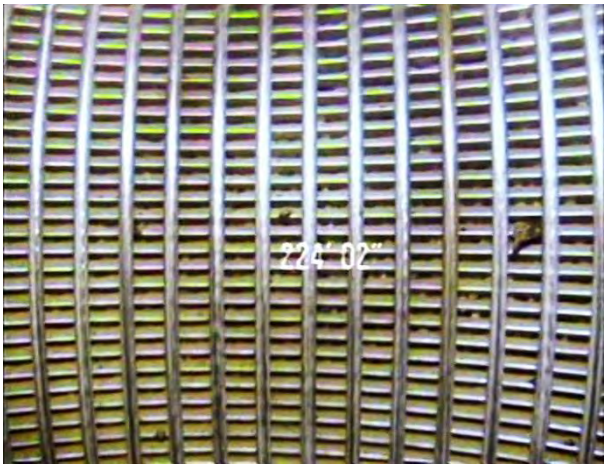
Historical static and pumping water levels and well performance data are shown on Figure 23 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 64 feet bgs in December 2008 to a maximum of 270 feet bgs in October 2003, while pumping water levels range from approximately 180 feet bgs in January 1996 to 269 feet bgs in September 2003. Water levels exhibit seasonal fluctuations due to pumping cycles and several broad-scale increasing and decreasing trends. However, the overall trend over the period of record has been decreasing, with water levels becoming relatively stable since 2015 (see Figure 23).

Instantaneous pumping rates have averaged approximately 431 gpm over the period of record from January 2002 through March 2020. Pumping rates have exhibited an increasing trend over the period of record from late-2003 through early-2011 and have since been on a declining trend (see

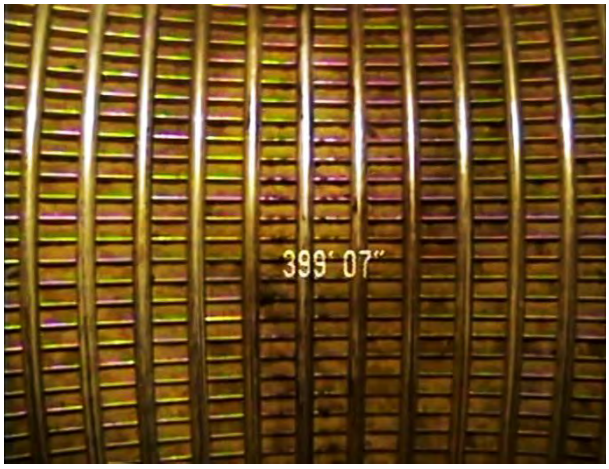
Figure 23). Specific capacity has averaged approximately 6 gpm/foot over the period of record and has exhibited a generally stable trend (see Figure 23).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), both static and pumping water levels have exhibited a generally stable trend, despite significant seasonal fluctuation (see Figure 23). Instantaneous pumping rate has declined by approximately 18% from early-2015 through early-2020. Specific capacity has been relatively stable (see Figure 23). There are operational constraints when running this well with Wells 25, 29, and 30 due to water level interference



Upper well screen open and in excellent condition.



Lower well screen partially clogged with sediment.

2.22 WELL 35

Well 35 was drilled and constructed to a depth of approximately 500 feet bgs in 1991 using the reverse circulation rotary drilling method. The blank well casing consists of 16-inch diameter by 5/16-inch wall thickness mild steel extending from ground surface to 200 feet bgs. The well screen consists of stainless steel wire-wrap with 0.060-inch openings extending from 200 to 500 feet bgs. The water level in the well was reported to occur at a depth of 174 feet bgs at time of construction (i.e., 1991). The instantaneous production rate recorded at the time of construction was approximately 800 gpm. The DWR Well Driller's Report is included in Appendix A.

April 30, 2018 Video Survey

On April 30, 2018, a downhole video survey was performed to evaluate the physical condition of the well. At the time that survey was conducted, the static water level was observed at a depth of approximately 173 feet bRP. The blank well casing above and below the water level was observed to exhibit moderate to severe corrosion, spalling, and pitting, increasing with depth. The well screen appeared to be in open, very clean, and in generally excellent condition to approximately 435 feet bRP, with gravel envelope material visible through the well screen openings (see photograph on following page). Sediment buildup within the well screen was observed below 435 feet bRP, increasing with increasing depth and completely clogging the well screen openings below 472 feet bRP. Although unclear, the bottom of the wire-wrap screen appears torn and separated below 476 feet bRP (see photograph on following page).

Fill was encountered at a depth of approximately 476 feet bRP, obscuring the lower portion of the well screen and indicating approximately 24 feet of fill above the reported total depth of the well. The as-built details verified by the downhole video survey are shown graphically in Appendix F.

Historical Groundwater Levels and Pumping Dynamics

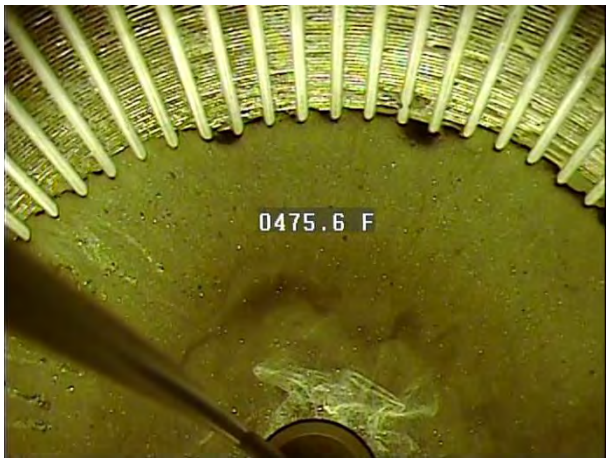
Historical static and pumping water levels and well performance data are shown on Figure 24 for the period of record from January 1992 to March 2020. Static water levels range from a minimum of approximately 154 feet bgs in April 1992 to a maximum of 265 feet bgs in June 2014, while pumping water levels range from approximately 251 feet bgs in February 1996 to 390 feet bgs in May 2007. Water levels exhibit seasonal fluctuations due to pumping cycles and a period of increased decline and recovery during the period of record from early-2002 through late-2010 (see Figure 24). The overall trend over the period of record has been decreasing, with water levels becoming relatively stable since 2015 (see Figure 24).

Instantaneous pumping rates have averaged approximately 369 gpm over the period of record from January 2008 through March 2020 and have exhibited an overall decreasing trend (see Figure 24). Specific capacity has averaged approximately 2.5 gpm/foot over the period of record and has exhibited a generally declining trend since late-2015 (see Figure 24).

Performance Characteristics (Prior 5 Years)

Over the past five (5) years (i.e., 2015 through 2020), both static and pumping water levels have exhibited a generally stable trend, despite significant seasonal fluctuation (see Figure 24). Instantaneous pumping rate has declined by approximately 5% and specific capacity has declined approximately 18% from early-2015 through early-2020 (see Figure 24).

Well screen open and in excellent condition.



Bottom of well screen appears torn and clogged.

3.0 RANKING METHODOLOGY

3.1 WELL CONDITION AND PERFORMANCE RANKING

The well condition assessments performed in Section 2.0 were used to develop an overall appraisal of the current condition of each well based on physical attributes and performance characteristics. These appraisals were used to rank the wells in order of overall condition, with the highest ranked wells having the worst overall condition, and the lowest ranked wells being in the best condition. The ranking of each well was based on the criteria discussed below and reflects each site's overall condition. The condition ranking criteria were given a weighting factor of 1 to 3 (3 being most important). For example, the age of a well is considered a critical factor related to evaluating the useful service life of a well and, thus, was given a weighting factor of 3. Each well was assessed individually as to respective well-specific criteria by being assigned a raw criteria score between 0 and 3 (3 being conditionally worse). The product of individual site-specific criteria scores and their respective weighting factors resulted in a total weighted score for well condition and performance.

Each of the wells were evaluated as to condition and performance in terms of several factors. Specifically, this evaluation included an assessment of the following criteria within three categories, each of which is summarized in Table 2 and discussed in greater detail below.

Well Condition and Ranking Criteria

Category	Criteria	Weighting Factor
Design and Construction	Well Age	3
	Steel Type	3
	Screen Type	2
	Screen Opening Size	2
	Remaining Service Life	3
	Drilling Method	1
Physical Condition	Structural Concerns / Risk of Collapse	3
	Fill and/or Debris	1
	Encrustation and/or Biofouling	2
Performance Characteristics	Water Level Trends	2
	Flow Rate and/or Specific Capacity Trend	1
	Sand and/or Gravel Production	3
	Water Levels Below Screen / Air Entrainment	2

3.1.1 DESIGN AND CONSTRUCTION CRITERIA

3.1.1.1 WELL AGE

The age of a well directly affects useful service life. Older wells will increasingly experience clogging of the well screen structure from mineral encrustation, buildup of corrosion byproducts, and biological growth. Continued metal loss from corrosion and rehabilitation activities may ultimately

lead to structural concerns (e.g., holes, ruptures, deformation, and enlarged screen openings) which may lead to operational issues, and ultimately complete failure of the well structure. As of the date of this report, the PWD well field ranges in age from 29 to 74 years with an average age of 45 years and with all but three (3) wells exceeding the theoretical useful service life. Although other criteria within this category may be affected as a direct result of well age, this criterion is considered to be an overall metric from which to assess the general condition of a well. The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Well Age
(Weighting Factor 3)

Description	Score
< 10 Years	0
10 – 29 Years	1
30 – 44 Years	2
> 45 Years	3

3.1.1.2 STEEL TYPE

The type of steel used to construct a well has a direct impact on clogging of the well screen structure and useful service life. A stainless steel well will suffer far less rates of corrosion than a mild steel well, will clog less readily, and will respond more positively to rehabilitation and redevelopment efforts. As such, a well constructed of higher grade steels will require less down time for maintenance and will need replacement at much greater intervals, allowing for longer periods of uninterrupted service. The range of steels between mild steel and stainless steel offer varying degrees of corrosion resistance. It should be noted that hard red and Kai-Well steels have a high copper content and were developed to withstand the rigors of the cable-tool drilling process. As such, these types of wells have been known to exhibit unusually long, albeit unpredictable, service lives. The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Steel Type
(Weighting Factor 3)

Description	Score
Stainless Steel	0
Hard Red / Kai-Well	1
Copper-Bearing / HSLA	2
Mild Steel / Unknown	3

3.1.1.2.1 SCREEN TYPE

The type of steel used to construct a well has a direct impact on structural integrity, rate of clogging, and useful service life. Pipe-based well screens such as louvers and mill slots offer structural strength while wire-wrap screens, especially those constructed of low-grade steels, are considered highly susceptible to degradation and structural decline. Opening geometry is also a factor, with louvers and wire-wrap geometries opening outward and being considered most favorable, and mill slots being susceptible to clogging and being least favorable. Knife-cut and hydraulically-perforated openings (e.g., Moss perforations) can be susceptible to high velocity flow, resulting in erosion and widening of the opening over time, ultimately leading to sand and gravel influx. The weighting factor assigned to this criterion is 2 and criteria scores were assigned based on the following.

Screen Type
(Weighting Factor 2)

Description	Score
Louvered	0
Stainless Steel Wire-Wrap	1
Knife-Cut / Mill Slot / Moss Perforations	2
Mild Steel Wire-Wrap	3

3.1.1.2.2 SCREEN OPENING SIZE

Larger screen openings are considered generally more resistant to clogging from mechanisms such as mineral encrustation, biological activity, and formation sands. Over the life of a well, smaller openings will generally result in lower well efficiency, resulting in non-recoverable decline in production, and the need for more frequent well rehabilitations. Additionally, wells with liners exhibit even greater well inefficiency and considered least favorable. The weighting factor assigned to this criterion is 2 and criteria scores were assigned based on the following.

Screen Opening Size
(Weighting Factor 2)

Description	Score
> 0.080-inch	0
0.060 – 0.080-inch	1
0.050 – 0.060-inch	2
< 0.050-inch / Well Liner Installed	3

3.1.1.2.3 REMAINING SERVICE LIFE

The useful service life of a well is heavily affected by many factors, including design, construction materials, construction methodology, screen type, water quality, operational practices, and maintenance activities. However, the two primary factors in estimation of remaining useful service life include the steel type from which the well is constructed and the amount of useful life that has already been expended (i.e., age). Generally speaking, mild steel construction within a slightly corrosive environment may have a 30-year service life. Use of copper-bearing steel materials will result in a service life expectancy of 30 to 45 years. High-Strength Low-Alloy (HSLA) steel will result in a service life of 45 to 60 years, while wells constructed of 304L and 316L stainless steels will have service lives in excess of 75 and 90 years, respectively. The PWD well field, with few exceptions, is constructed primarily from lower grade materials such as mild steel and, consequently, do not have extended theoretical service lives. Additionally, the majority of the wells are advanced in age, with all but four (4) wells exceeding remaining service life based on age and steel type. The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Remaining Service Life
(Weighting Factor 3)

Description	Score
> 30 Years	0
15 – 29 Years	1
5 – 14 Years	2
< 5 Years	3

3.1.1.2.4 DRILLING METHOD

Although not a particularly critical factor, the method by which a well is drilled can affect operational dynamics over the life of a well, primarily due to the degree with which drilling fluid additives are utilized. Drilling additives are used to maintain borehole integrity by controlling the flow of drilling fluids into the formation through formation of a cake of mud upon the borehole surface. This can invade and damage aquifer materials, resulting in lower well efficiencies, and must be removed quickly following well construction. Cable-tool drilling is typically accomplished without the use of additives and will most likely result in a well that is not affected by drilling additives or the drilling process itself. Reverse-circulation rotary drilling typically relies on hydrostatic pressure to maintain borehole integrity, employs little or no additives, and has a low probability of causing damage to aquifer materials. Direct-circulation rotary drilling uses a wall cake generated by a full program of drilling additives to maintain borehole integrity and has a high probability of resulting in a well that is not properly developed following construction. The weighting factor assigned to this criterion is 1 and criteria scores were assigned based on the following.

Drilling Method
(Weighting Factor 1)

Description	Score
-	0
Cable Tool	1
Reverse-Circulation Rotary	2
Direct-Circulation Rotary	3

3.1.1.3 PHYSICAL CONDITION CRITERIA

This category of criteria concerns an assessment of the current condition and health of each well by direct observation through review of downhole video surveys. PWD provided 142 video surveys, of which, the most recent video survey was reviewed, with older surveys reviewed in an effort to ascertain older conditions and to clarify well construction details prior to well modification. Where recent surveys were not available, assumptions were made based on other data.

3.1.1.3.1 STRUCTURAL CONCERNS / RISK OF COLLAPSE

The video survey review revealed several wells that are exhibiting structural issues, including severe corrosion, spalling and exfoliation, holes, ruptures, and deterioration. Some wells have experienced past structural issues as is evidenced by well modifications such as casing liners, patches, and bottom plugs. Holes and ruptures are problematic as groundwater flow can result in an evacuation of material from behind the feature, ultimately leading to voids behind the casing wall which can dramatically increase the risk of casing collapse. Seven (7) wells (Well Nos. 7A, 10, 14A, 16, 18, 21, and 25) show evidence of severe corrosion and structural issues, and are at risk of structural collapse or will experience severely shortened service lives from prior well modifications. One of these wells, Well No. 7A, has a large vertical rupture within the well screen as a result of over-inflation of a pneumatic inflatable packer installed on the pump column to mitigate cascading water. Plans are currently being developed to install a partial liner within this well. The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Structural Concerns / Risk of Collapse
(Weighting Factor 3)

Description	Score
None / Unknown	0
Minimal (Few Holes, Existing Patches, Minor Spalling, Enlarged Perforations)	1
Moderate (Many Holes, Existing Lined Sections, Moderate Spalling, Minor Screen Deterioration)	2
Sever (Large Ruptures, Heavy Spalling, Casing Deformation, Severe Screen Deterioration)	3

3.1.1.4 FILL AND/OR DEBRIS

Fill material will commonly accumulate at the bottom of a well during the course of normal operation. However, the nature and degree of fill can be symptomatic of other problems. For example, the presence of large volumes of fill and/or the presence of gravel envelope material within that fill can be an indication that there are holes or ruptures within the well casing and/or screen, or that the well screen openings are enlarged and/or improperly designed. Additionally, large volumes of fill can cover well screen openings and reduce groundwater flow to the well. In this case, the number of feet of fill was used as a metric from which to evaluate the severity of fill accumulation. The weighting factor assigned to this criterion is 1 and criteria scores were assigned based on the following.

Fill and/or Debris
(Weighting Factor 1)

Description	Score
< 9 feet	0
10 – 19 feet	1
20 – 49 feet	2
> 50 feet	3

3.1.1.5 ENCRUSTATION AND/OR BIOFOULING

Unchecked bacterial growth and mineral encrustation can result in clogged well screen openings and accelerated corrosion. Long periods of untreated bacterial activity and mineral buildup can result in unrecoverable loss in well production. As such, the degree of biofouling and mineral encrustation, as observed on the video surveys, was used as a metric for how severely the wells have been impacted and the probability that the wells can be successfully rehabilitated. The weighting factor assigned to this criterion is 1 and criteria scores were assigned based on the following.

Fill and/or Debris
(Weighting Factor 2)

Description	Score
No Significant Encrustation and/or Biofouling Present	0
Minimal (Superficial Buildup, Minimal Nodules, Little to No Bacterial Activity)	1
Moderate (Significant Encrustation, Nodules, and Bacterial Activity)	2
Severe (Major Obstruction of Well Screen, Abundant Nodules, Widespread Biological Activity)	3

3.1.2 PERFORMANCE CHARACTERISTICS

3.1.2.1 WATER LEVEL TRENDS

There are many factors affecting groundwater level trends (both static and pumping), including but not limited to regional water level changes, changes in wellfield and/or individual well operation, clogging of the well screen, worn pumping equipment, and liner installation. Wells that exhibit diverging static and pumping water level trends are likely impacted by clogging of the well intake structure rather than by regional groundwater level decline or pump-related issues. As such, criteria scores were primarily based on the magnitude of divergence between static and pumping water levels within the past 5 years (i.e., 2015-2020). The weighting factor assigned to this criterion is 2 and criteria scores were generally assigned based on the following parameters.

Water Level Trends
(Weighting Factor 2)

Description	Score
No Divergence of Static and Pumping Water Levels	0
Slight Divergence of Static and Pumping Water Levels	1
Moderate Divergence Static and Pumping Water Levels	2
Major Divergence Static and Pumping Water Levels	3

3.1.2.2 FLOW RATE AND/OR SPECIFIC CAPACITY TRENDS

As with water levels, there are many factors affecting instantaneous pumping rate and specific capacity trends, including but not limited to regional water level changes, changes in wellfield management and/or individual well operations, clogging of the well screen, modified pumping equipment, and well modifications. Wells that exhibit declining instantaneous pumping rates and/or specific capacity were considered more problematic for the purposes of this evaluation, while wells that exhibit no declines were considered less problematic. As such, criteria scores were primarily based on the magnitude of declining trends over the past 5 years (i.e., 2015-2020). The weighting factor assigned to this criterion is 1 and criteria scores were assigned based on the following.

Flow Rate and/or Specific Capacity Trends
(Weighting Factor 1)

Description	Score
No Decline in Instantaneous Pumping Rate and/or Specific Capacity	0
Slight Decline in Instantaneous Pumping Rate and/or Specific Capacity	1
Moderate Decline in Instantaneous Pumping Rate and/or Specific Capacity	2
Major Decline in Instantaneous Pumping Rate and/or Specific Capacity	3

3.1.2.3 SAND AND/OR GRAVEL PRODUCTION

Sustained production of formation sand from a well is an undesirable condition as it can lead to enlargement of perforations, creation of voids behind the well casing and increased risk of structural collapse, accelerated wear and damage to pumping equipment, service complaints, and in rare cases, land subsidence in the vicinity of the well head. Production of material from the gravel envelope (if present) can be a symptom of more serious structural issues and can cause severe damage to pumping equipment when entrained. This criterion was evaluated by assessing the number of available PWD sand reports per well over the past five (5) years (i.e., 2015-2020), weighted by the severity of each report (i.e., none/unknown, trace, small trace, and large trace). The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Sand and/or Gravel Production
(Weighting Factor 3)

Description	Score
None / Unknown	0
Minimal (Minor or Isolated Sand Production)	1
Moderate (Significant and/or Sustained Sand Production)	2
Severe (Heavy Production of Sand and/or Gravel Envelope)	3

3.1.2.4 WATER LEVELS BELOW SCREEN / AIR ENTRAINMENT

Water levels that have declined to the extent that they are below the top of the well screen can create undesirable conditions within a well, including 1) water quality degradation from turbulent flow of water entering the well above the water column, and 2) the effective reduction of aquifer thickness (i.e., aquifer dewatering). Turbulent flow and cascading water can cause entrainment of air within the water column which can lead to accelerated corrosion of the well and pumping components, damage to the pump from cavitation, and service complaints due to aerated water. The weighting factor assigned to this criterion is 2 and criteria scores were assigned based on the following.

Sand and/or Gravel Production
(Weighting Factor 2)

Description	Score
None / Unknown	0
Minimal (Water Levels Below Top of Screen)	1
Moderate (Evidence of Cascading Water Conditions)	2
Severe (Cascading Water Conditions when Idle, Reported Air Entrainment)	3

3.2 SUPPLEMENTAL RANKING CONSIDERATIONS

The well condition and performance assessment performed in Section 3.1 resulted in a ranked list of wells with the most problematic condition and performance being ranked toward the top of the list. The wells were then further evaluated using the supplemental ranking criteria included in Table 3 described in greater detail below. The incorporation of these supplemental criteria enable an assessment of 1) the probability of successful well rehabilitation and/or repair, 2) the general cost of well rehabilitation and/or repair, and 3) the relevance of the individual well to the system. The supplemental ranking criteria were given a weighting factor of 1 to 3 (3 being most important) and each well was assessed individually by being assigned a raw criteria score between 0 and 3 (3 being best). The product of individual supplemental criteria scores and their respective weighting factors resulted in a total supplemental weighted score. A well with a high probability of a successful rehabilitation at low cost would score relatively high, while a well with a low probability of success at high cost would score relatively low.

3.2.1 PROBABILITY OF SUCCESSFUL WELL REHABILITATION AND/OR REPAIR

The extent of well rehabilitation and/or repair work needed for each of the wells was estimated based on the well condition and performance assessment. An assessment was then made as to the magnitude of risk posed by the required work, and the likelihood that the rehabilitation event would result in a positive outcome. Wells at high risk of structural collapse and little to no possibility of success were scored low, while those well posing little risk and high probability of improvement were scored high. For example, a well experiencing widespread biofouling, reduced performance, and observable structural issues such as holes and/or ruptures within the well casing would be scored low. Wells that appear structural sound with minor levels of biofouling and mineral encrustation may score relatively high. The weighting factor assigned to this criterion is 2 and criteria scores were generally assigned based on the following parameters.

Probability of Successful Rehabilitation and/or Repair
(Weighting Factor 3)

Description	Score
Very Low (High Risk / Not Feasible)	0
Low (Improvement Unlikely)	1
Moderate (Some Improvement Possible)	2
High (Significant Improvement Likely)	3

3.2.2 COST OF REHABILITATION AND/OR REPAIR

The cost to complete the estimated well rehabilitation and/or repair work needed for each of the wells was estimated based on planning-level cost estimates for each component of work and roughly scaled based on the depth of the well. A deep well requiring repair, chemical and mechanical cleaning, and redevelopment would be considered relatively expensive and assigned a low score. A

shallow well only requiring mechanical cleaning and disinfection would be considered relatively inexpensive and would be scored high. The weighting factor assigned to this criterion is 3 and criteria scores were generally assigned based on the following parameters.

Cost of Rehabilitation and/or Repair
(Weighting Factor 3)

Description	Score
Very High (Repairs, Mechanical and Chemical Cleaning, Redevelopment)	0
High (Mechanical and Chemical Cleaning, Redevelopment)	1
Moderate (Mechanical Cleaning and Redevelopment)	2
Low (Mechanical Cleaning and Disinfection)	3

3.2.3 RELEVANCE TO THE SYSTEM

Regardless of how each well ranks with regard to prior assessments, some wells may be deemed more critical for operation of the system and should potentially be ranked at a higher level regardless of prior ranking scores. As such, PWD personnel were requested to provide input as to which wells are considered more critical to the system. Generally, wells within the north wellfield are considered a higher priority to system operation and were assigned a score of 2. A subset of wells within the north wellfield (Well Nos. 3A, 7A, 14A, and 23A) are equipped with natural gas generators and operate at greater efficiency, and were assigned a score of 3. Similarly, Well No. 2A is equipped with an engine-driven pump and was also assigned a score of 3 due to increased operational efficiency. All other wells were assigned a score of 1 for this criterion as they are beyond the north wellfield and exhibit very low production capacity. The weighting factor assigned to this criterion is 3 and criteria scores were assigned based on the following.

Relevance to the System
(Weighting Factor 3)

Description	Score
-	0
Low (Not Critical to System Operation)	1
Moderate	2
High (Critical to System Operation)	3

3.3 RANKING RESULTS

3.3.1 WELL CONDITION AND PERFORMANCE RANKING

The results of the well condition and performance ranking, including weighting factors, criteria scores, total weighted scores, and rank are provided in Table 4, ordered by well designation. The

highest ranked wells represent the most problematic wells in terms of condition and performance characteristics, with the lowest ranked wells being considered in the best condition.

3.3.2 SUPPLEMENTAL RANKING

Supplemental ranking modifies the well condition and performance ranking to include the supplemental effects of 1) probability of successful well rehabilitation efforts, 2) the cost of well rehabilitation and repair, and 3) relevance to the system. The results of the supplemental ranking, including weighting factors, criteria scores, total weighted scores, and rank are provided in Table 5, ordered by well designation.

3.3.3 FINAL PRIORITIZATION RANKING

The final prioritization ranking is provided in Table 6, including weighting factors, criteria scores, total weighted scores, modified weighted scores, and rank. Seven (7) wells were identified as structurally unsound and have been assigned a modified criteria score of 0, resulting in those wells being relegated to the bottom of the ranking (shaded red in Tables 4 through 6). These wells should either 1) not undergo significant rehabilitation efforts for fear of casing collapse, or 2) should not be rehabilitated as the probability of improving performance is considered unlikely. It should be noted that these wells may be deemed suitable for routine maintenance and/or well repair should they be considered critical to the system, or should time be needed to raise capital funding for new construction projects (e.g., recent liner installations at Well Nos. 7A and 25). However, these wells are nearing the end of their useful service lives and should be replaced within the next 10 years.

4.0 RECOMMENDATIONS

4.1 WELL REPLACEMENT

The PWD well field is in generally poor condition, primarily due to the use of inferior construction materials and poor design elements (i.e., mild steel casing and screen, wire-wrap well screen, and relatively thin walled casing). At the very least, PWD should plan for replacement of those wells identified as structurally unsound and deemed unsuitable candidates for well rehabilitation efforts. Those wells include Well 7A, 10, 14A, 16, 18, 21, and 25. The order of the replacements should be based on the relevance of each well to the system as will be determined by PWD. Well 7A is currently undergoing repair and redevelopment to extend its useful service life and should be ranked lower in terms of the schedule for replacement. The following table summarizes current production capacity versus the earliest known capacity for each well identified in need of replacement.

Well Replacements – Production Capacity

Well Designation	Pressure Zone	Earliest Recorded Capacity (year) (gpm)	Current Capacity (gpm)
7A	2800	2,000 (1985)	600*
10	2800	208 (2008)	164
14A	2800	972 (2008)	753
16	2950	575 (1960)	136
18	3250	171 (1954)	78
21	2950	270 (2007)	227
25	2950	750 (1989)	217
Total	-	4,946	2,175

* Estimated capacity projection following installation of casing liner in 2020.

It should be noted that wells situated within the north wellfield generally exhibit much higher production capacities than wells situated within other areas of PWD's service area. As such, it is recommended that the north wellfield area be considered the most favorable area for replacement wells, particularly during the earliest phases of a well replacement program. A well site assessment and preliminary design was recently completed as one of the first steps toward construction of one or more production wells, designated Well Nos. 36 and 37, within the north wellfield area.

4.2 WELL REHABILITATION

The remaining 15 wells were ranked in order of which wells are most problematic, have the highest chance of successful well rehabilitation at the least cost, and considered most critical to system operation (see table below). Those wells that have been rehabilitated within the past five (5) years are considered to be a lower priority for imminent well rehabilitation and are shaded green.

Final Rehabilitation Ranking

Well Designation	Pressure Zone	Final Prioritization Rank	Last Well Rehabilitation Event	Recommended Rehabilitation Effort
26	2850	1	2016	CH-I, R
3A	2800	1	2012	M, CH-I
15	2800	3	2016	M, CH-I, CH-II, R
2A	2800	4	2010	M, CH-I, CH-II, R
11A	2800	5	2012	M, CH-I, R
29	2950	6	2018	M, CH-I, CH-II, R
6A	2800	7	2018	M, CH-I, CH-II, R
19	3250	8	2011	M, CH-I, CH-II, R
35	2950	9	2018	CH-I, R, CP
23A	2800	9	2013	M, CH-I, CH-II, R
30	2850	11	2016	M, CH-I, R
8A	2800	11	2017	CH-I, R
22	2850	13	2016	M, CH-I, R, CP
32	2800	14	2013	M, CH-I, CH-II, R
33	2850	15	2008	CH-I, R

M: Mechanical cleaning.
CH-I: Phase I chemical treatment with polymer dispersant and/or surfactant.
CH-II: Phase II chemical treatment with acid.
R: Redevelopment.
CP: Casing patch installation.

4.3 ESTIMATED COST OF WELL REHABILITATION

The cost to complete the estimated well rehabilitation and/or repair work efforts outlined in the table above are based on general estimates for each component of work and roughly adjusted based on the depth of the well (i.e., the total rehabilitation cost for a well of less than 500 feet total depth was adjusted to 80% of the total estimated cost). It should be noted that cost estimates presented herein are to be utilized only as a general metric from which to compare costs between wells and should in no way be used for planning purposes. The estimated cost for each component of rehabilitation or repair work is summarized as follows.

Work Effort	Estimated Cost
Mechanical Cleaning	$10,000
Phase I Chemical Treatment	$5,000
Phase II Chemical Treatment	$50,000
Redevelopment	$60,000
Casing Patch Installation	$15,000

The estimated total costs for rehabilitation, redevelopment, and repair for each of the 15 top-ranked wells are presented below along with recommended rehabilitation timing. Those wells that have been rehabilitated within the past five (5) years are considered to be a lower priority for imminent well rehabilitation and are shaded green.

Estimated Rehabilitation Costs and Schedule

Well Designation	Pressure Zone	Final Prioritization Rank	Last Well Rehabilitation Event	Estimated Rehabilitation Cost	Recommended Rehabilitation Year
26	2850	1	2016	$52,000	2023
3A	2800	1	2012	$75,000	2021
15	2800	3	2016	$125,000	2023
2A	2800	4	2010	$125,000	2021
11A	2800	5	2012	$75,000	2021
29	2950	6	2018	$100,000	2028
6A	2800	7	2018	$125,000	2025
19	3250	8	2011	$100,000	2023
35	2950	9	2018	$64,000	2028
23A	2800	9	2013	$125,000	2021
30	2850	11	2016	$60,000	2023
8A	2800	11	2017	$65,000	2024
22	2850	13	2016	$72,000	2026
32	2800	14	2013	$125,000	2023
33	2850	15	2008	$52,000	2021

4.4 EQUIPPING OF INACTIVE WELLS

Well No. 28 was constructed in 1989 and had a reported instantaneous production rate of 800 gpm at the time of construction. Well No. 34A was constructed in 1992 and had a reported instantaneous production rate of 450 gpm at the time of construction. Neither of these wells were equipped following construction due to funding issues and have since remained inactive. It is possible that these wells could be rehabilitated, redeveloped, equipped, and brought to service. However, both wells are nearing the end of their estimated useful service life based on steel type alone and may not be viable for long-term utilization. Furthermore, the thorough evaluation, testing, and infrastructure requirements necessary to bring these wells to service may ultimately be cost-prohibitive.

4.5 PROGRAM UPDATES

It is recommended that this well rehabilitation prioritization program be updated as new information and system needs are developed, as existing facilities are modified, and/or new facilities constructed. Additionally, criteria scores and weighting factors can be modified as the need arises.

5.0 REFERENCES

California Department of Water Resources, 2020. Well Completion Report Map Application: https://dwr.maps.arcgis.com/apps/webappviewer/index.html?id=181078580a214c0986e2da28f8623b37. Accessed: May 2020.

California Department of Water Resources, 2003. California's Groundwater. Bulletin No. 118. Update 2004.

California State Water Resources Control Board, Division of Drinking Water, 2018. Electronic Data Transfer (EDT) Library – Water Quality Analyses Database Files. Accessed: April 2018.

Cooper, H. H., Jr. and Jacob, C. E., 1946. A Generalized Graphical Method for Evaluating Formation Constants and Summarizing Well Field History. Transactions, American Geophysical Union, Vol. 27, No. 4.

Ferris, J.G., Knowles, R. H., Brown, R.S., and Stallman, R.W., 1963. Theory of Aquifer Tests. U.S. Geological Survey Water Supply Paper 1536-E.

MWH, 2016. 2016 Water System Master Plan. Prepared for: Palmdale Water District. December 2016.

MWH, 2008. Hydrogeologic Review for Two Proposed Water Wells. Technical Memorandum prepared for: Palmdale Water District. March 25, 2008.

Palmdale Water District, 2019. Request for Proposals for Well Rehabilitation Prioritization Program. December 19, 2019.

Schnieders, John H., 2003. Chemical Cleaning, Disinfection and Decontamination of Water Wells. First Edition. Johnson Screens, Inc., St. Paul, MN.

Smith, Stuart A., and Comeskey, Allen E., 2010. Sustainable Wells – Maintenance, Problem Prevention, and Rehabilitation. CRC Press, Boca Raton, FL.

Theis, C.V., Brown, R.H., and Meyer, R.R., 1963. Estimating the Transmissibility of Aquifers from the Specific Capacity of Wells. United States Geological Survey Water Supply Paper 1536-I, pp 331-340. 1963.

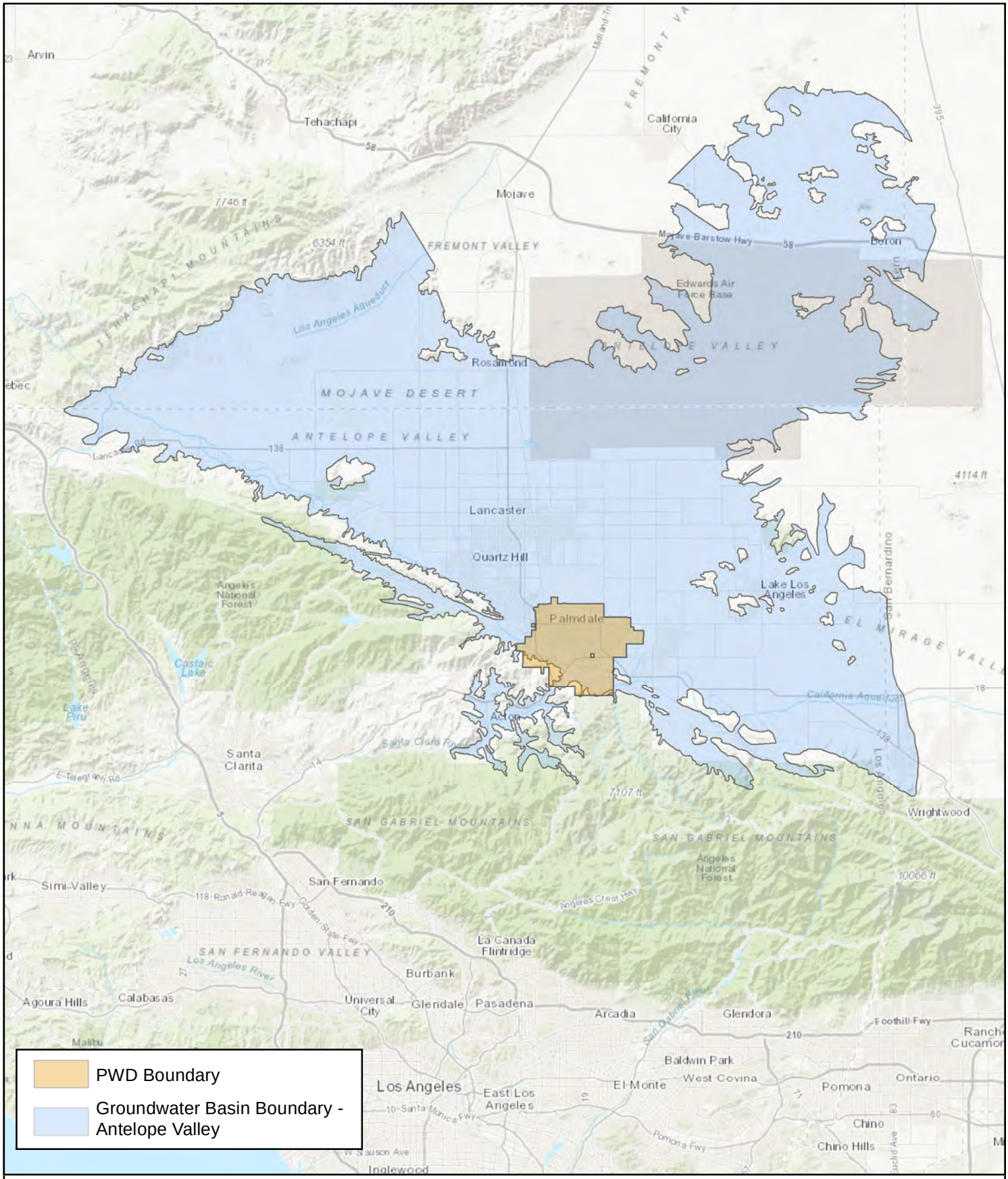
Theis, C.V., 1935. The Relation Between the Lowering of the Piezometric surface and the Rate and Duration of Discharge of a Well Using Groundwater Storage. Transactions, American Geophysical Union. Washington D.C., pp 518 524.

Todd Groundwater, 2019. 2018 Annual Report – Antelope Valley Watermaster – Final. Prepared for: Antelope Valley Watermaster. July 29, 2019.

United States Geological Survey, 2013. Groundwater Quality in the Antelope Valley, California. January 2013.

FIGURES

KYLE Groundwater



GENERAL PROJECT LOCATION

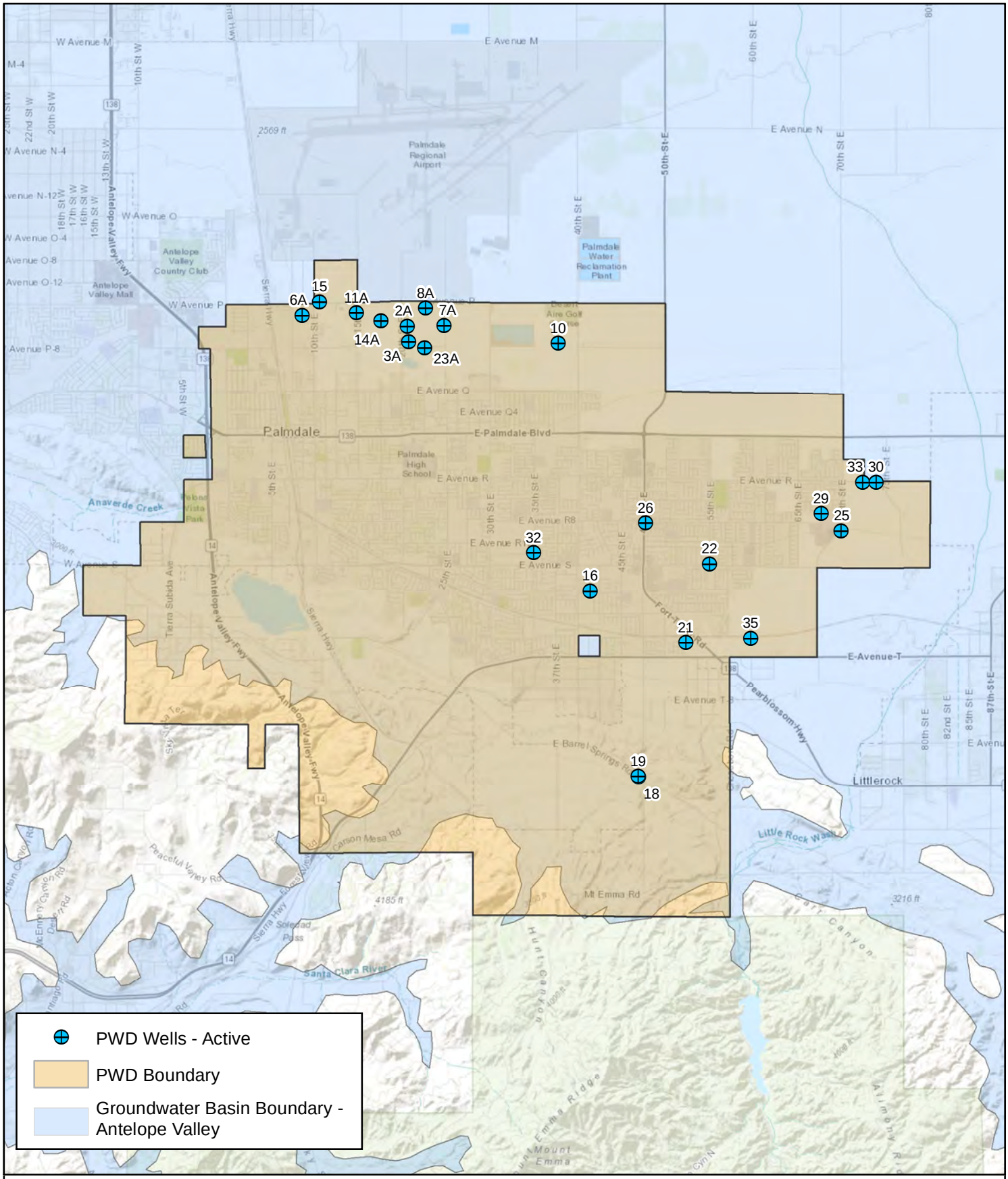
WELL REHABILITATION PRIORITIZATION PROGRAM
PALMDALE WATER DISTRICT
PALMDALE, CALIFORNIA
DECEMBER 2020

N

0 5 10
Miles

KYLE Groundwater

PROJECT NO.	FIGURE
3020.001	1



WELL LOCATIONS

WELL REHABILITATION PRIORITIZATION PROGRAM
PALMDALE WATER DISTRICT
PALMDALE, CALIFORNIA
DECEMBER 2020

N

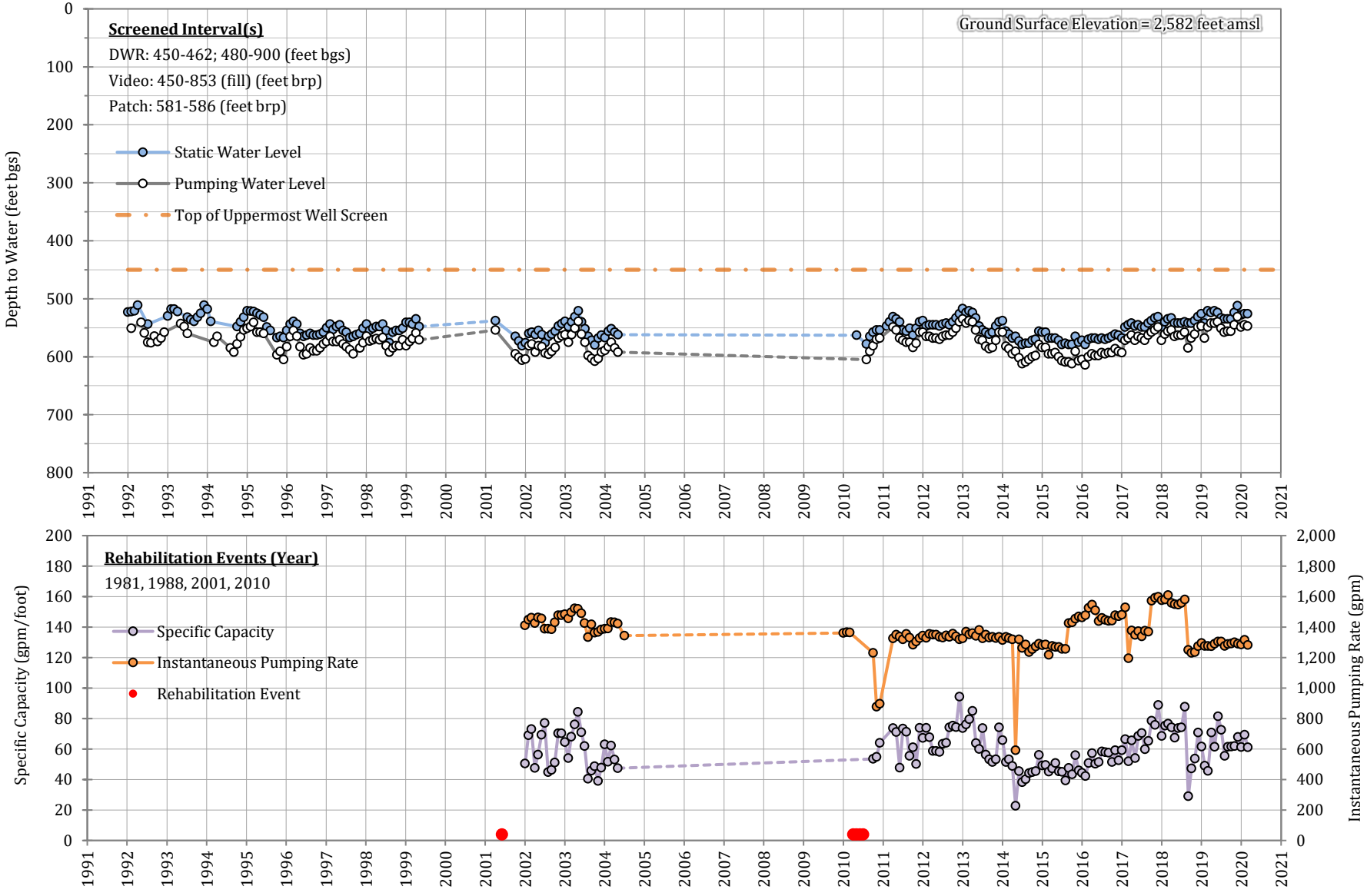
0 0.75 1.5
Miles

KYLE Groundwater

PROJECT NO.	FIGURE
3020.001	2

Figure 3

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 2A

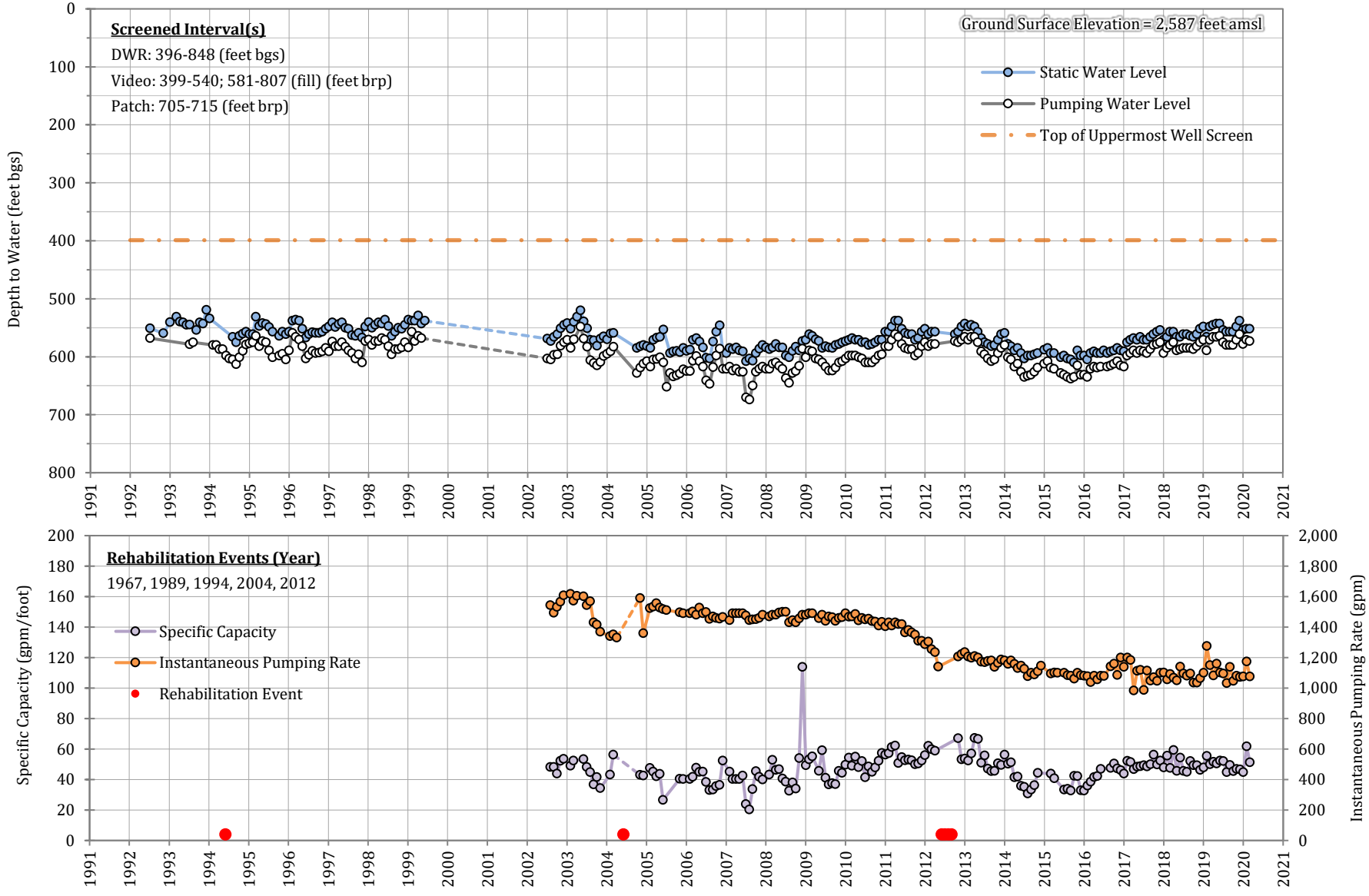


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 4

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 3A

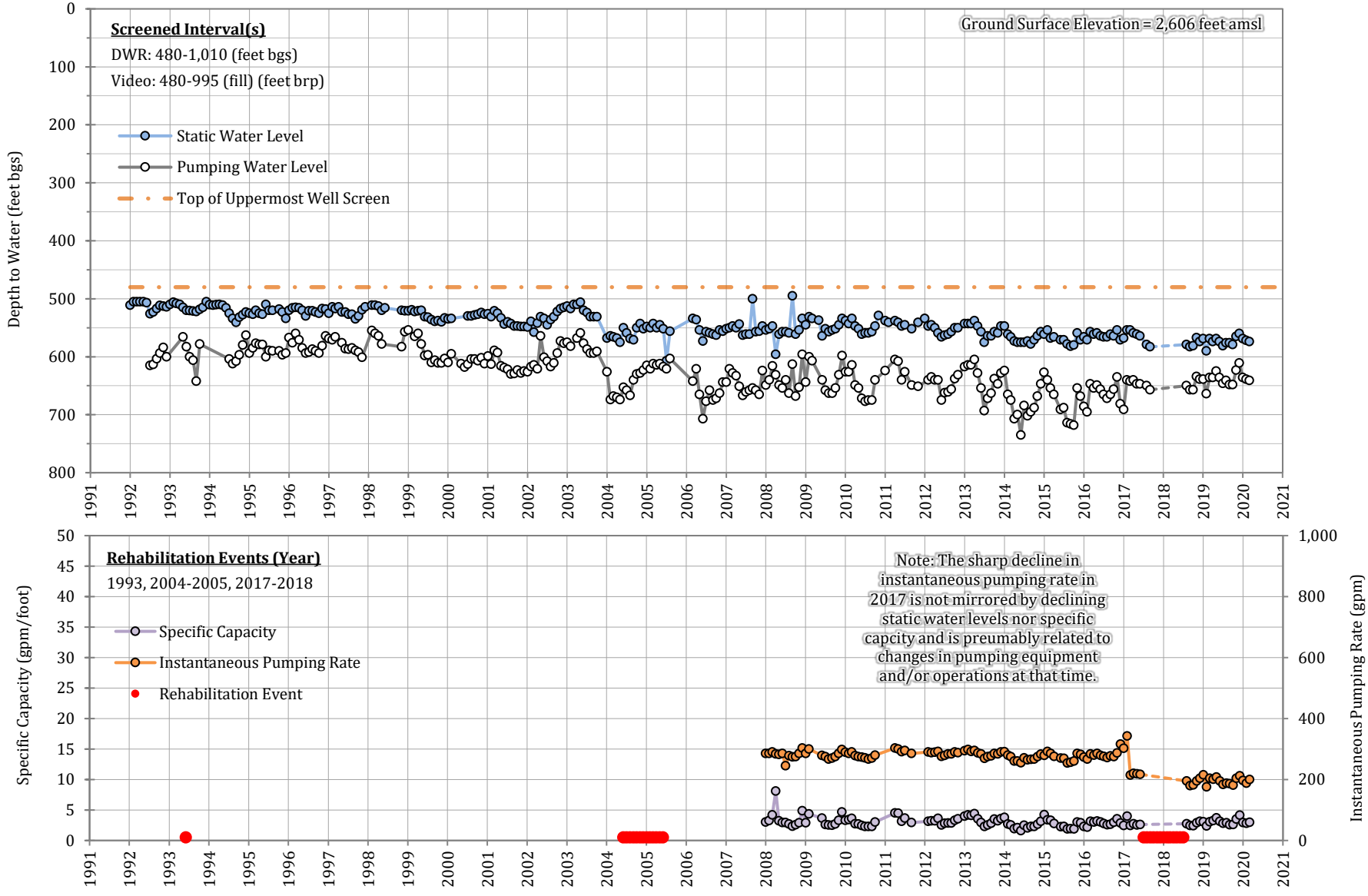


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 5

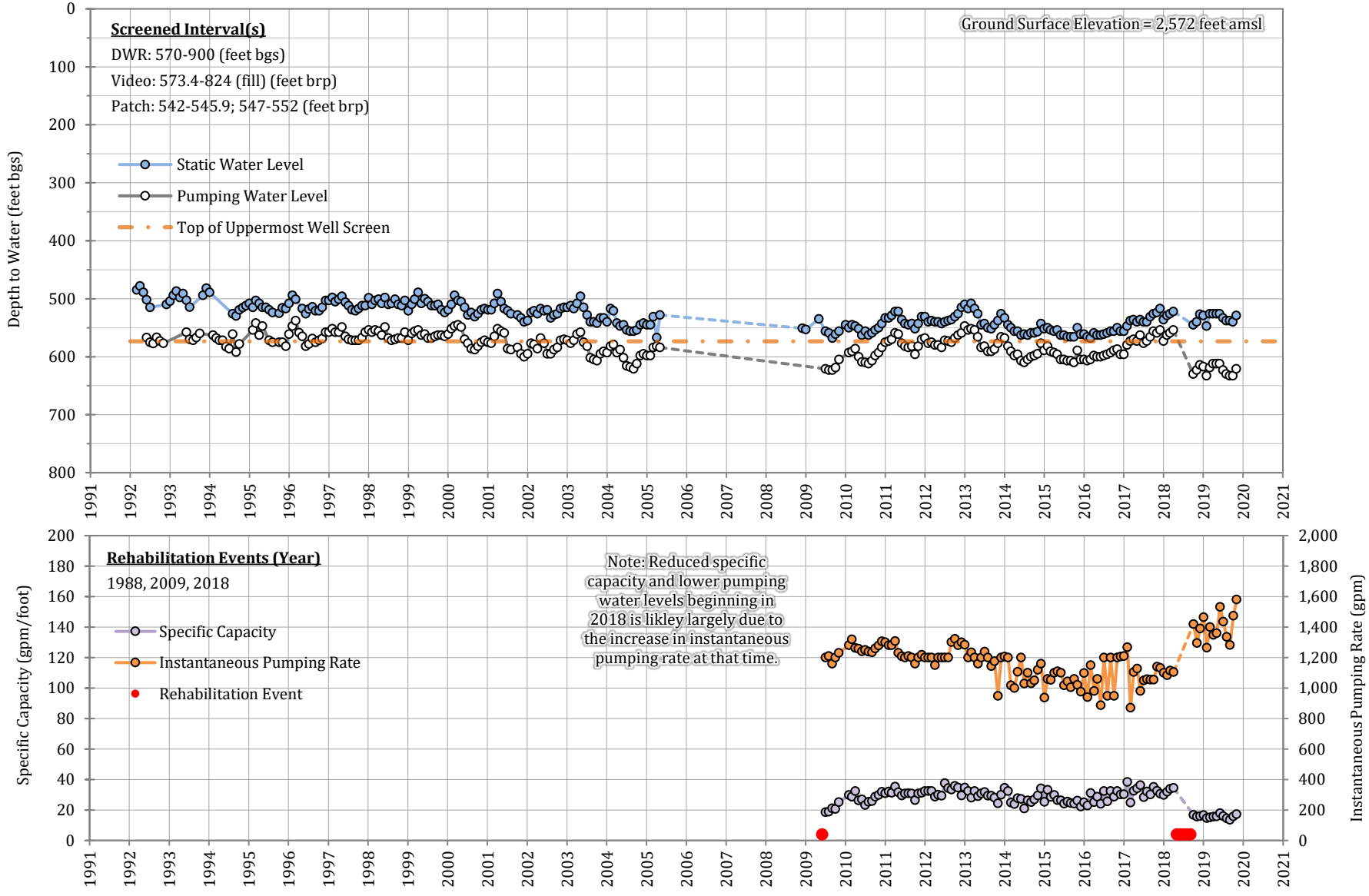
Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 6A



Source: Palmdale Water District (2020).

KYLE Groundwater

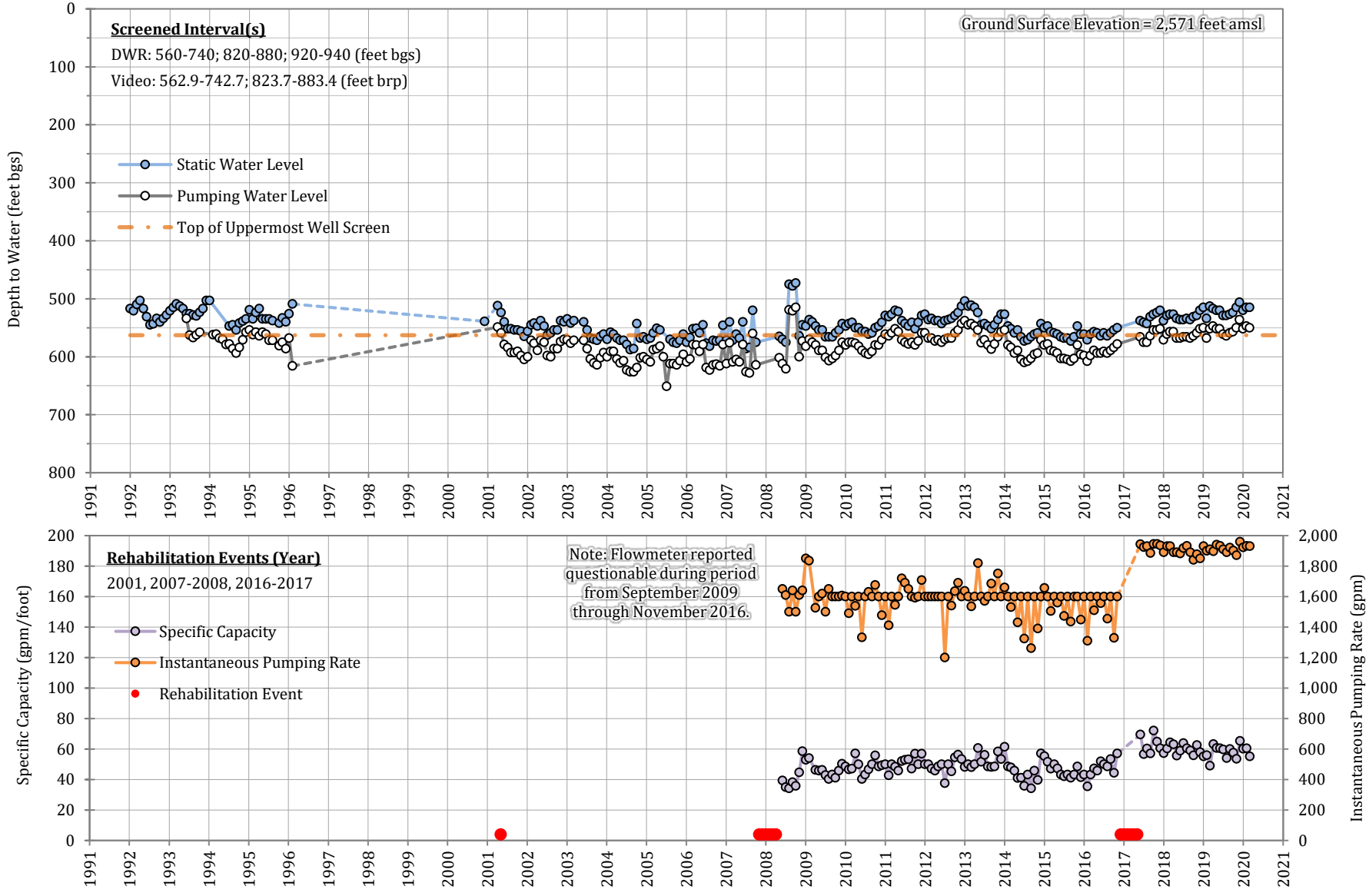
Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 7A



Source: Palmdale Water District (2020).

Figure 7

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 8A

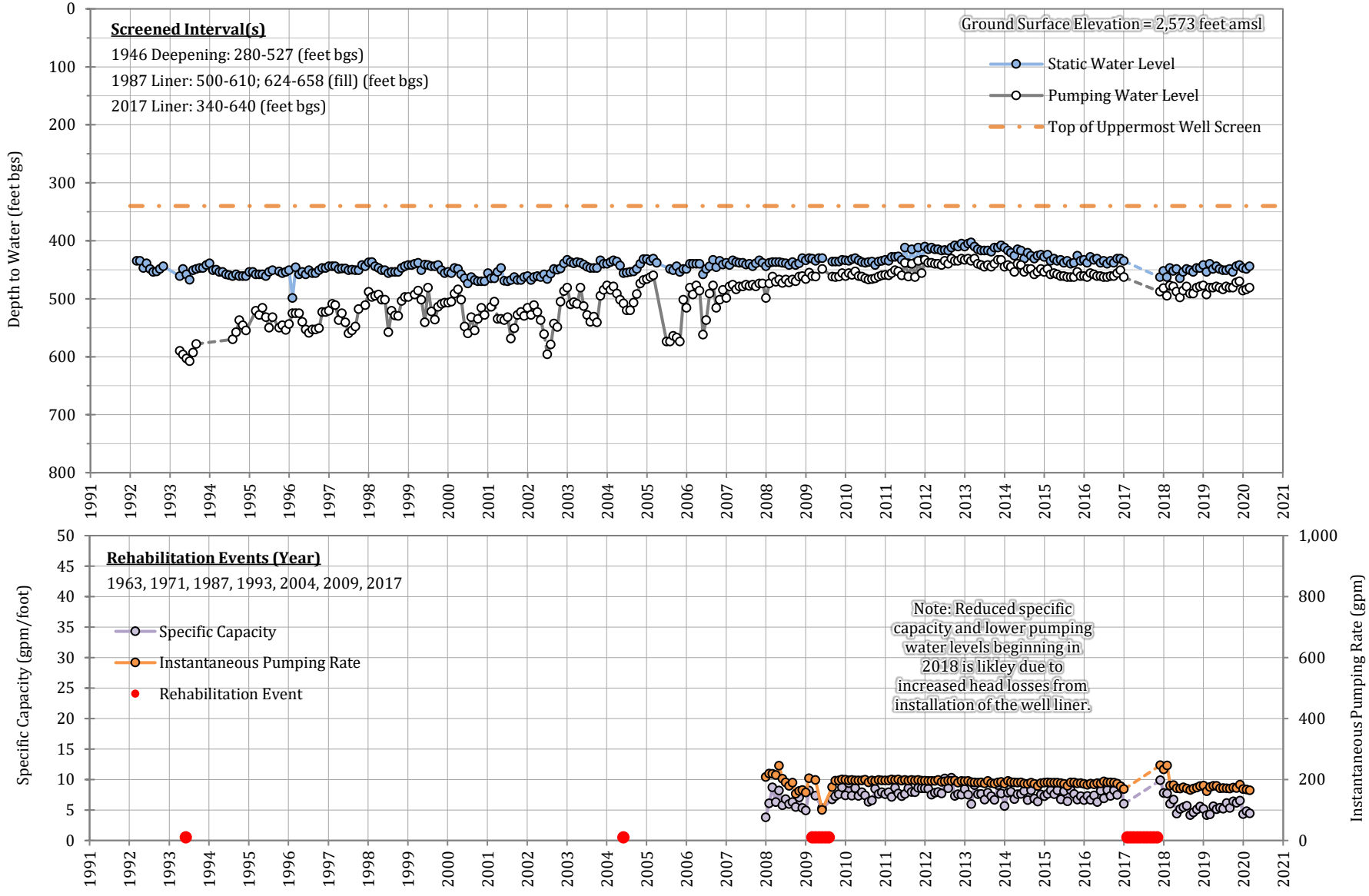


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 8

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 10

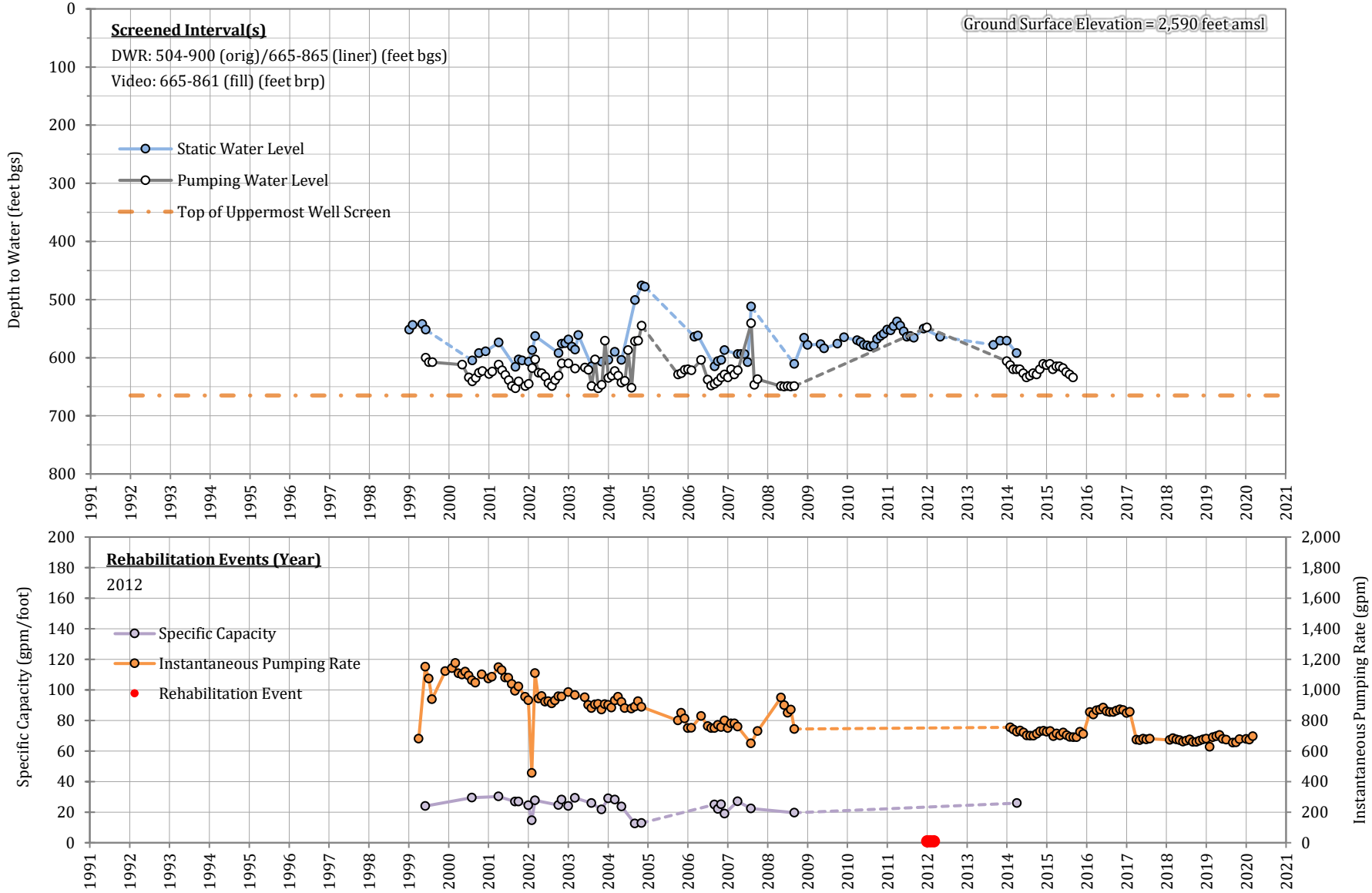


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 9

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 11A

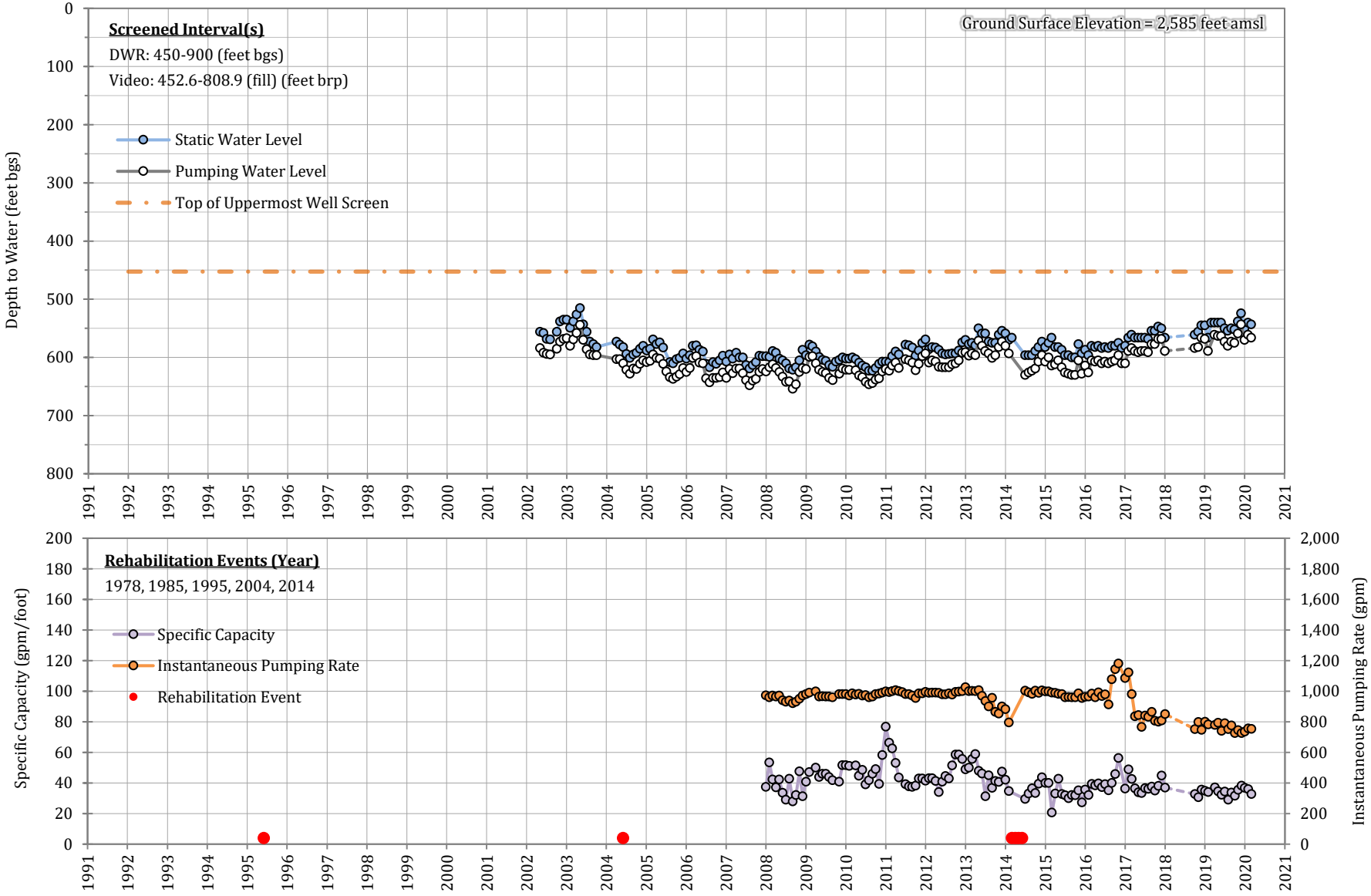


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 10

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 14A

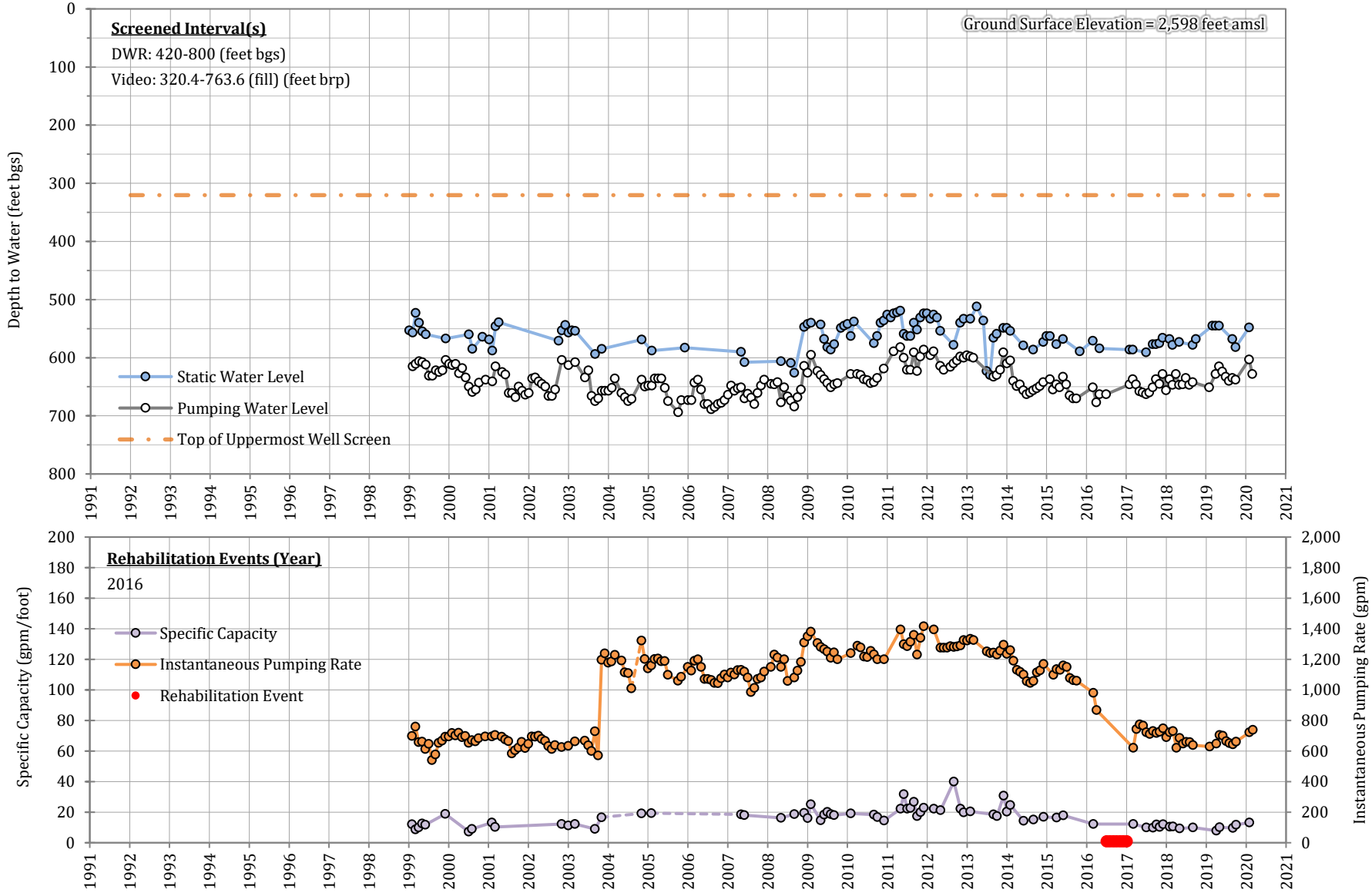


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 11

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 15

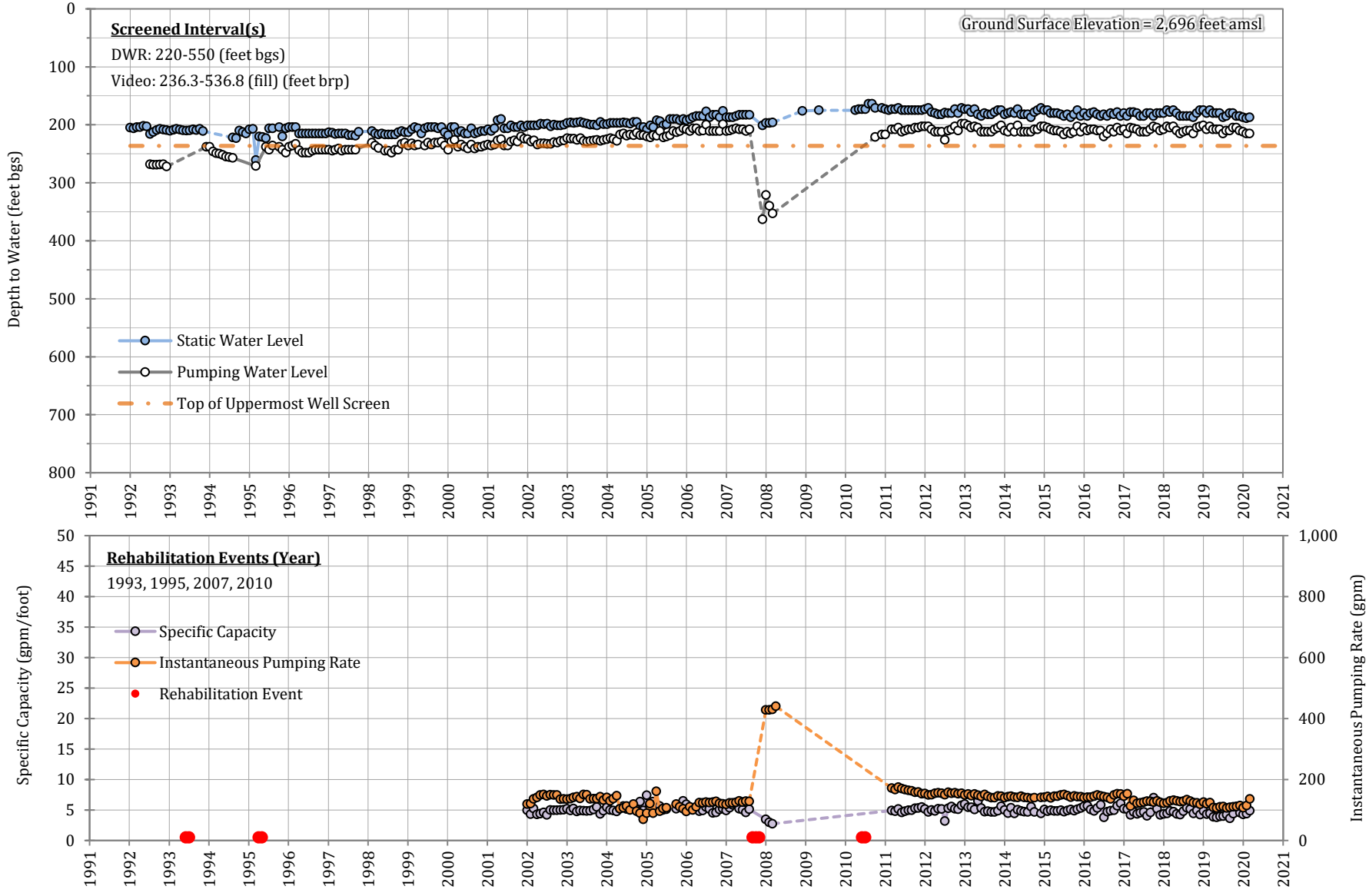


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 12

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 16

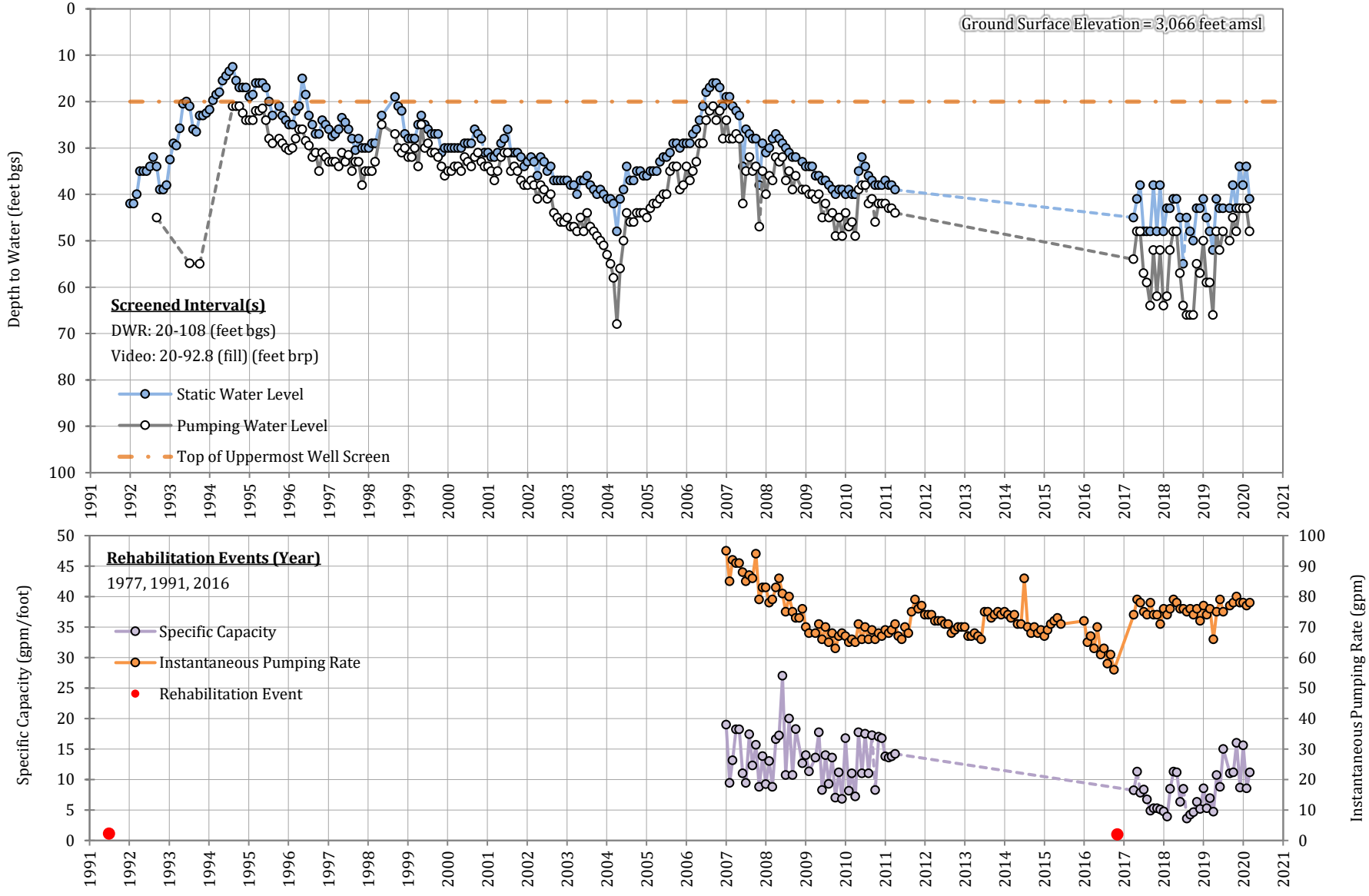


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 13

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 18

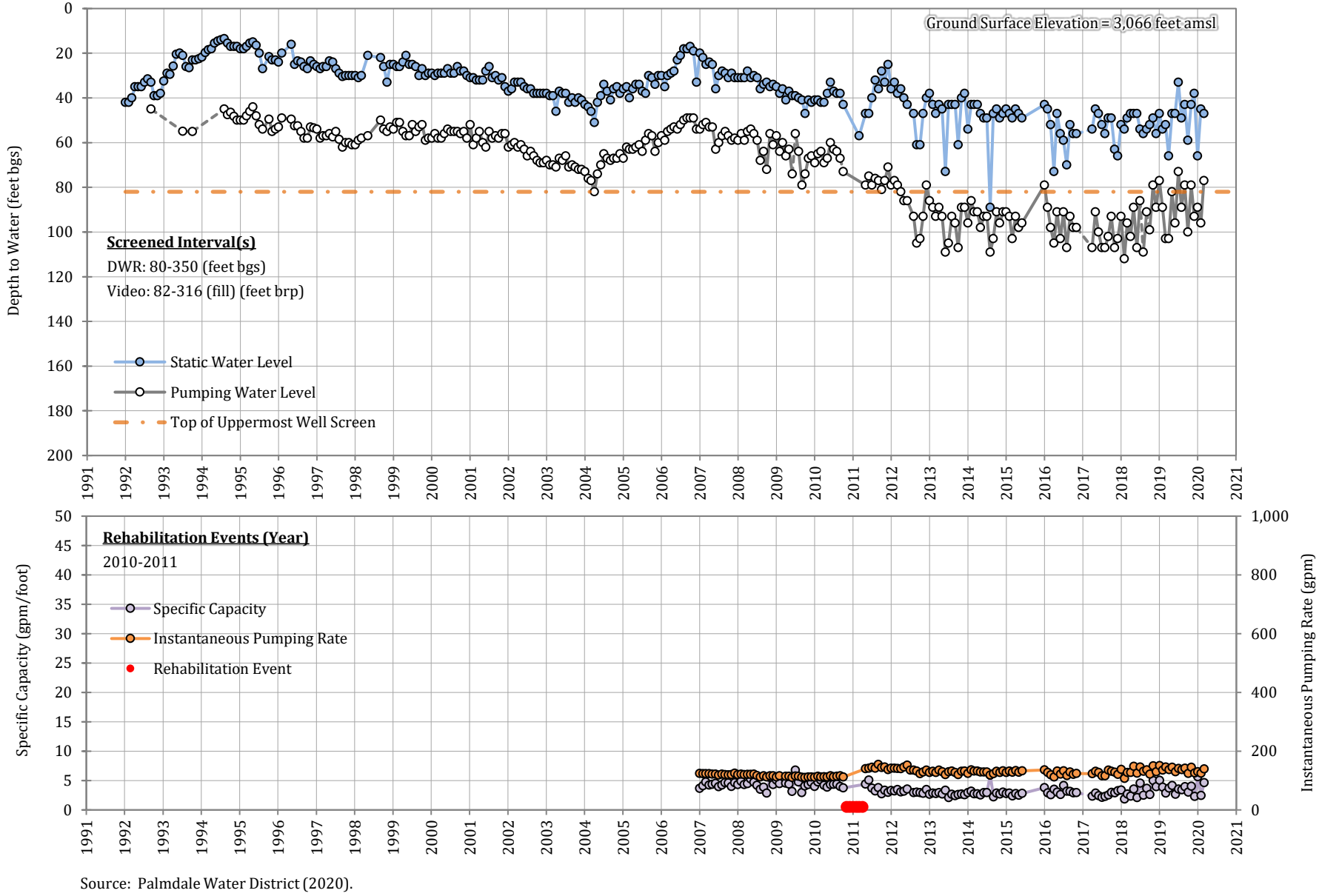


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 14

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 19

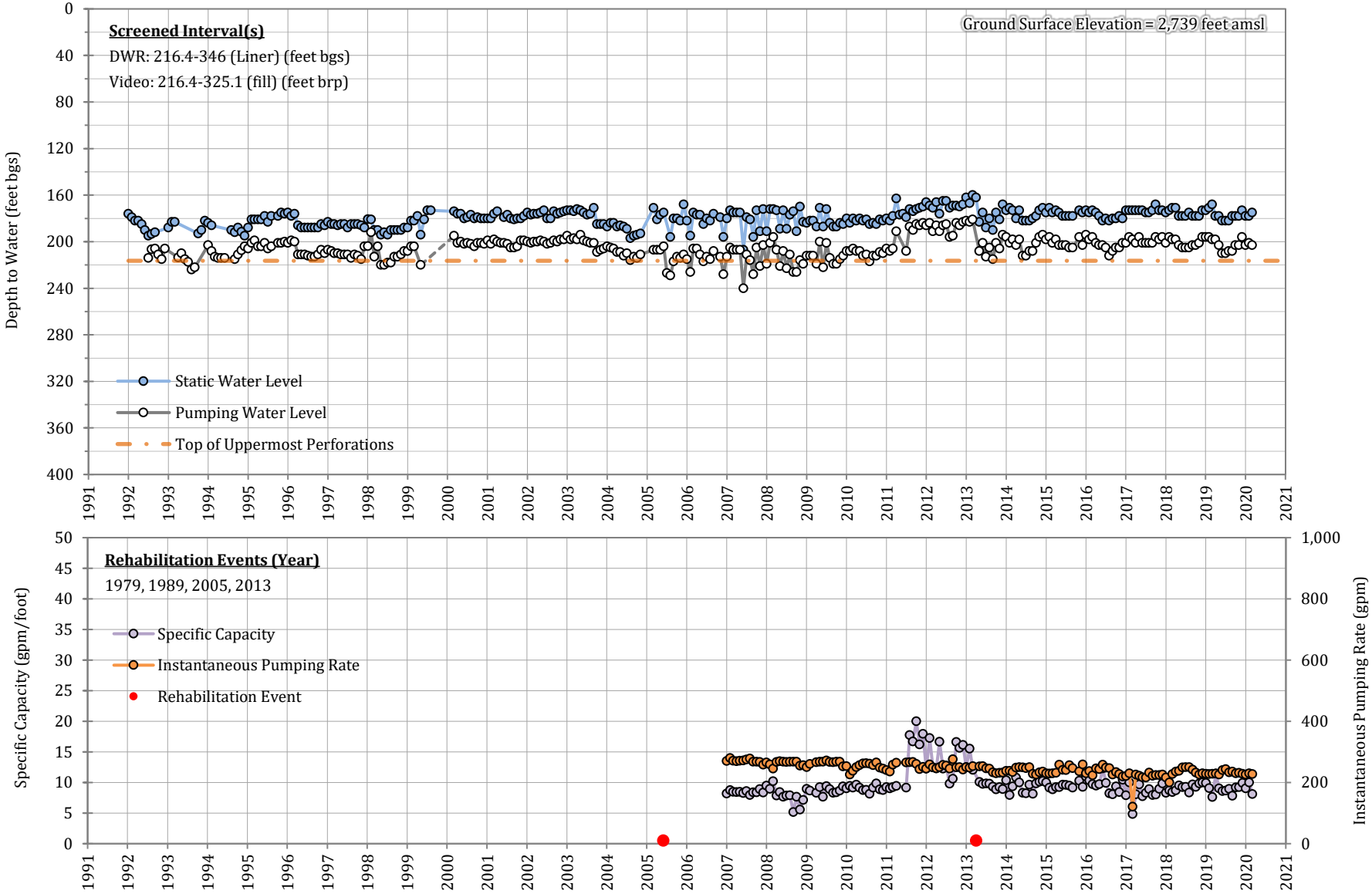


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 15

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 21

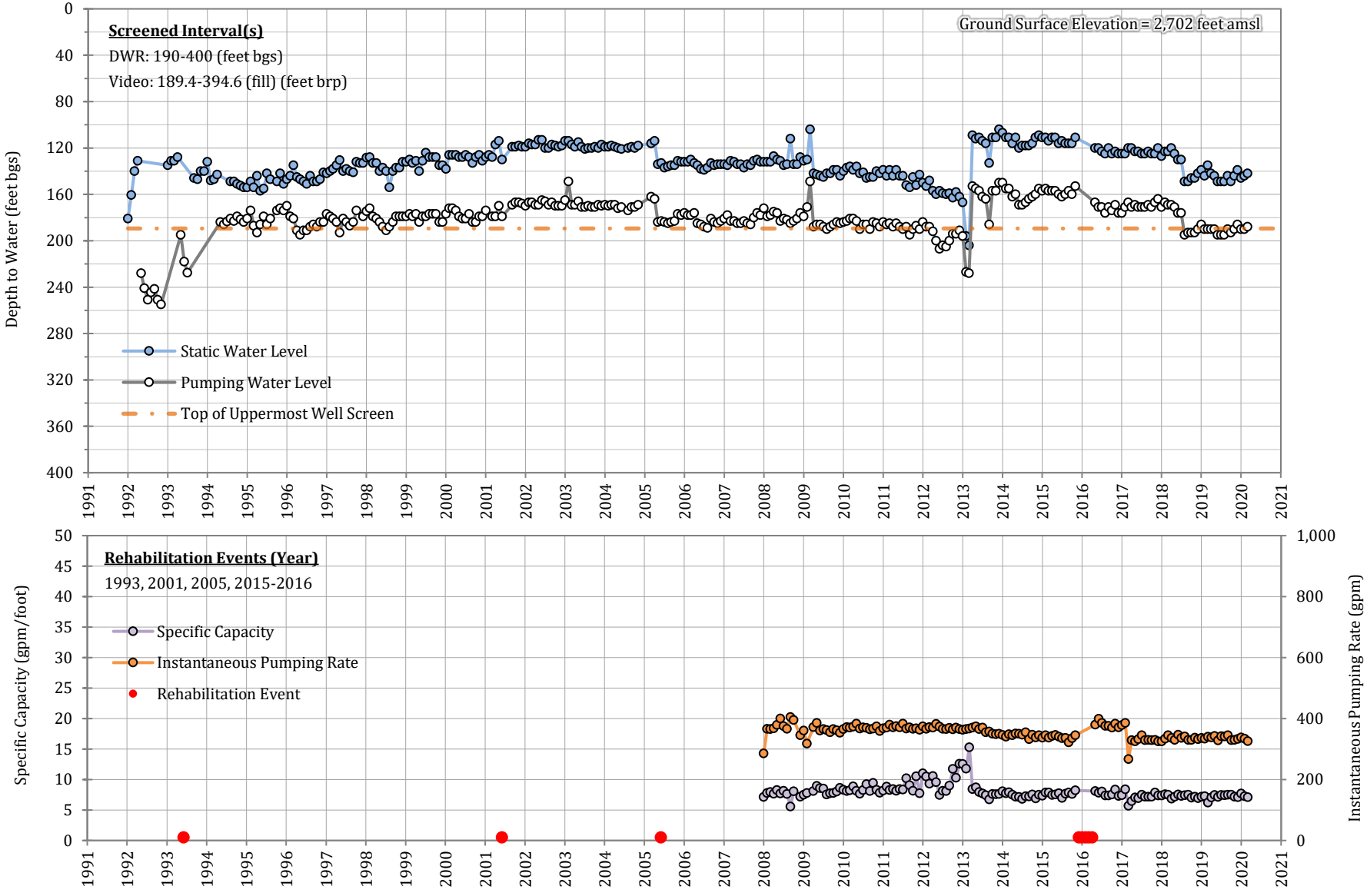


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 16

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 22

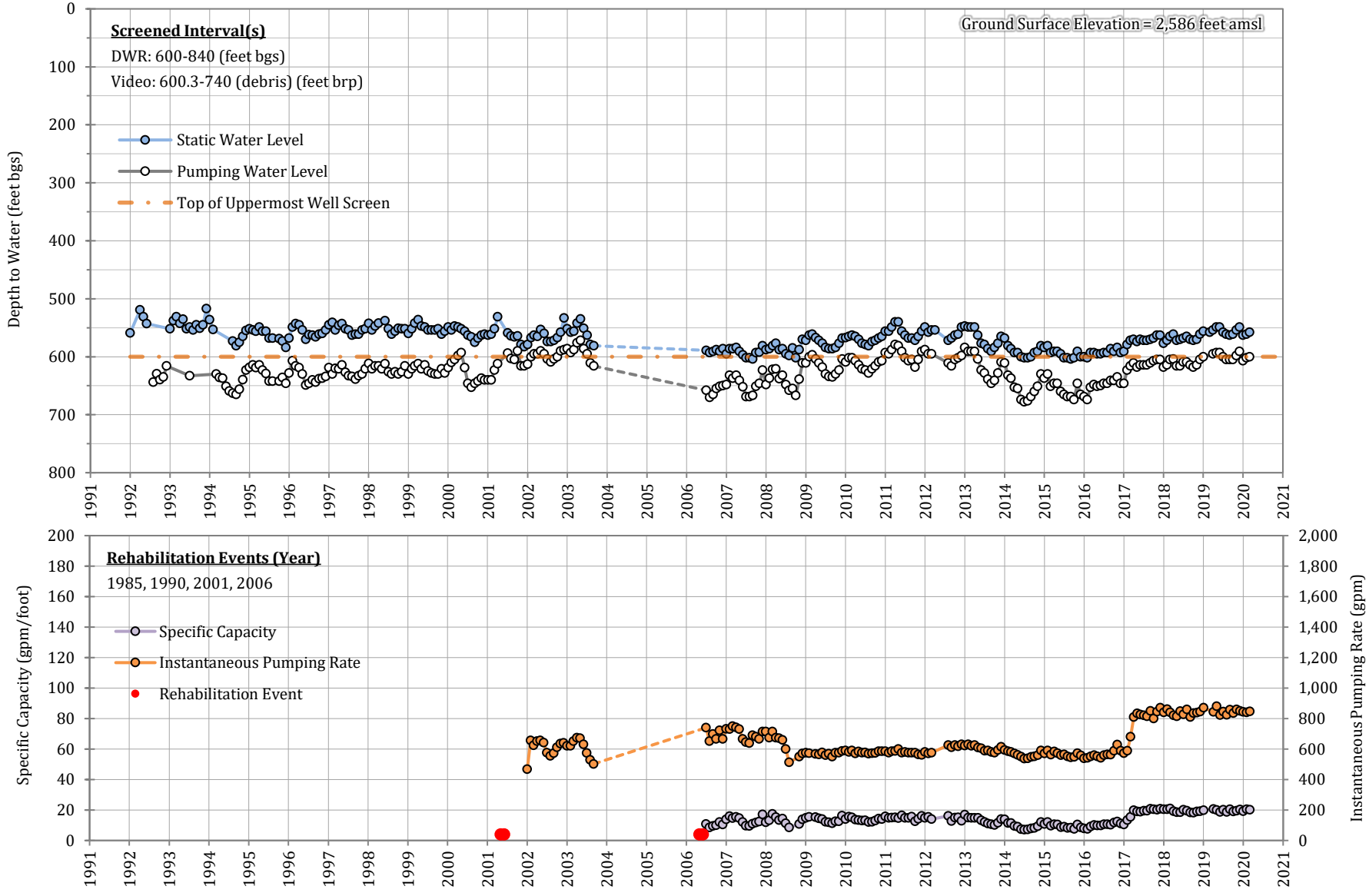


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 17

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 23A

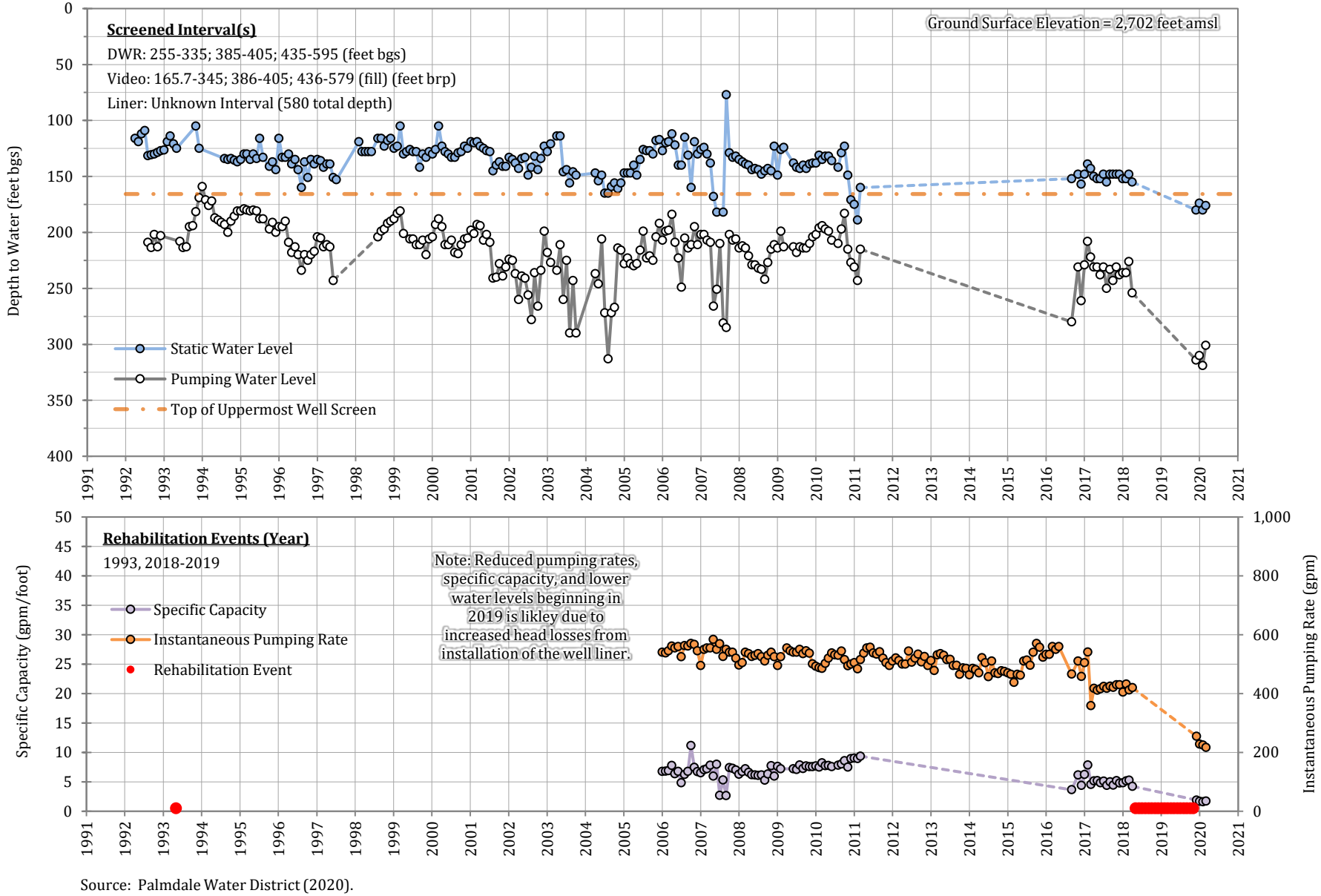


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 18

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 25

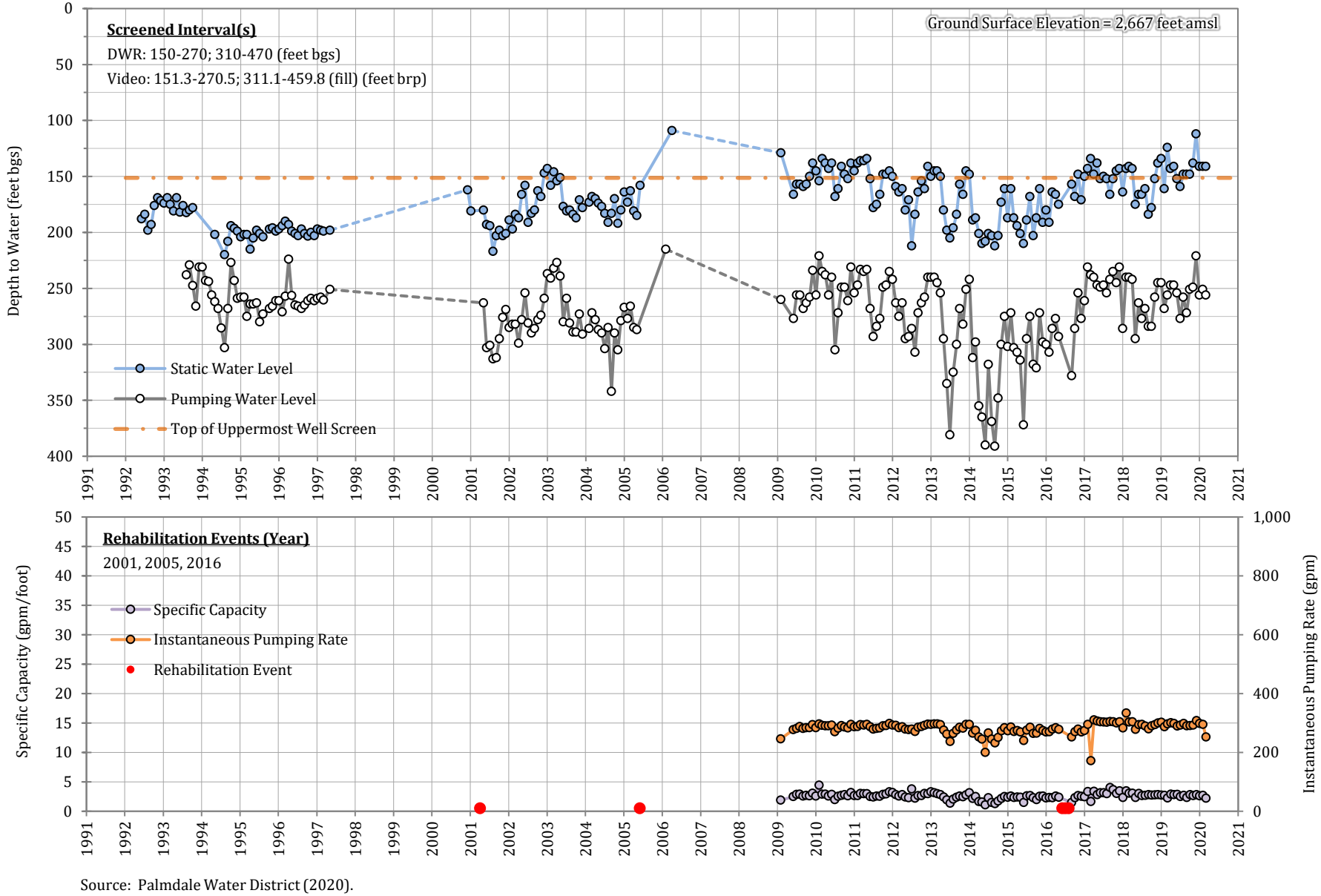


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 19

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 26

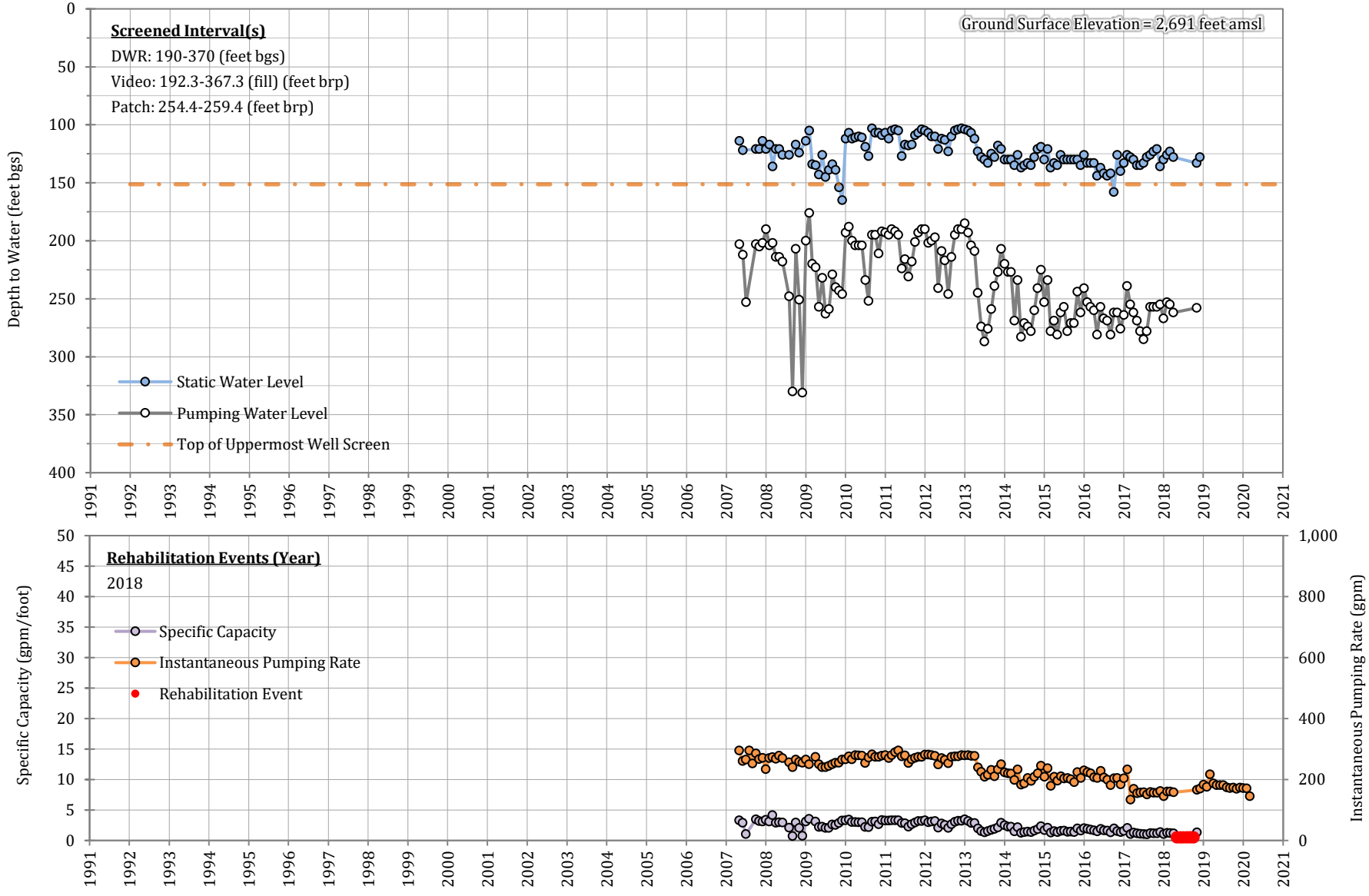


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 20

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 29

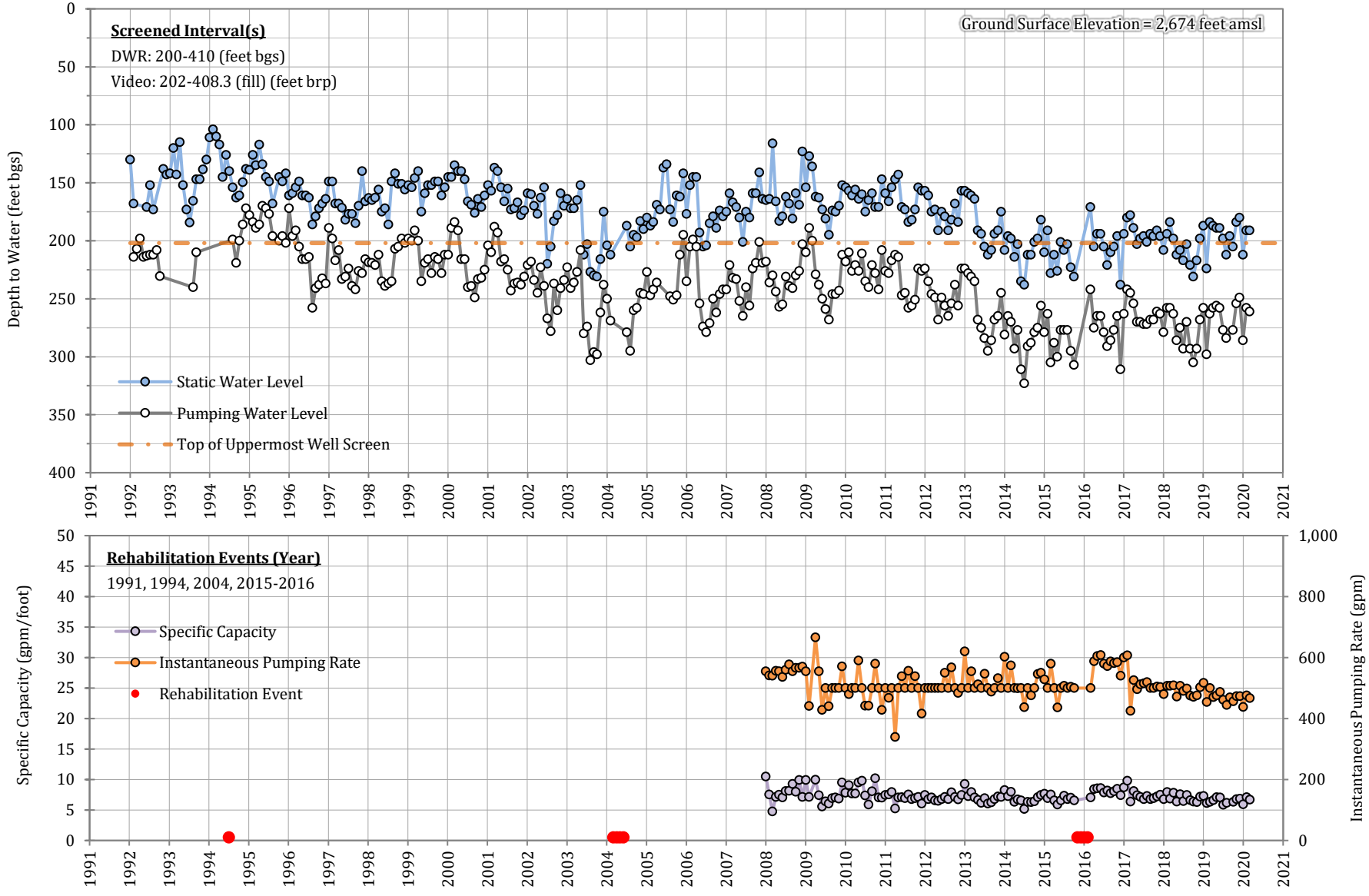


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 21

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 30

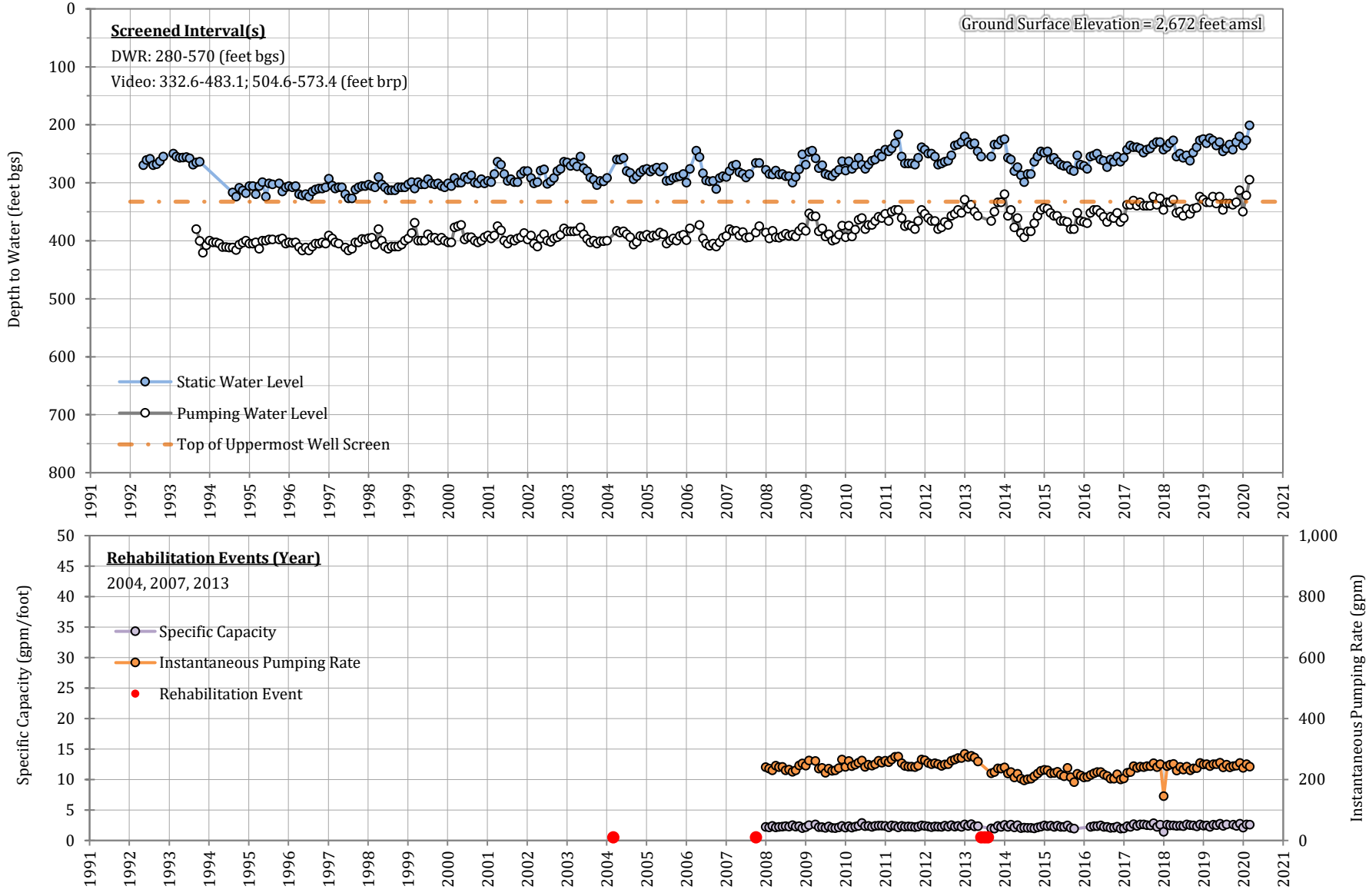


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 22

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 32

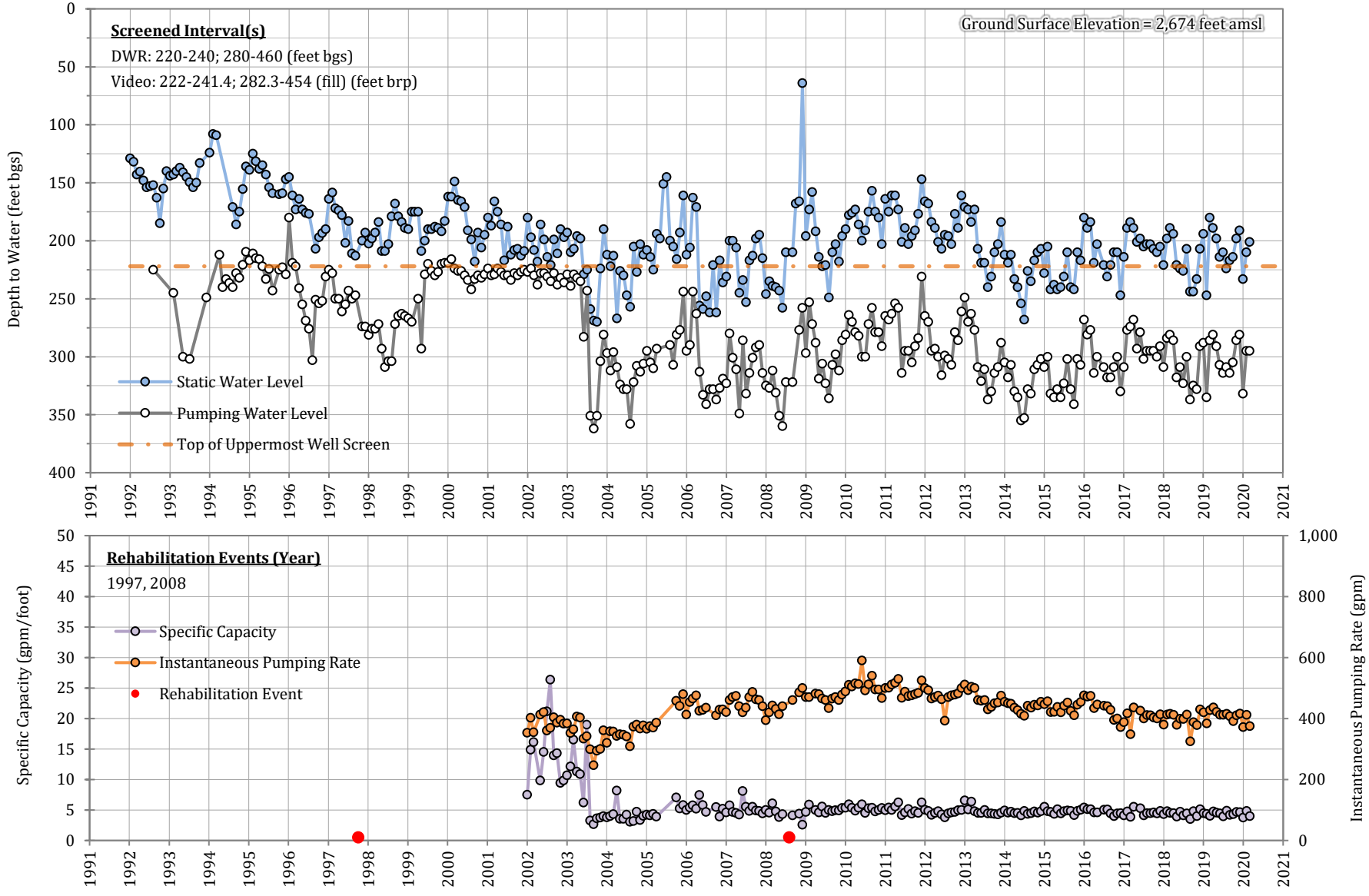


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 23

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 33

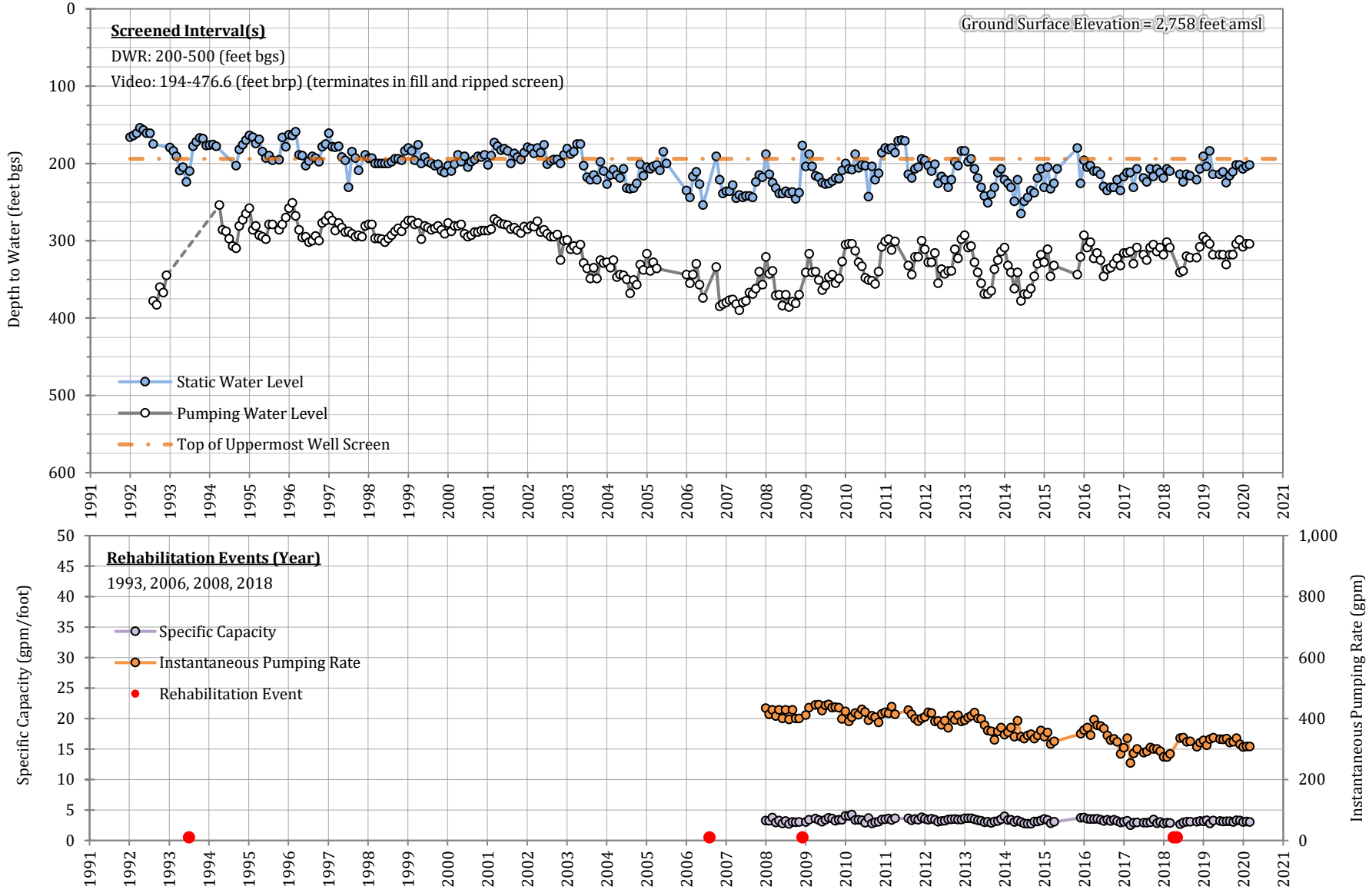


Source: Palmdale Water District (2020).

KYLE Groundwater

Figure 24

Historical Groundwater Levels and Pumping Dynamics
Palmdale Water District Well No. 35



Source: Palmdale Water District (2020).

KYLE Groundwater

TABLES

Summary of Well Construction and Operational Details

Well Designation	State Well Number	Pressure Zone	Well Status	Street Address	Construction Year	Construction Method	Borehole Depth [feet bgs]	Steel Type[1]	Well Depth [feet bgs]	Original Casing Diameter / Depth [inches / feet bgs]		Original Wall Thickness / Depth [inches / feet bgs]		Casing Liner / Patch Diameter / Depth [inches / feet bRP]		Screen Interval(s) [feet bgs]	Screen Interval(s) Video Survey [feet bgs]	Screen Type	Screen Opening Size [inches]	Gravel Type	Annular Seal Depth [feet bgs]	Original Pumping Rate [gpm]	Original Static Water Level [feet bgs]	Original Drawdown [feet]
1	06N11W19	-	Inactive	-	-	RC	1,080	MS	1,080	16	0-1,080	5/16	0-1,080	-	-	540-1,060	-	Wire-Wrap	0.090	-	80	350	491	197
1A	06N11W19	-	Destroyed	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2A	06N11W19E	2800	Active	39400 20th Street	1968	DR	915	MS	900	16	0-900	1/4	0-900	-	581-586	450-462; 480-900	450-853(fill)	Louvered	0.125	No. 5	50	2,100	370	-
3A	06N11W19E06	2800	Active	2163 E. Avenue P-8	1960	DR	868	MS	848	16	0-848	1/4	0-848	-	705-715	396-848	399-540; 581-807(fill)	Louvered	0.125 (estimated based on gravel size)	Pea	-	-	-	-
4	06N12W23M01	-	Destroyed	450 South of Ave. P-8 East of Division St.	1954	DR	651	MS	624	14	0-624	1/4	S	-	-	300-624	-	Chisel	0.188	Pea	50	360	305	175
4A	06N11W19F	2800	Inactive / Standby (High CrVI)	2475 E. Avenue P-8	1970	DR	838	MS	830	18 16	0-330 330-830	5/16	0-830	-	-	Ful-Flo: 480-510; 540-630; 690-720; 780-810 Std Flo: 510-540; 630-690; 720-780; 810-830	480-791(fill)	Louvered	0.125	5/16 x 4	50	-	-	-
5	05N12W04	2950	Inactive / Out of Service (2003)	1036 Barrel Springs Road	Acq. 1963	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6A	06N12W23A	2800	Active	39455 10th Street	1983	DR	1,030	MS	1,010	16	0-1,010	1/4	0-1,010	-	-	480-1,010	480-995(fill)	Louver (Mill on DWR)	0.080	No. 5	100	800	600	-
7A	06N11W19F	2800	Active	39395 25th Street	1985	RC	1,020	MS	920	16	0-920	1/4	0-920	-	542-545.9 547-552	570-900 (orig.) 570-832.5 (plugged below)	573.4-824(fill)	Wire-Wrap	0.050	6 x 12	80	2,000	485	53.5
8A	06N11W19C	2800	Active	2200 E. Avenue P	1988	RC	1,030	MS (blank) SS (screen)	960	16	0-960	1/4 3/8	0-560 560-960	-	-	560-740; 820-880; 920-940	562.9-742.7; 823.7-883.4	Wire-Wrap	0.050	No. 8	80	2,500	461	-
9	06N11W32P	2800	Destroyed	3347 E. Avenue S.	1961	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	06N11W20G01	2800	Active	3701 E. Avenue P-8	orig. 1928 deep. 1946 lined 1987 lined 2017	-	696	-	600?	16 14	0-282 (orig.) 275-600? (deep.)	-	-	12 8.765	0-658 (fill) (1987 liner) 0-640 (2017 liner)	280-527 (14" 1946 deep.) 500-610 (12" 1987 liner) 624-658? (12" 1987 liner) 340-640 (8" 2017 liner)	No survey following 2017 liner install.	Unknown (1946) Vert. Mills Knife & Louvered (1987) Machine Cut (2017)	-	-	-	-	-	-
11A	06N12W24C	2800	Active	39501 E. 15th Street	1963	DR	1,275	MS	900	16	0-900	1/4	0-900	12	0-875 (liner)	504-900 (orig.) 665-865 (liner)	665-861(fill)	Louvered	0.125 (orig.) 0.060 (liner)	Pea	50	-	-	-
12	06N11W05F	2850	Destroyed	36824 N. 40th Street East	Acq. 1957 Drilled 1920s	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14A	06N12W24A	2800	Active	39401 20th Street	1965	DR	900	MS	900	16	0-900	1/4	0-900	-	-	450-900	452.6-808.9(fill)	Louvered	-	-	50	-	-	-
15	06N12W13N01	2800	Active	1003 East Avenue P	1960	DR	880	MS	800	16	0-800	1/4	0-800	-	-	420-800 (DWR) 320-800 (Actual)	320.4-763.6(fill)	Machine Cut	0.125	Special	50	1,750	325	44
16	05N11W05C	2950	Active	4125 E. Avenue S-4	1960	DR	585	MS	550	14	0-550	1/4	0-550	-	-	220-550	236.3-536.8(fill)	Machine Cut	0.125	Special	50	575	260	115
17	06N12W34N	3200	Inactive / Off Line (1997)	718 Denise Avenue	1956	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
18	05N11W17H	3250	Active	4640 Barrel Springs Road	1954	DR	137	MS	108	8	0-108	8 ga	0-108	6 SDR-21	0-108 (assumed)	20-108 (orig.) 48-108 (liner)	20-92.8(fill)	Machine Cut	-	-	-	171	37	48
19	05N11W17H	3250	Active	4640 Barrel Springs Road	1961	DR	393	MS	350	14	0-350	1/4	0-350	-	-	80-350	82-316(fill)	Machine Cut	-	Nos. 3 and 4	None	115	54	62
20	05N11W09A	3000	Inactive / Out of Service	5680 Pearblossom Highway	Acq. 1977	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	05N11W04P	2950	Active	36525 52nd Street East	1960	DR	-	MS	350	16	0-170 (casing) 170-350 (open)	-	0-350	10 x 1/4	0-350	216.4-346 (Liner)	216.4-325.1(fill)	Machine Cut	0.140 (liner)	#4 Pea (Liner)	-	-	-	-
22	06N11W34P	2850	Active	5401 E. Avenue S	1974	DR	400	MS	400	16	0-400	1/4	0-400	-	-	190-400	189.4-394.6(fill)	Louvered	0.125	No. 5	50	460	130	70
23	06N11W19L01	-	-	-	1977	RC	-	MS	857	16	0-857	1/4	0-857	-	-	496-856	-	Louvered	0.125	Minus 3/8	50	2,300(?)	480	-
23A	06N11W19L	2800	Active	2202 E. Avenue P-8	1991	RC	900	MS	840	16	0-840	5/16	0-840	-	-	600-840	600.3-740(debris)	Louvered	0.030	1/4" Birdseye	50	-	-	-
24	06N11W19L	2800	Inactive / Out of Service	2701 E. Avenue P-8	1985	RC	-	MS	920	16	0-900	1/4	0-920	-	-	570-900	-	-	0.050	6 x 12	80	600	481	124
25	06N11W35J01	2950	Active (Not run with 33)	37520 70th Street E	1989	DR	607	MS	605	16	0-605	5/16	0-605	10.75 x 1/4	0-580 (liner)	255-335; 385-405; 435-595	165.7-345; 386-405; 436-525(fill)	Wire-Wrap (orig.) Vet. Slots (liner)	0.060 (orig.) 0.040 (liner)	No. 5 (liner)	80	750	108	-
26	06N11W33J02	2850	Active	4701 Katrina Place	1989	DR	484	MS	480	16	0-480	5/16	0-480	-	-	150-270; 310-470	151.3-270.5; 311.1-459.8(fill)	Wire-Wrap	0.060	6 x 12	50	750	180	-
27	06N11W35	2850	Destroyed	575' West of 70th Street on R12	1989	RC	-	MS	605	16	0-605	5/16	0-605	-	-	145-235; 255-345; 385-405; 435-595	-	-	0.060	6 x 12	80	750	108	30
28	05N11W03A01	2850	Unequipped	1,534' South of Ave S 650' West of 70th	1989	RC	-	MS	625	16	0-625	5/16	0-625	-	-	325-625	-	Louvered	0.094	5/16" Special	50	800	195	-
29	06N11W35G01	2950	Active (Run 3 hrs/day)	37700 E. 67th Street	1989	RC	394	MS	370	16	0-370	5/16	0-370	-	254.4-259.4 (patch)	190-370	192.3-367.3(fill)	Louvered	0.070	5/16" Special	50	350	104	-
30	06N11E36C	2850	Active	7392 E. Avenue R	1989	RC	425	MS	410	16	0-410	5/16	0-410	-	-	200-410	202-408.3(fill)	Louvered	0.070	5/16" Special	50	1,400	126	-
31	06N11W26J	-	Destroyed	600' South of Palmdale 50' West of 70th	1990	RC	-	MS	300	16	0-300	5/16	0-300	-	-	175-295	-	Louvered	0.094	5/16" Special	50	150	119	-
32	06N11W32P	2800	Active	37301 E. 35th Street	1989	DR	580	MS	570	16	0-570	5/16	0-570	-	-	280-570	332.6-483.1; 504.6-573.4(fill)	Louvered	0.094	5/16" Special	50	450	238	-
33	06N11E36D	2850	Active (Not run with 25)	7160 E. Avenue R	1991	RC	469	MS (blank) SS (screen)	465	16	0-465	1/4	0-465	-	-	220-240; 280-460	222-241.4; 282.3-454(fill)	Wire-Wrap	0.040 0.070	4 x 8 / 6 x 12 Blend	80	1,000	130	110
34	06N11W26M	2850	Borehole Only	Avenue R and 60th Street	1992	RC	344	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-
34A	06N11W26M	2850	Inactive / Unequipped	3,000' South of Ave. S 101' West of Cannon Ct.	1991	RC	-	MS (Blank) SS (Screen)	570	16	0-570	5/16	0-570	-	-	250-570	-	Wire-Wrap	0.060	6 x 12	50	450	164	175
35	05N11W03N01	2950	Active	36549 E. 60th Street	1991	RC	820	MS (blank) SS (screen)	500	16	0-500	5/16	0-500	-	-	200-500	194-476.6 (terminates in fill and ripped screen)	Wire-Wrap	0.060	6 x 12	100	800	174	207

Sources:

California Department of Water Resources, 2018.

Palmdale Water District, 2020.

State Water Resources Control Board Division of Drinking Water, 2018.

Notes:

[1] Steel type assumed to be low-carbon mild steel when not indicated in records.

[2] Machine cut slots assumed to be 0.125-inch when not indicated in records..

[3] Construction details for Well No. 25 liner (2018-2019) are unknown as of the date if this report.

Shaded cells represent wells evaluated and ranked as part of this study.

Table 2

Well Condition and Performance Ranking Criteria

	Criteria	Weighting Factor	0	1	2	3
Design and Construction	**Well Age**	**3**	< 10 Years	10 - 29 Years	30 - 44 Years	> 45 Years
	Steel Type	**3**	Stainless Steel	Hard Red / Kai-Well	Copper-Bearing / HSLA	Mild Steel / Unknown
	Screen Type	**2**	Louvered	Stainless Steel Wire-Wrap	Knife-Cut / Mill Slot / Moss Perforations	Mild Steel Wire-Wrap
	Screen Opening Size	**2**	> 0.080-inch	0.060 - 0.080-inch	0.050 - 0.060-inch	< 0.050 inch
	Remaining Service Life	**3**	> 30 Years	15 - 29 Years	5 - 14 Years	< 5 Years
	Drilling Method	**1**	-	Cable Tool	Reverse-Circulation Rotary	Direct-Circulation Mud Rotary
Physical Condition	**Structural Concerns / Risk of Collapse**	**3**	None / Unknown	Minimal (Few Holes, Existing Patches, Minor Spalling, Enlarged Perforations)	Moderate (Many Holes, Existing Lined Sections, Moderate Spalling, Minor Screen Deterioration)	Severe (Large Ruptures, Heavy Spalling, Casing Deformation, Severe Screen Deterioration)
	Fill and/or Debris	**1**	< 9 feet	10 - 19 feet	20 - 49 feet	> 50 feet
	Encrustation and/or Biofouling	**2**	No Significant Encrustation and/or Biofouling Present	Minimal (Superficial Buildup, Minimal Nodules, Little to No Bacterial Activity)	Moderate (Significant Encrustation, Nodules, and Bacterial Activity)	Severe (Major Obstruction of Well Screen, Abundant Nodules, Widespread Biological Activity)
Performance Characteristics	**Water Level Trends**	**2**	No Divergence of Static and Pumping Water Levels	Slight Divergence of Static and Pumping Water Levels	Moderate Divergence Static and Pumping Water Levels	Major Divergence Static and Pumping Water Levels
	Flow Rate and/or Specific Capacity Trend (Prior 5-year Period)	**1**	No Decline in Instantaneous Pumping Rate and/or Specific Capacity	Slight Decline in Instantaneous Pumping Rate and/or Specific Capacity	Moderate Decline in Instantaneous Pumping Rate and/or Specific Capacity	Major Decline in Instantaneous Pumping Rate and/or Specific Capacity
	Sand and/or Gravel Production	**3**	None / Unknown	Minimal (Minor or Isolated Sand Production)	Moderate (Significant and/or Sustained Sand Production)	Severe (Heavy Production of Sand and/or Gravel Envelope)
	Water Levels Below Screen / Air Entrainment	**2**	None / Unknown	Minimal (Water Levels Below Top of Screen)	Moderate (Evidence of Cascading Water Conditions)	Severe (Cascading Water Conditions when Idle, Reported Air Entrainment)

Supplemental Ranking Criteria

Criteria	Weighting Factor	0	1	2	3
Probability of Successful Rehabilitation and/or Repair	**3**	Very Low (High Risk / Not Feasible)	Low (Improvement Unlikely)	Moderate (Some Improvement Possible)	High (Significant Improvement Likely)
Cost of Rehabilitation and/or Repair	**3**	Very High (Repairs, Mechanical and Chemical Cleaning, Redevelopment)	High (Mechanical and Chemical Cleaning, Redevelopment)	Moderate (Mechanical Cleaning and Redevelopment)	Low (Mechanical Cleaning and Disinfection)
Relevance to the System	**3**	-	Low (Not Critical to System Operation)	Moderate	High (Critical to System Operation)

Well Condition and Performance Ranking
(by order of well designation)

Well Designation	Design and Construction						Physical Condition			Performance Characteristics				Total Weighted Score	Well Condition and Performance Rank
	Well Age	Steel Type	Screen Type	Screen Opening Size	Remaining Service Life	Drilling Method	Structural Concerns / Risk of Collapse	Fill and/or Debris	Encrustation and/or Biofouling	Water Level Trends	Specific Capacity / Production Trend	Sand and/or Gravel Production	Water Levels Below Screen / Air Entrainment		
	3	**3**	**2**	**2**	**3**	**1**	**3**	**1**	**2**	**2**	**1**	**3**	**2**		
2A	3	3	0	0	3	3	1	2	3	0	0	1	2	**48**	**15**
3A	3	3	0	0	3	3	1	2	1	0	1	2	3	**50**	**10**
6A	2	3	2	0	3	3	1	1	2	0	0	2	2	**49**	**12**
7A	2	3	3	2	3	2	3	1	2	0	0	2	3	**62**	**2**
8A	2	3	1	2	3	2	0	3	0	0	1	1	1	**41**	**20**
10	3	3	2	3	3	1	3	2	1	0	0	2	2	**61**	**3**
11A	3	3	0	3	3	3	0	1	3	0	1	2	0	**50**	**10**
14A	3	3	0	0	3	3	3	3	2	0	1	3	1	**58**	**6**
15	3	3	2	0	3	3	1	2	3	0	1	1	3	**55**	**8**
16	3	3	2	0	3	3	3	1	3	0	1	2	0	**57**	**7**
18	3	3	2	0	3	3	3	1	2	0	0	3	1	**59**	**4**
19	3	3	2	0	3	3	0	2	2	0	0	3	1	**51**	**9**
21	3	3	2	0	3	3	2	2	3	0	1	0	0	**49**	**12**
22	3	3	0	0	3	3	2	0	2	0	1	0	1	**43**	**18**
23A	1	3	0	3	3	2	1	3	2	0	0	1	1	**44**	**16**
25	2	3	3	3	3	3	3	3	3	2	3	2	2	**74**	**1**
26	2	3	3	2	3	3	1	2	1	1	0	3	2	**59**	**4**
29	2	3	0	0	3	2	1	0	3	2	3	1	2	**49**	**12**
30	2	3	0	1	3	2	0	0	1	0	1	2	2	**41**	**20**
32	2	3	0	0	3	3	0	0	2	0	0	3	1	**42**	**19**
33	1	0	1	2	0	2	1	1	1	0	3	1	2	**27**	**22**
35	1	3	1	1	3	2	1	2	0	0	2	2	2	**44**	**16**

Notes:

Weighting factors range from 1 to 3 (3 being considered most important).

Criteria scores range from 0 to 3 (3 being considered the most problematic).

Total weighted criteria scores calculated as product of weighting factor and criteria scores.

Higher rank equates to poorer well condition and/or performance.

Red shaded cells indicate wells that are considered structural unsound or beyond useful service life.

Supplemental Ranking
(by order of well designation)

Well Designation	Design and Construction						Physical Condition			Performance Characteristics				Supplemental Criteria			Total Weighted Score	Final Prioritization Rank
	Well Age	Steel Type	Screen Type	Screen Opening Size	Remaining Service Life	Drilling Method	Structural Concerns/ Risk of Collapse	Fill and/or Debris	Encrustation and/or Biofouling	Water Level Trends	Specific Capacity / Production Trend	Sand and/or Gravel Production	Water Levels Below Screen/ Air Entrainment	Probability of Successful Well Rehabilitation and/or Repair	Cost of Well Rehabilitation and/or Repair	Relevance to the System		
	3	**3**	**2**	**2**	**3**	**1**	**3**	**1**	**2**	**2**	**1**	**3**	**2**	**3**	**3**	**3**		
2A	3	3	0	0	3	3	1	2	3	0	0	1	2	2	2	3	**69**	**7**
3A	3	3	0	0	3	3	1	2	1	0	1	2	3	1	3	3	**71**	**3**
6A	2	3	2	0	3	3	1	1	2	0	0	2	2	1	2	2	**64**	**12**
7A	2	3	3	2	3	2	3	1	2	0	0	2	3	0	0	3	**71**	**3**
8A	2	3	1	2	3	2	0	3	0	0	1	1	1	1	3	2	**59**	**18**
10	3	3	2	3	3	1	3	2	1	0	0	2	2	0	3	2	**76**	**2**
11A	3	3	0	3	3	3	0	1	3	0	1	2	0	1	3	2	**68**	**8**
14A	3	3	0	0	3	3	3	3	2	0	1	3	1	0	0	3	**67**	**9**
15	3	3	2	0	3	3	1	2	3	0	1	1	3	1	2	2	**70**	**6**
16	3	3	2	0	3	3	3	1	3	0	1	2	0	0	0	1	**60**	**17**
18	3	3	2	0	3	3	3	1	2	0	0	3	1	0	1	1	**65**	**11**
19	3	3	2	0	3	3	0	2	2	0	0	3	1	1	2	1	**63**	**14**
21	3	3	2	0	3	3	2	2	3	0	1	0	0	1	3	1	**64**	**12**
22	3	3	0	0	3	3	2	0	2	0	1	0	1	1	3	1	**58**	**20**
23A	1	3	0	3	3	2	1	3	2	0	0	1	1	1	2	3	**62**	**15**
25	2	3	3	3	3	3	3	3	3	2	3	2	2	0	3	1	**86**	**1**
26	2	3	3	2	3	3	1	2	1	1	0	3	2	0	3	1	**71**	**3**
29	2	3	0	0	3	2	1	0	3	2	3	1	2	3	2	1	**67**	**9**
30	2	3	0	1	3	2	0	0	1	0	1	2	2	2	3	1	**59**	**18**
32	2	3	0	0	3	3	0	0	2	0	0	3	1	1	2	1	**54**	**21**
33	1	0	1	2	0	2	1	1	1	0	3	1	2	1	3	1	**42**	**22**
35	1	3	1	1	3	2	1	2	0	0	2	2	2	2	3	1	**62**	**15**

Notes:

Weighting factors range from 1 to 3 (3 being considered most important).

Well condition and performance criteria scores range from 0 to 3 (3 being considered the most problematic).

Supplemental criteria scores range from 0 to 3 (3 being considered the most likely for successful rehabilitation at least cost).

Total weighted criteria scores calculated as product of weighting factor and criteria scores.

Higher rank equates to poorer well condition and/or performance.

Red shaded cells indicate wells that are considered structural unsound or beyond useful service life.

Final Prioritization Ranking
(by order of rank)

Well Designation	Design and Construction						Physical Condition			Performance Characteristics				Supplemental Criteria			Total Weighted Score	Modified Weighted Score	Final Prioritization Rank
	Well Age	Steel Type	Screen Type	Screen Opening Size	Remaining Service Life	Drilling Method	Structural Concerns/ Risk of Collapse	Fill and/or Debris	Encrustation and/or Biofouling	Water Level Trends	Specific Capacity / Production Trend	Sand and/or Gravel Production	Water Levels Below Screen/ Air Entrainment	Probability of Successful Well Rehabilitation and/or Repair	Cost of Well Rehabilitation and/or Repair	Relevance to the System			
	3	3	2	2	3	1	3	1	2	2	1	3	2	3	3	3			
26	2	3	3	2	3	3	1	2	1	1	0	3	2	0	3	1	71	71	1
3A	3	3	0	0	3	3	1	2	1	0	1	2	3	1	3	3	71	71	1
15	3	3	2	0	3	3	1	2	3	0	1	1	3	1	2	2	70	70	3
2A	3	3	0	0	3	3	1	2	3	0	0	1	2	2	2	3	69	69	4
11A	3	3	0	3	3	3	0	1	3	0	1	2	0	1	3	2	68	68	5
29	2	3	0	0	3	2	1	0	3	2	3	1	2	3	2	1	67	67	6
6A	2	3	2	0	3	3	1	1	2	0	0	2	2	1	2	2	64	64	7
19	3	3	2	0	3	3	0	2	2	0	0	3	1	1	2	1	63	63	8
35	1	3	1	1	3	2	1	2	0	0	2	2	2	2	3	1	62	62	9
23A	1	3	0	3	3	2	1	3	2	0	0	1	1	1	2	3	62	62	9
30	2	3	0	1	3	2	0	0	1	0	1	2	2	2	3	1	59	59	11
8A	2	3	1	2	3	2	0	3	0	0	1	1	1	1	3	2	59	59	11
22	3	3	0	0	3	3	2	0	2	0	1	0	1	1	3	1	58	58	13
32	2	3	0	0	3	3	0	0	2	0	0	3	1	1	2	1	54	54	14
33	1	0	1	2	0	2	1	1	1	0	3	1	2	1	3	1	42	42	15
7A	2	3	3	2	3	2	3	1	2	0	0	2	3	0	0	3	71	0	16
10	3	3	2	3	3	1	3	2	1	0	0	2	2	0	3	2	76	0	16
14A	3	3	0	0	3	3	3	3	2	0	1	3	1	0	0	3	67	0	16
16	3	3	2	0	3	3	3	1	3	0	1	2	0	0	0	1	60	0	16
18	3	3	2	0	3	3	3	1	2	0	0	3	1	0	1	1	65	0	16
21	3	3	2	0	3	3	2	2	3	0	1	0	0	1	3	1	64	0	16
25	2	3	3	3	3	3	3	3	3	2	3	2	2	0	3	1	86	0	16

Notes:

Weighting factors range from 1 to 3 (3 being considered most important).

Well condition and performance criteria scores range from 0 to 3 (3 being considered the most problematic).

Supplemental criteria scores range from 0 to 3 (3 being considered the most likely for successful rehabilitation at least cost).

Total weighted criteria scores calculated as product of weighting factor and criteria scores.

Higher rank equates to poorer well condition and/or performance.

Red shaded cells indicate wells that are considered structural unsound or beyond useful service life.

APPENDIX A

Well Driller's Reports

KYLE Groundwater

WELL #2-A

DUPLICATE
Retain this copy

WATER WELL DRILLERS REPORT

(Sections 7073, 7080, 7081, 7082, Water Code)

Do Not Fill In

No. 34691

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES

State Well No.
Other Well No.

(1) OWNER:

Name Palmdale Irrigation District
Address 2005 East Avenue Q
Palmdale, Calif. 93550

(2) LOCATION OF WELL:

County L.A. Owner's number, if any
Township, Range, and Section T-6-N R-11-W Sec 19
Distance from cities, roads, railroads, etc. 1/4 mi S of Ave P; abt 1000' E of 20th St. East

(3) TYPE OF WORK (check):

New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall
0	200	16"	1/4"
0	50	30"	1/4"

If gravel packed

Diameter of Bore	From ft.	To ft.
26"	0	900
36"		

Size of shoe or well ring:
Size of gravel: No. 5
Describe joint Welded

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen Louvre

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
450	462	abt 50	5	1/2" x 2"
480	900	"	5	" "

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata
From 0 ft. to 50 ft.
From ft. to ft.
Method of sealing Cement

(9) WATER LEVELS:

Depth at which water was first found, if known 378 ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing 370 ft.

(10) WELL TESTS:

Was pump test made? Yes ☒ No ☐ If yes, by whom? Peerless Pump
Yield: 2100 gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☒ If yes, attach copy

(11) WELL LOG:

Total depth 915 ft. Depth of completed well 900 ft.

Formation: *Describe by color, character, size of material, and structure*

ft. to	ft.	
0 -	5	Surface soil
5 -	17	Fine sand, small gravel
17 -	23	Rocks, sand, gravel
23 -	35	Medium to coarse sand
35 -	40	Rocks, med to coarse sand
40 -	48	Fine to medium sand
48 -	110	Rocks, med to coarse sand, gravel
110 -	130	Medium to coarse sand
130 -	140	Med to fine sand, clay streaks
140 -	180	Med to coarse sand & rocks
180 -	200	Fine sand with clay streaks
200 -	270	Fine sand /streaks
270 -	345	Med sand, coarse sand with clay/
345 -	366	Clay
366 -	400	Sand, clay streaks
400 -	475	Hard to med sand with clay streak
475 -	530	Med to coarse sand, gravel, smal clay streaks /streaks
530 -	545	Coarse sand, small gravel, clay/
545 -	560	Brown clay, streaks of sand
560 -	590	Med sand, small clay streaks, clay
590 -	620	Med to coarse sand, small clay str
620 -	645	Coarse sand, gravel, clay, coarse sand
645 -	685	Med sand, small clay streaks
685 -	692	small clay streaks, rocks, med sa
692 -	720	Med sand, small clay streaks
720 -	800	Med to coarse sand, clay streaks
800 -	900	Med gravel, sand, clay streaks, & fine sand
900 -	915	Blue clay

"WATER PERFORMANCE"
600 GPM @ 388 feet
900 " @ 390 "
1200 " @ 392 "
1500 " @ 395 "
(Continued on attached sheet)

Work started 3-14- 19 68 Completed 4-16- 19 68

WELL DRILLER'S STATEMENT:

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

NAME Rotman Drilling Company
(Person, firm, or corporation) (Typed or printed)
Address 727 West Avenue J
Lancaster, Calif. 93534
[SIGNED] [signature] (Well Driller)
License No. 117561 Dated 30 Apr 1968 19

SKETCH LOCATION OF WELL ON REVERSE SIDE.

DWR 188 (REV. 9-65)

EVANS BROS.

LICENSED WELL DRILLING CONTRACTORS
ROTARY WELL DRILLING • GRAVEL PACKING

WHITEHALL 2-5514
P. O. BOX 1163

42907 NORTH SIERRA HIGHWAY
LANCASTER, CALIFORNIA

December 30, 1960

Palmdale Irrigation District
816 East Ave Q-7
Palmdale, California

Well No. 3A

Well log and casing detail.
Drilled 868' of 12 1/4" hole, reamed hole to 28" to 848'.
Cased with 848' of 16" I. D. x 1/4" Roscoe Moss Co. casing.
0 to 396' blank, 396' to 848' perforated.
Gravel packed with 135 tons of pea gravel.

0	to	10'	surface sand & hardpan
10'	"	40'	sand & gravel-streaks of clay
40'	"	102'	clay-streaks of sand
102'	"	165'	clay-thin streaks of sand
165'	"	212'	packed sand-streaks of clay
212'	"	230'	sandy clay & sand
230'	"	261'	hard sand-streaks of clay
261'	"	267'	sand & gravel clay streaks
267'	"	291'	hard sand-streaks of clay
291'	"	312'	sand & gravel clay streaks
312'	"	335'	firm sand clay streaks
335'	"	400'	hard sand-thin streaks of soft clay
400'	"	465'	clay & sand
465'	"	497'	sand-streaks of clay
497'	"	546'	sand-thin streaks of clay
546'	"	552'	sand, clay streaks & rocks
552'	"	565'	sand-thin streaks of clay
565'	"	572'	firm sand-thin streaks of clay
572'	"	580'	sand-some clay
580'	"	586'	firm sand
586'	"	600'	clay-small amount of sand
600'	"	685'	clay-streaks of sand
685'	"	740'	clay, streaks of sand, thin streaks of sandy shale
740'	"	835'	clay-thin streaks of sand & brown shale
835'	"	848'	sand & brown shale
848'	"	851'	hard sand
851'	"	868'	clay-thin streaks of sand

Well #4A

Page 1 of 2 pages

Do Not Fill In

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

No. 66313

State Well No.

Other Well No.

TRIPLICATE
Retain this copy

(1) OWNER:
Name Palmdale Irrigation District
Address 2005 East Ave. Q.
Palmdale, Calif. 93550

(2) LOCATION OF WELL:
County Los Angeles Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc. 360' west of center of 25th. St. East, 110' No. of E of Ave P 8

(3) TYPE OF WORK (check):
New Well ☒ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Other ☐

(6) CASING INSTALLED:
STEEL: ☒ OTHER:
SINGLE ☒ DOUBLE ☐

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	If gravel packed From ft.	If gravel packed To ft.
Up 18"	330'	18	5/16	30"	0	838'

Type of shoe or ball rings: Tank and collars, welded
Describe joints
Size of gravel: 5/16" x 4

(7) PERFORATIONS OR SCREEN:
Type of perforation or name of screen: Louvered, Horizontal

From	To	Perf. per row	Rows per ft.	Size
510 480 540	510	12	12	2 3/8 x 1/8
630 540 690	690 720	12	12	Same size
720 690 780		12	12	slots in
810 780 930	810	12	12	all of perfs.

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes ☒ No ☐ To what depth 50 ft.
Were any strata sealed against pollution? Yes ☐ No ☒ If yes, note depth of strata
From ft. to ft.
From Cement grout
Method of sealing

(9) WATER LEVELS:
Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing ft.

(10) WELL TESTS:
Was pump test made? Yes ☐ No ☐ If yes, by whom? Roscoe Moss Co.
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☐ If yes, attach copy

(11) WELL LOG:
Total depth 838 ft. Depth of completed well 830 ft.
Formation: Describe by color, character, size of material, and structure

			ft.
0	2	Sandy top soil	
2	6	Sand and gravel	
6	10	Sandy brown clay	
10	23	Brown sand	
23	26	Sandy clay	
26	31	Sand	
31	33	Sandy brown clay	
33	41	Sand and gravel	
41	43	Sand and large gravel	
43	52	Sandy brown clay	
52	56	Brown sand	
56	57	Sandy brown clay	
57	65	Coarse sand and gravel	
65	74	Light brown medium sand	
74	88	Coarse sand and gravel	
88	99	Sandy brown clay	
99	114	Coa rse brown sand	
114	127	Soft sandy brown clay	
127	136	Medium to coarse brown sand	
136	153	Layers of coarse brown sand and sandy brown clay	
153	165	Coarse brown sand	
165	185	Sandy brown clay	
185	191	Hard cemented sand	
191	197	Sandy brown clay	
197	213	Hard sand	
213	221	Sandy brown clay	
221	231	Hard coarse brown sand and small gravel	
231	240	Sandy brown clay	
240	271	Layers of sandy brown clay and hard sand	
271	284	Hard coarse brown sand	
284	289	Brown clay	
289	308	Layers of sand and brown clay	
308	360	Sandy brown clay and small layers of sand	
360	375	Sandy brown clay	
375	384	Coarse light brown sand (continued)	

Work started 6/1/70 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Bill Bellamy KM
(Person, firm, or corporation) (Typed or printed)
Address P. O. Box 846
Reedley, California 93654
[SIGNED] Bill Bellamy
(Well Driller)
License No. 106833 Dated 7/7/70, 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

OWR 188 (REV 9-68)

23179-950 9-68 30M TRIP △O OSP

4A 66313 Pg. 2

TRIPLICATE
Retain this copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do Not Fill In
No. [redacted]

State Well No. _____
Other Well No. _____

(1) OWNER:

Name
Address

(2) LOCATION OF WELL:

County Owner's number, if any
Township, Range, and Section
Distance from cities, roads, railroads, etc.

(3) TYPE OF WORK (check):

New Well ☐ Deepening ☐ Reconditioning ☐ Destroying ☐
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE (check):

Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:

Rotary ☐
Cable ☐
Other ☐

(6) CASING INSTALLED:

STEEL: OTHER:
SINGLE ☐ DOUBLE ☐

If gravel packed

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.

Size of shoe or well ring:
Size of gravel:
Describe joint

(7) PERFORATIONS OR SCREEN:

Type of perforation or name of screen

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.

(8) CONSTRUCTION:

Was a surface sanitary seal provided? Yes ☐ No ☐ To what depth ft.
Were any strata sealed against pollution? Yes ☐ No ☐ If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing

(9) WATER LEVELS:

Depth at which water was first found, if known ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing ft.

(10) WELL TESTS:

Was pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes ☐ No ☐
Was electric log made of well? Yes ☐ No ☐ If yes, attach copy

(11) WELL LOG:

Total depth ft. Depth of completed well ft.
Formation: *Describe by color, character, size of material, and structure*

384	398	Brown clay to ft.
398	404	Hard sandy brown clay (tightly packed)
404	415	Small layers of brown sand and sandy brown clay
415	422	Light brown coarse sand
422	432	Brown clay and layers of sand
432	442	Brown clay
442	447	Hard sandy brown clay
447	452	Hard coarse light brown sand
452	480	Brown clay
480	496	Hard coarse brown sand
496	499	Reddish brown clay
499	503	Hard coarse brown sand
503	504	Sandy brown clay
504	511	Coarse brown sand
511	520	Brown joint clay
530	534	Coarse brown sand and small gravel (loose)
534	548	Brown clay
548	552	Coarse brown sand
552	561	Brown clay
561	565	Coarse sand and gravel
565	570	Layers of sand and sandy brown clay
570	580	Coarse sand and gravel
580	581	Sandy brown clay
581	584	Coarse sand and gravel
584	592	Brown clay
592	594	Sandy clay and layers of coarse sand
594	598	Brown clay
598	600	Sandy brown clay
600	604	Brown clay
604	656	Layers of sand and sandy clay
656	660	Coarse brown sand
660	670	Brown clay and layers of sandy clay
670	673	Medium to coarse brown sand
673	696	Brown clay and layers of sandy clay
696	700	Sandy clay and layers of sand
700	705	Brown clay (cont. on reverse)

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:

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

NAME
(Person, firm, or corporation) (*Typed or printed*)
Address

[SIGNED]
(*Well Driller*)

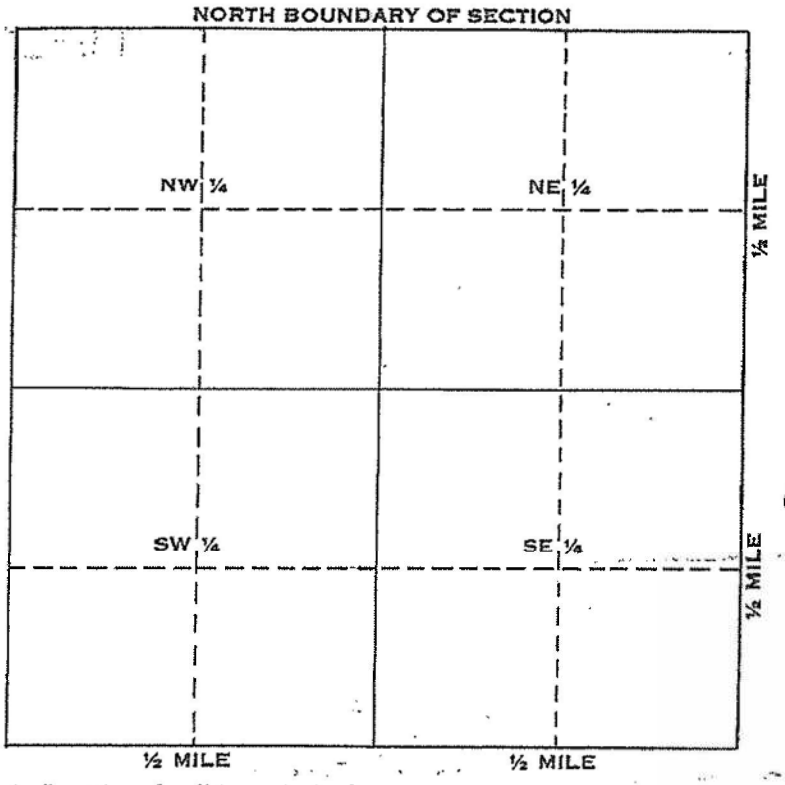
License No. Dated 19

SKETCH LOCATION OF WELL ON REVERSE SIDE

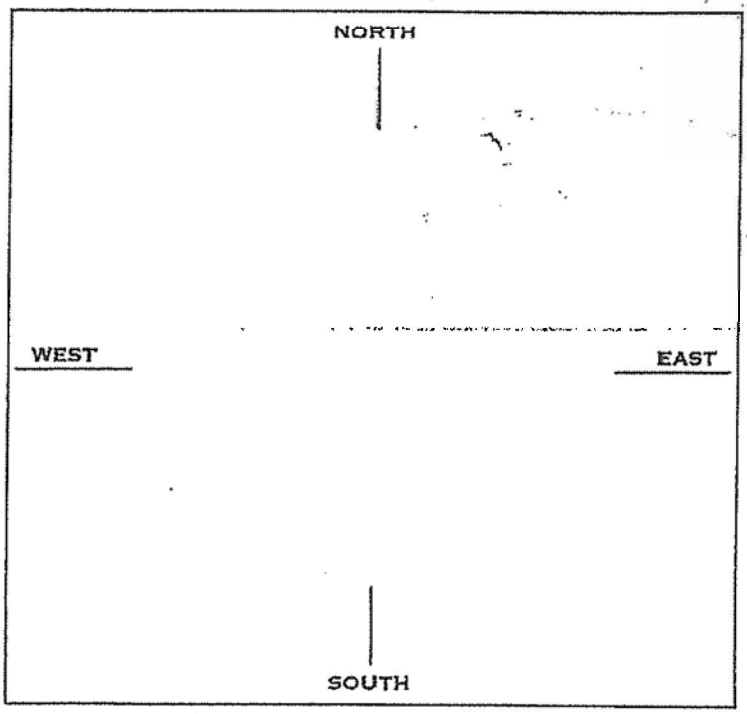
25179-950 9-68 30M YRIP △D OSP

WELL LOCATION SKETCH

Lo. Conte HA
3852, 21E.



A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

Township _____ N/S

Range _____ E/W

Section No. _____

(11) WELL LOG (cont.)

705	716	Sandy brown clay
716	721	Coarse brown sand
721	724	Sandy brown clay and layers of sand
724	726	Gray clay
726	731	Sandy brown clay
731	762	Layers of sand and sandy clay
762	773	Sandy grayish-brown clay
773	774	Coarse sand
774	780	Sandy brown clay
780	799	Coarse brown sand
799	813	Sandy brown clay
813	821	Brown coarse sand
821	823	Sandy blue clay
823	825	Hard cemented sand
825	838	Fractured rock - clean

6A

DUPLICATE
Driller's Copy

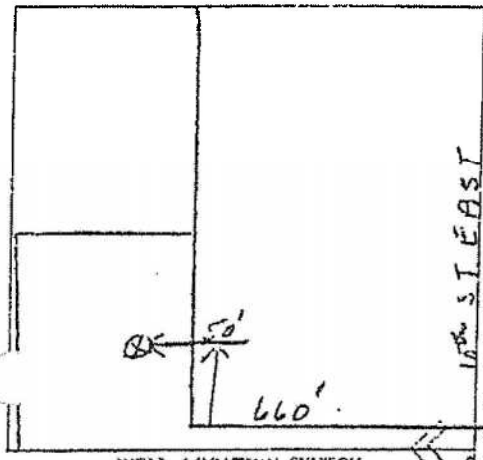
STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 067867

Notice of Intent No. 141981
Local Permit No. or Date 12-30-82
State Well No.
RECREATION Other Well No. 193/188

(1) OWNER: Name Palmdale Water District
Address 2005 East Avenue Q
City Palmdale, Ca. Zip 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 6A
Well address if different from above
Township 6N Range 12W Section 23
Distance from cities, roads, railroads, fences, etc.
N.E. Corner Sec. 23 & 10th St. East



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐ Public ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #5
Diameter of bore 30
Packed from 0 to 1010 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	1010	16	.250
0	100	32	Conductor Pipe

(8) PERFORATIONS: Mill Cut
Type of perforation or size of screen

From ft.	To ft.	Slot size
480	1000	.080x3

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 100 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ft.
Method of sealing Grout

(10) WATER LEVELS:
Depth of first water, if known 455'
Standing level after well completion 600' ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? Fetterman Thelen
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 600' At end of test 600' ft.
Discharge 800 gal/min after 30 hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Was electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1030 ft. Depth of completed well 1010 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Med. to Coarse sand & some gravel in Reddish Clay
50	60	Med. to Coarse sand, small gravel
60	70	Med. to Coarse sand w/ Reddish Clay layers
70	90	Med. to Coarse sand
90	130	Med to Coarse sand, sm. gravel Silt Streaks
130	170	Med. to Coarse sand, sm. gravel
170	190	Med. to Coarse sand
190	200	Fine to Coarse sand
200	240	Fine to Coarse sand
240	250	Brn. Clay w/ 30% Fine to Coarse sand
250	280	Med. to Coarse sand
280	290	Fine to Coarse sand
290	300	Fine to Coarse Sand w/ 20% Clay
300	310	Fine to Coarse sand w/20% Clay
310	320	Fine to Coarse sand w/ 30% Brn. Clay
320	330	Fine to Med. sand w/ 30% Clay
330	340	Med. to Coarse sand w/30% Brn Clay
340	360	Fine to Coarse sand
360	380	Fine to Med. sand
380	410	Fine Sand (Hard packed)
410	420	Fine to Med. sand
420	430	Fine to Coarse sand
430	440	Fine to Coarse sand 10% Brn. Clay
440	450	80% Fine to Med. Sand 20% Brn. Clay
450	470	Fine to Med. Sand
470	480	Fine sand

Work started 2-23 19 82 Completed 2-17 19 83

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME Rotterman Drilling Co. (Person, firm, or corporation) (Typed or printed)
Address 1647 W. Division
City Lancaster, Ca. Zip 93534
License No. 336599 Date of this report 3-17-83

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

6A

ATE
's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

PAGE # 2 # 067867

Do not fill in
No. 067868

Notice of Intent No.
Local Permit No. or Date
State Well No.
Other Well No.

(1) OWNER: Name Palmdale Water District
Address
City Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock
Municipal
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of bore
Placed from ft. to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, If known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
480	500	Fine Sand (Loose)
500	510	90% Fine Sand 10% Brn. Clay
510	520	70% Brn. Clay 30% Fine sand
520	540	90% Brn. Clay 10% Fine sand
540	550	75% Brn. Clay 25% Fine sand
550	560	80% Brn Clay 20% Fine sand
560	590	80% Brn. Clay 20% Fine sand
590	620	70% Brn. Clay 30% Fine sand
620	625	60% Fine sand 40% Brn. Clay
625	630	70% Fine to Med. Sand 30% Brn. Clay
630	640	90% Fine to Med. sand 10% Brn. Clay
640	660	80% Fine to Med. Sand 20% Brn. Clay
660	670	90% Brn. Clay 10% Fine sand
670	690	Brn. Clay w/Fine to Coarse sand
690	700	Brn. Clay w/ 10% Fine sand
700	710	Fine to Med. sand w/30% Brn. Clay
710	720	Fine to Med. sand w/50% Brn. Clay
720	730	Med. to Coarse sand w/ 30% Brn. Clay
730	740	Med. to Coarse sand w/ 50% Brn. Clay
740	750	Fine to Med. sand w/ 50% Brn. Clay
750	760	Med. to Coarse sand w/ 50% Brn. Clay
760	780	Fine to Med. sand W/ 60% Brn. Clay
780	790	Fine to Med. sand w/ 5% brn. Clay
790	800	Fine to Med. sand w/ #5 gravel
800	810	Med. to Coarse sand w/ #5 gravel (Hornfels)

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

DWR 188 (REV. 7-76) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

6A

AYE
r's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do not fill in
No. 067869

Notice of Intent No.
Local Permit No. or Date
PAGE # 3 # 067867
State Well No.
Other Well No.

(1) OWNER: Name
Address
City Zip

(2) LOCATION OF WELL (See instructions):
County Owner's Well Number
Well address if different from above
Township Range Section
Distance from cities, roads, railroads, fences, etc.

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☐ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☐
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☐ Size
Diameter of hole
Packed from ft. to ft.

(7) CASING INSTALLED:
Steel ☐ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☐ No ☐ If yes, to depth ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing

(10) WATER LEVELS:
Depth of first water, if known ft.
Standing level after well completion ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom?
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test ft. At end of test ft.
Discharge gal/min after hours Water temperature
Chemical analysis made? Yes ☐ No ☐ If yes, by whom?
Electric log made? Yes ☐ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth ft. Depth of completed well ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
810	820	Med. to Coarsesand w/ # 5 gravel & 10% Grey Clay
820	830	Med. to Coarse sand w/ #5 gravel & 10% Grey Clay
830	840	Med. to Coarse sand w/30% Brn. Clay
840	850	Med. to Coarse sand W/ 20% Brn. Clay
850	860	Med. to Coarse sand w/ 10% Brn. & White Clay
860	880	Fine to Med. sand w/ 10% Brn. Clay
880	900	Coarse sand w/ # 3 to 5 gravel
900	910	Coarse sand w/ # 3 to 4 gravel & Blue Clay streaks
910	920	Med. to Coarse sand w/ Grey Clay streaks
920	940	Med. to Coarse sand
940	970	Fine to Coarse sand
970	1000	Fine to Med. sand
1000	1010	Fine to Coarse sand
1010	1020	Fine to Med. sand
1020	1030	Fine sand, Granite (Chips)

Work started 19 Completed 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
SIGNED (Well Driller)
NAME (Person, firm, or corporation) (Typed or printed)
Address
City Zip
License No. Date of this report

OWR 188 (REV. 7-74) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

Well 7A

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

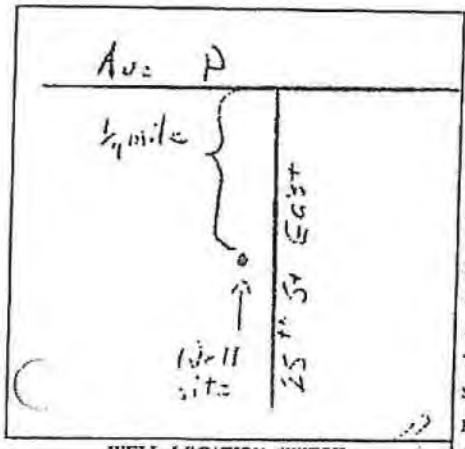
Do not fill in
No. 219188

Notice of Intent No. 213282
Local Permit No. or Date 930273M

State Well No.
Other Well No.

(1) OWNER: Name Palmdale Water District
Address 2005 E. Ave. Q
City Palmdale, CA Zip 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 7A
Well address if different from above
Township 6N Range 11W Section 19
Distance from cities, roads, railroads, fences, etc. ½ mile South 100' west from intersection of Ave. P and 25th St. east.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Stock ☐
Municipal ☒
Other ☐

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 6 X 12
Diameter of bore 24"
Packed from T.D. to Surf. ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	80	28	.250
0	570	16	.250
900	920	16	.250

(8) PERFORATIONS: Wire Wrap
Type of perforation or size of screen

From ft.	To ft.	Slot size
570	900	.050

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 80 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval ft.
Method of sealing Cement

(10) WATER LEVELS:
Depth of first water, if known 485 ft.
Standing level after well completion 485 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Contractor
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 485 ft. At end of test 538.5 ft
Discharge 2000 gal/min after 23½ hours Water temperature
Chemical analysis made? Yes ☐ No ☒ If yes, by whom?
Electric log made? Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1020 Depth of completed well 920 ft.
from ft. to ft. Formation (Describe by color, character, size or material)

SEE ATTACHED

Work started 4/4 19 85 Completed 9/20 19 85

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

SIGNED (Well Driller)
NAME LAYNE-WESTERN COMPANY, INC. (Person, firm, or corporation) (Typed or printed)
Address P. O. Box 3216
City Bakersfield, CA Zip 93385
License No. 452609 Date of this report 9/23/85

DWR 188 (REV. 7-78) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

7A

BA 3667

Palmdale Water Dist.

Layne-Western Company, Inc.

WELL LOG

Feet		Feet	Description
0	to	80	Sand, Clay & Top Soil
80	to	90	Medium Sand
90	to	100	Medium Sand
100	to	110	Clay & Sand
110	to	120	Clay & Sand
120	to	130	Clay & Sand
130	to	140	Clay & Sand
140	to	150	Sand
150	to	160	Course Sand
160	to	170	Course Sand
170	to	180	Course Sand
180	to	190	Course Sand
190	to	200	Course Sand
200	to	208	Sand & Gravel
208	to	216	Sand & Clay 50% EA
216	to	220	Sand & Gravel
220	to	240	Clay & Sand 50% EA
240	to	289	" " " "
289	to	305	Sand & Gravel
305	to	330	Clay
330	to	365	Clay
365	to	375	Clay
375	to	380	Sand & 10% Clay
380	to	400	Clay Little Sand
400	to	415	Sand & Clay 50% EA
415	to	420	Sand & Little Clay
420	to	440	Gravel & Clay
440	to	451	Sand Gravel & Clay
451	to	471	Clay
471	to	515	Sand & Gravel
515	to	530	Sand Gravel & Clay
530	to	545	Clay
545	to	550	Sand Gravel & Clay
550	to	580	Clay
580	to	590	Sand & Gravel
590	to	600	Clay
600	to	630	Sand & Clay
630	to	640	Clay & Little Sand
640	to	650	Sand & Gravel 50% EA
650	to	660	" " " "
660	to	670	Clay & Gravel
670	to	680	Clay & Little San
680	to	690	Clay & 10% Sand
690	to	700	Clay
700	to	710	Clay & Little Sand
710	to	720	Clay & Sand 50%
720	to	730	Sand
730	to	740	Sand
740	to	750	Medium Sand & Small Gravel
750	to	760	Medium Sand & some Clay
760	to	770	Hard Brown Clay
770	to	780	Medium Course Sand
780	to	790	Brown Clay Traces of sand
790	to	800	Fine Sand Traces of Clay

LW-233

Layne-Western Company, Inc.

Palmdale Water Dist.

WELL LOG

Feet		Feet	Description
800	to	810	Brown Clay & Fine to Course Sand
810	to	820	Brown Clay & Fine to Medium Sand
820	to	830	Soft to Hard Brown Clay
830	to	840	Fine to Course Sand Layers of Clay
840	to	850	Fine to Medium Sand " " "
850	to	860	" " " " " " "
860	to	870	Fine to Medium Sand Traces of Clay Some Hard Quartz
870	to	880	Brown Clay Layers of Fine Sand
880	to	890	Fine Sands Traces of Clay
890	to	900	Brown Clay Layers of Course Sand
900	to	910	Fine to Medium Sand Traces of Clay
910	to	920	Brown Clay Layers of Medium Sand
920	to	930	Medium Sand Traces of Clay
930	to	940	Fine to Medium Sand Traces of Clay
940	to	950	Fine Sand Traces of Clay
950	to	960	Fine to Medium Sand Traces of Clay
960	to	970	Brown Clay Layers of Sand
970	to	980	Fine Sand & Gravel
980	to	990	Gravel & Sand
990	to	1000	Gravel & Little Rock
1000	to	1020	Broken Granite

8A

Note: This is page One of 2 pages
See Also No. 281952 *Do not fill in*

ORIGINAL
File with DWR

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

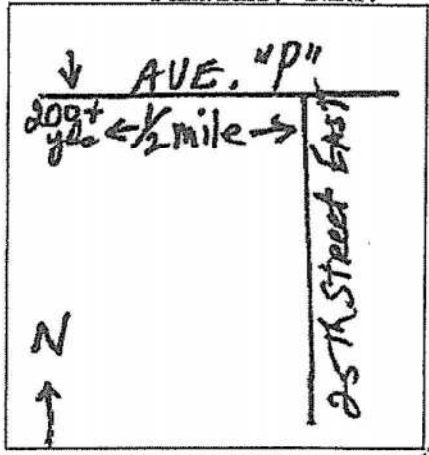
No. 281951

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 East Avenue "Q"
City Palmdale, Calif. ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 8A
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc. approximately 1/2 mile West of 25th St. East and 200 yards South of Ave. "P" Palmdale, Calif.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #8
Diameter of bore 26"
Packed from 1030 to surface

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Cage or Wall
0	80	30"	.250
0	560	16"	.250
740	820	16"	.375
880	920	16"	.375
& 940	960	16"	.375

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
560	740	.050
820	880	.050
920	940	.050

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 80 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing cement/sand slurry

(10) WATER LEVELS:
Depth of first water, if known 461 ft.
Standing level after well completion 468 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Beylik Drilling
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 461 ft. At end of test 468 ft.
Discharge 2500 gal/min after 24 hours Water temperature _____
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? Owner
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1030 ft. Completed depth 960 ft.

from ft.	to	ft. Formation (Describe by color, character, size or material)
0	-	15 ft. clay, some sand
15	-	20 ft. sand, gravel & some clay
20	-	30 ft. gravel and sand
30	-	40 ft. sand, clay and gravel
40	-	80 ft. gravel and sand
80	-	110 ft. sand, clay and gravel
110	-	120 ft. sand
120	-	130 ft. gravel
120	-	160 ft. sand and clay
160	-	170 ft. clay
170	-	180 ft. clay, gravel and sand
180	-	190 ft. sand and gravel
190	-	210 ft. fine sand, gravel and some clay
210	-	240 ft. fine sand and clay
240	-	250 ft. fine sand and clay
250	-	260 ft. fine sand
260	-	270 ft. gravel
270	-	290 ft. gravel and clay
290	-	300ft. gravel
300	-	330 ft. clay
330	-	344 ft. gravel and clay
344	-	360 ft. clay
360	-	380 ft. clay and gravel
380	-	390 ft. clay, sand and gravel
390	-	410 ft. clay and sand
410	-	420 ft. clay
420	-	450 ft. clay and fine sand
450	-	460 ft. fine sand
460	-	500 ft. sand and clay
500	-	520 ft. sand and clay, gravel
520	-	560 ft. sand and gravel
560	-	590 ft. gravel
590	-	610 ft. gravel and sand
610	-	630 ft. clay and sand
630	-	640 ft. gravel and sand
640	-	650 ft. clay, sand and gravel
650	-	660 ft. gravel and sand
660	-	680 ft. clay
680	-	700 ft. clay and sand

continued on No. 281952 Page 2)

Work started Oct. 21, 19 87 Completed Nov. 30 19 87

WELL DRILLER'S STATEMENT:

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

Signed John R. Beylik (Well Driller)
NAME BEYLIK DRILLING, INC. (Person, firm, or corporation) (Typed or printed)
Address 591 S. Walnut Street
City La Habra, Calif. ZIP 90631
License No. 306291 C57&C-61 Date of this report Feb. 10, 1988

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

See Also Page 2, No. 281952

8A

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

ORIGINAL
File with DWR

Do not fill in

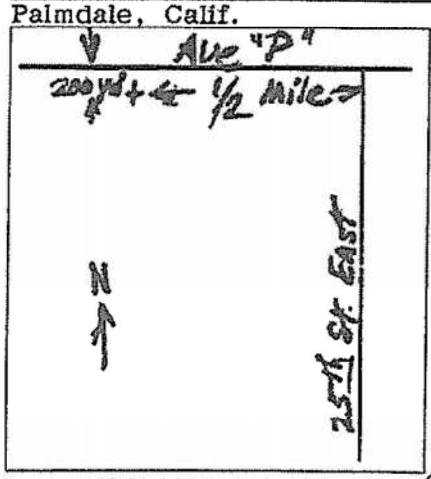
No. 281952

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 East Avenue "Q"
City Palmdale, Calif. ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 8A
Well address if different from above _____
Township 6N Range 11W Section 19
Distance from cities, roads, railroads, fences, etc. Approximately 1/2 mile West of 25th Street East, and 200 yards South of Avenue "P" Palmdale, Calif.



WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size #8
Diameter of bore 26"
Packed from 1030 to surface ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Dia in.	Gage or Wall	From ft.	To ft.	Slot size
0	80	30"	.250			
80	360	18"	.250			
740	820	16"	.375	820	880	.050
880	920	16"	.375	920	940	.050
940	960	16"	.375			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 80 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing cement/sand slurry

(10) WATER LEVELS:
Depth of first water, if known 461 ft.
Standing level after well completion 468 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? Beylik Drilling
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test 461 ft. At end of test 468 ft.
Discharge 461 gal/min after 468 hours Water temperature _____
Chemical analysis made? Yes ☒ No ☐ If yes, by whom? OWNER
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 1030 ft. Completed depth 960 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
700	720	clay, sand and gravel
720	730	gravel, sand and red clay
730	740	clay and gravel
740	790	clay
790	800	clay and gravel
800	810	clay
810	850	clay and gravel
850	870	clay
870	880	80% gravel and 20% clay
880	910	gray clay
910	925	gravel, sand and clay
925	930	clay and gravel
930	1010	clay
1010	1020	gravel and small amt. clay
1020	1035	clay and gravel
1035	1045	clay
1045	1050	clay and gravel
1050	1054	hard rock and clay
and	end	end

Work started Oct. 21 19 87 Completed Nov. 30 19 87

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed John R Beylik (Well Driller)
NAME BEYLIK DRILLING INC. (Person, firm, or corporation) (Typed or printed)
Address 591 S. Walnut Street
City La Habra, Calif. ZIP 90631
License No. 306291 C57&C-61 Date of this report Feb. 10, 1988

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

FORM 115
INVESTIGATION

06N/11W-20G01, S

SHEET 1

DIVISION OF WATER RESOURCES
DEPARTMENT OF PUBLIC WORKS
STATE OF CALIFORNIA

NUMBER 6N 11W 20G1

19-0116

WELL LOG

LOCAL DESIGNATION #8730

06N/11W-20G1,S

LOCATION 1330' W. of 40th St. E., 75' N. of Ave. P8

S.W. ¼, N.E. ¼, Sec. 20, T. 6N., R. 11W.

OWNER Mata Hara Ranch - P.M. Gregory

DATE COMPLETED May 23, 1946

DIAMETER OF CASING 16" I.D. = 0 - 282'
12" I.D. = 275' - 600' = 325'

DRILLED BY J. L. Clugage

SOURCE OF INFORMATION J. L. Clugage

INSPECTED WHILE DRILLING SEE FILE NO.

SURFACE ELEVATION 2568 U.S.G.S. Topo.

SKETCH

Originally drilled in 1928, at which time depth 297' sanded 6' and boulders dumped into well from 291 - 285.

MICROFILMED

Cable Tools Method

DEPTH	ELEVATION OF BOTTOM OF STRATUM	MATERIAL		THICKNESS FEET	% VOIDS	ABSOLUTE VOIDS FEET	TOTAL VOIDS FEET
285-291		Boulders (Dumped into well)					
-297		Sand (not of original strata)					
297-302		Hard clay	C	3/2			
-308		Coarse gravel & sand	TG	6			
-348		Clay & gravel	GC	40			
-357		Gravel & sand	TG	9			
-369		Clay & Gravel	GC	12			
-375		Sand & gravel	TG	6			
-441		Clay & gravel	GC	25/41			
-478		Brown clay	C	37			
-498		Mud & sand	SC	20			
-501		Sand & gravel	TG	2/1			
-527		Clay & gravel	GC	26			
-696		Hard decomposed gravel & clay composition of conglomerate & shale		73/96			
		Perf. 280' - 527'					

FOR FIELD COPIES USE ALTERNATE LINES

LOG OBTAINED BY DATE 2-28-47

57588 8-32 15M CALIFORNIA STATE PRINTING OFFICE

5

19-0116

6N/11W-20 G1

6N/11W-20 G1

SHEET 1

LOS ANGELES COUNTY
FLOOD CONTROL DISTRICT
HYDRAULIC DIVISION
WELL DATA

6N/11W 20 G1

Owner: MAPA MAPA PARCEL - P.M. GREGORY.

Location and Description: 1320' W. OF 40TH ST. E.,
25' N. OF AVE P-8.

Use: Irrigation

Elev. of average grd. at well: 2268' U. S. G. S. Datum

Elev. of grd. adjacent to well: U. S. G. S. Datum

Water surface reference points:

(a) From ____ To ____ Elev. ____ How det. ____
Description: ____

(b) From ____ To ____ Elev. ____ How det. ____
Description: ____

(c) From ____ To ____ Elev. ____ How det. ____
Description: ____

(d) From ____ To ____ Elev. ____ How det. ____
Description: ____

Type of well: STAND. — Size: 16" O.D. 0-282

Original depth: 696' Soundings: 13", 215'-690'

Pumping equipment: ____

Power unit: Diesel

Capacity: 2,451 (-9.91) Drawdown: 15' (228'-243', auto fall on winter 1947)

Date drilled: MAY 1946 (true) By: J. C. CLUCAGE

Artesian characteristics: ____

Quality of water: ____

Remarks: ORIG. DRILLED 291' DEEP IN 1928;
SANDED 6' AND BOULDERS RUMPED
INTO WELL FROM 291'-26.5'
DWR CHECKED LOCATION WITH DRILLER
INTERVIEWED MAR. 1947

(OVER)

Well Numbers: Owner's # 2 | 6/11-20 G1 | D.W.R. No. 6N-11-20c 1x | D.W.R. | F.C. 6730

DN 11W 20G1

19-0116

LOG OF WELL NO. 8730

FROM	TO	CLASSIFICATION OF MATERIALS	FROM	TO	CLASSIFICATION OF MATERIALS
265	271	BOULDERS (DUMPED INTO WELL)			
271	277	SAND (OUT OF ORIGINAL STRATA)			
277	302	HARD CLAY			
302	308	COARSE GRAVEL & SAND			
308	348	CLAY & GRAVEL			
348	357	GRAVEL & SAND			
357	369	CLAY & GRAVEL			
369	375	SAND & "			
375	441	CLAY & "			
441	478	BROWN CLAY			
478	498	MUD & SAND			
498	501	SAND & GRAVEL			
501	527	CLAY & GRAVEL			
527	646	HARD DECOMPOSED GRAVEL & CLAY COMPOSITION OF CONGLOMERATE & SHALE			

Perforations 280' - 527'

Struck water at

Water level before perf. after perf.

Remarks

(OVER)

19-0116
6/11-20 GP

Complete a separate form for each well

STATE OF CALIFORNIA
STATE WATER RIGHTS BOARD

FIRST NOTICE
GROUND WATER EXTRACTIONS

Item

1. a. Name of person filing this notice: [illegible]
   b. Address: 816 Avenue [illegible] Palmdale, California
   Street address or P. O. box number — City — State
2. a. Name of person extracting ground water if different than 1. above:
   b. Address:
   Street address or P. O. box number — City — State
3. Name of owner or owners of property on which well is located:
   a. Same
   b.
   c.
4. Address of person or persons listed in 3. above:
   a. Street address or P. O. box number — City — State
   b. Street address or P. O. box number — City — State
   c. Street address or P. O. box number — City — State
5. a. Other persons owning or claiming interest in well or use of water:
   (1) P. M. Gregory 4110 East Avenue P, Palmdale, California
   Name — Street address or P. O. box number — City — State
   (2) Lucille Gregory " " " " " " "
   Charles P. Harper
   Name — Street address or P. O. box number — City — State
   (3) Marjorie H. Swanson " " " " " "
   Name — Street address or P. O. box number — City — State
   b. Previous owners of well during past 10 years:
   (1) Same as 5a
   Name — Street address or P. O. box number — City — State
   (2)
   Name — Street address or P. O. box number — City — State
6. Owner's designation of well: 5
   (Same designation must be shown here) Number — Name
7. Description of well location:
   a. County: Los Angeles
   b. Where United States Public land survey has been made, describe location to nearest 40 acre subdivision thereof as follows:
   SE ¼, NE ¼, Section 20 T. [illegible] R. [illegible] [illegible]
   c. Description related to local landmarks and/or survey corners, if data for this is not available:
   Well located approx. [illegible] West of center line [illegible] East and [illegible] north of center line East Avenue [illegible]

Note: Additional sheets may be appended if necessary, item numbers must be shown thereon.

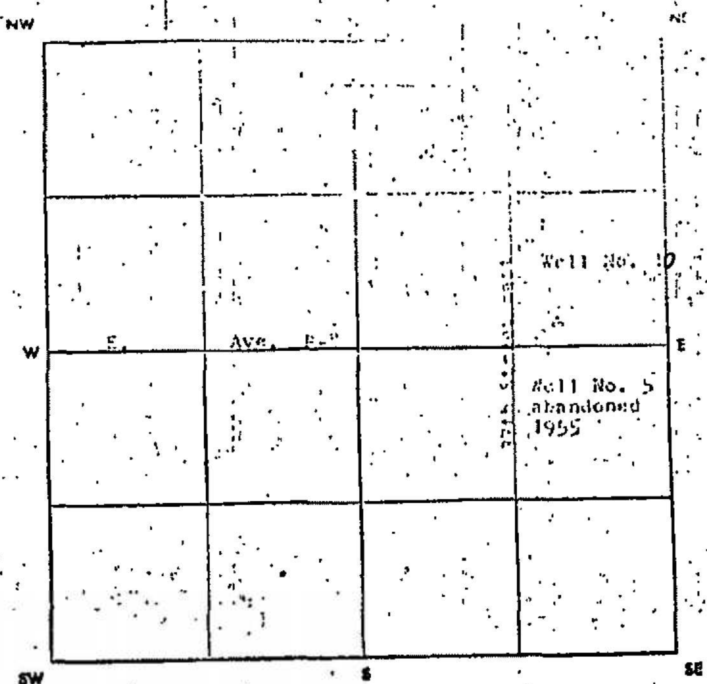
SWRB Form 800

$300 Fee Received

19-0116

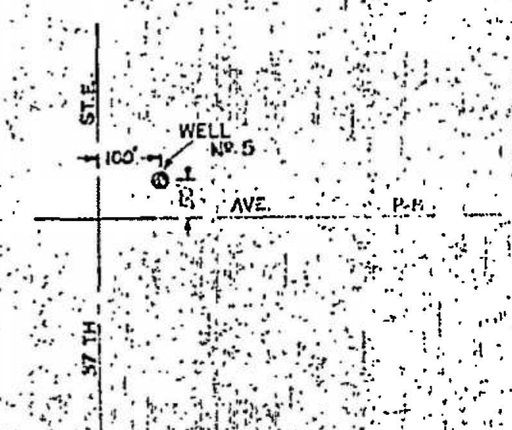
Item

8. Sketch below the location as described in [illegible] defined by bearing and distance).



Sec. 20 Twshp. 6N Rge. 11W SBB&M

Sketch other description below



WINTROATH PUMPS

DIVISION OF WORTHINGTON CORP.

VERTICAL TURBINE PUMPS

"WHEREVER LIQUID NEEDS A LIFT"

Alhambra, California

Proposal No. K-124

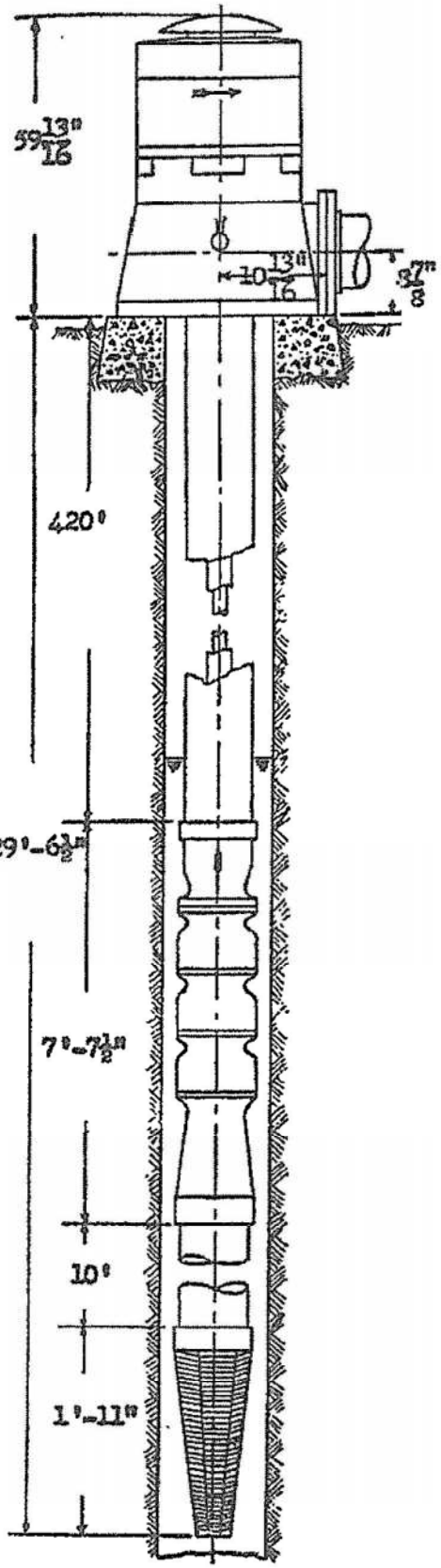
Specification No. 6005

Well No. 22 - NOW # 10

Date July 7, 1960

For Palmdale Irrigation District
Palmdale
California

PUMP SPECIFICATION



MOTOR DRIVEN PUMP HEAD

Type 3KY-10
Size Discharge 8" Base Size 16½"
Motor Mfr. U.S., G.E. or equal
Type Motor VHS
H.P. 100 Volts 220/440 Cycles 60
R.P.M. 1760 Phase 3

COLUMN

Type Threaded & Coupled
Section Length 20'
Eduction Pipe:
Size 8"
Weight per foot 24.70#
Thickness .277"
Threads per inch 8
Tubing:
Size 2½"
Weight per foot 7.661#
Thickness .276
Bearing Spacing 5'
Bearing Material Bronze
Shafting:
Size 1½"
Material 1045 C.S.

BOWLS

Type 12L-54 No. of Stages 8
External Diameter 11½"
Type Impeller Closed
Bowl Material Cast iron
Impeller Material Bronze
Shaft Material S. S.
Bushing Material Bronze
Bearing Material Bronze

SUCTION

Type Threaded & Coupled
Size 8"
Weight per foot 24.70#
Thickness .277
Threads per inch 8
Section Length 10'
Type Strainer Cone

WELL AND PERFORMANCE DATA

Well Diameter 16" & 14" Well Depth 610'
Static Water Level 320'
Pumping Water Level 375'
Surface Lift 231'
Total Lift 606'
Capacity 550 GPM Speed 1760 RPM
Required H.P. 108

11A

WELL #11A - FILE

EVANS BROS.

LICENSED WELL DRILLING CONTRACTORS
ROTARY WELL DRILLING • GRAVEL PACKING

WHITEHALL 2-6814
P. O. BOX 1163

42907 NORTH SIERRA HIGHWAY
LANCASTER, CALIFORNIA

WELL NO. 11-A

April 6, 1963

Palmdale Irrigation District
2005 East Ave Q
Palmdale,
California

Well log and casing detail.

Drilled 1275 feet of 10 5/8inch pilot hole, reamed 50 feet to 36 inches, cased with 50 feet of 30" I. D.x1/4" Moss Co. casing. Cemented with 85 sacks of cement.
Reamed hole from 50' to 900 ' to 28", cased with 900' of 16"x1/4" I. D. Moss Co. casing. 0 to 504' blank, 504' to 900'perforated. Perforations horizontal louver, 45 1/8"x2 1/2 holes per foot.. Gravel packed with 136 tons of pea gravel.

0	to	4'	surface soil
4'	"	8'	hardpan
8'	"	20'	coarse sand
20'	"	65'	clay
65'	"	76'	brown clay
76'	"	93'	brown clay, streaks of sand
93'	"	108'	coarse sand & sandy brown clay
108'	"	125'	brown clay & streaks of sand
125'	"	178'	hard sand & clay, streaks of gravel
178'	"	215'	sand, streaks clay & hard sand
215'	"	228'	clay, streaks of sand
228'	"	255'	sand with clay streaks
255'	"	278'	clay & sand
278'	"	290'	brown clay, streaks of gravel
290'	"	298'	brown clay
298'	"	318'	brown clay, streaks of sand
318'	"	321'	clay, sand & gravel
321'	"	339'	brown clay & gravel
339'	"	360'	sand & sandy brown clay
360'	"	369'	hard sand & brown clay
369'	"	400'	coarse to medium sand, streaks of clay
400'	"	450'	brown clay, thin streaks of sand
450'	"	470'	sand & gravel, some clay
470'	"	475'	brown clay, streaks of sand
475'	"	575'	brown clay, streaks of sand (thin)
575'	"	670'	sand with streaks of clay & cobblestone
670'	"	728'	clay, streaks of sand
728'	"	756'	brown clay & sand
756'	"	776'	brown clay with streaks of medium to coarse sand
778'	"	789'	medium sand with streaks of clay
789'		846'	brown clay & sand
$49		900	Sand & brown clay

900 917 ?

11A

Well log Palmdale Irrigation District, Well No. 11A

917'	to	920'	very hard sand
920'	"	1007'	blue clay, streaks of shale
1007'	"	1030'	soft shale with streaks of medium to coarse sand
1030'	"	1035'	shale
1035'	"	1096'	shale & blue clay, streaks of medium to coarse sand
1096'	"	1101'	sand & shale
1101'	"	1106'	blue clay, medium to coarse sand, some white clay
1106'	"	1115'	hard shale with streaks of sand
1115'	"	1210'	blue shale, streaks of sand
1210'	"	1236'	blue shale, streaks of sand & brn. clay
1236'	"	1249'	blue shale & sand with large flakes of mica
1249'	"	1275'	blue shale, sand & cobblestones

Owell # 14A
File

EVANS BROS.

LICENSED WELL DRILLING CONTRACTORS
ROTARY WELL DRILLING • GRAVEL PACKING

WHITEHALL 2-6614
P. O. BOX 1163

42907 NORTH SIERRA HIGHWAY
LANCASTER, CALIFORNIA

March 31, 1965

Palmdale Irrigation District
2005 East Ave Q
Palmdale, California

Well log and casing detail Well No. 14-A
Reamed hole to 36" to 50 ',cased with 50' of 30"x1/4" Moss Co. casing & cemented with 85 sacks of cement.
Reamed hole to 27½"from 50' to 900'.Cased with 900' of 16"I. D.x1/4" Moss Co. casing. 0 to 450' blank, 450' to 900' perforated.

0	to	3'	surface soil
3'	"	20'	coarse sand & gravel
20'	"	50'	fine to medium gravel,some brown clay
50'	"	70'	" " " " with red & brown clay
70'	"	100'	fine to medium sand,streaks of brown clay
100'	"	160'	fine sand,small amount of brown clay
160'	"	200'	fine to medium sand,50/50 streaks of brown clay
200'	"	289'	" " " " streaks of brown clay
289'	"	373'	hard medium to fine sand streaks of brown clay
373'	"	382'	brown clay,some sand
382'	"	410'	hard fine to medium sand,some brown clay
410'	"	430'	fine to medium sand & brown clay
430'	"	450'	brown clay & fine sand
450'	"	500'	hard brown clay & cemented sand
500'	"	550'	fine sand & brown clay
550'	"	600'	sand & brown clay
600'	"	657'	fine sand & hard brown clay
657'	"	668'	brown clay,some sand streaks
668'	"	750'	coarse to medium sand,streaks of brown clay
750'	"	810'	fine to medium sand,streaks of brown clay
810'	"	830'	" " " " very little clay
830'	"	860'	" " " " & brown clay
860'	"	900'	sandy gray clay & streaks of sand

ORIGINAL
File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No.____
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7074, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
No. 26950
State Well No.____
Other Well No.____

(1) OWNER:
Name Palmdale Irrigation District
Address 816 Ave. Q-7
Palmdale

(2) LOCATION OF WELL:
County L. A. Owner's number, if any— 15
R. F. D. or Street No.
10th St. East and Ave. P
Palmdale

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
50 ft.	28" ID	conductor pipe	
800 ft.	16" ID x 1/4"	wall well casing	

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Size of gravel: special
Describe joint butt welded

(7) PERFORATIONS:
Type of perforator used machine cut
Size of perforations 1/8" in., length, by .2" in.
From 50 perforations from rotineal slots per ft.
" 0 " to 420 ft. solid " "
420 " " 800 " perforated " "

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 50 ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata
From ft. to ft.
" " "
Method of Sealing cement under pressure

(9) WATER LEVELS:
Depth at which water was first found 325 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes, by whom? driller
Yield: 1750 gal./min. from 369 ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 880 ft. Depth of completed well 800 ft.
Formation: *Describe by color, character, size of material, and structure.*

0 ft. to	20 ft.	surface soil
20 "	40 "	gravel
40 "	60 "	clay and gravel
60 "	70 "	" "
70 "	90 "	sand and clay streaks
90 "	150 "	sand, clay and coarse gr:
150 "	180 "	sand and clay streaks
180 "	220 "	fine sand
220 "	280 "	sand and gravel
280 "	315 "	sand and clay streaks
315 "	345 "	gravel
345 "	375 "	hard packed sand
375 "	430 "	coarse sand
430 "	475 "	hard packed sand
475 "	505 "	sand and clay
505 "	535 "	sand and clay streaks
535 "	565 "	hard sand
565 "	645 "	clay and sand
645 "	675 "	hard packed sand
675 "	705 "	sand and clay streaks
705 "	735 "	" " "
735 "	765 "	hard sand
765 "	795 "	hard fine sand
795 "	824 "	fine sand and clay
824 "	850 "	" " "
850 "	870 "	firm sand and clay
	" Layers	of cemented formation
870 "	880 "	hard sharp sand
"	"	

Performance:
1750 gpm from 369 ft.

Work started Jan. 27 1960. Completed Feb. 12 1960

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address 121 W. Ave. I
Lancaster
[SIGNED] E. J. Rottman
Well Driller
License No. 17562 Dated ____, 19____

Complete as much information as possible. Leave blank if information is not available, use N.A. if not applicable.
** Indicates items required for Source Water Assessment*
*** Indicates additional items required for assessments and Ground Water Rule*

	(separate multiple entries in field with semi-colon)	Actual, Estimated or Default?
DATA SHEET GENERAL INFORMATION		
System Name	Palmdale Water District	*from DHS database*
System Number	1910102	*from DHS database*
Source of Information *(well log, DHS/County files, system, etc)*	Well Log, Files & Field Review	
Organization Collecting Information *(DHS, County, System, other)*	CDPH, R. Roda	
Date Information Collected/Updated	5/28/2010	
WELL IDENTIFICATION		
* Well Number or Name	15	*from DHS database*
* DHS Source Identification Number (**FRDS ID No.**)	06N/12W-13N01 S	
DWR Well Log on File? ("YES" or "NO")	Yes	
State Well Number (from DWR)	15	
Well Status (Active, Standby, Inactive)	Active	*from DHS database*
WELL LOCATION		
Latitude	(Leave Blank)	*from DHS database*
Longitude	(Leave Blank)	*from DHS database*
Ground Surface Elevation (ft above Mean Sea Level)	2591'	
Street Address	1003 East Avenue P	
Nearest Cross Street	10th Street East	
City	Palmdale	
County	Los Angeles	
* Neighborhood/Surrounding Area *(see Note 1)*	Co/ Ru	
Site plan on file? ("YES" or "NO")	Yes	
DWR Ground Water Basin	Antelope Valley	*to come from DWR*
DWR Ground Water Sub-basin	Lancaster Sub-Unit	*to come from DWR*
SANITARY CONDITIONS		
** Distance to closest Sewer Line, Sewage Disposal, Septic Tank (ft)	Sewer Line 95 ft.	Estimated
Distance to Active Wells (ft)	1,500 ft. (Well 6)	Estimated
Distance to Abandoned Wells (ft)	N/A	Unknown
Distance to Surface Water (ft)	16,750 ft.	Estimated
** Size of controlled area around well (square feet)	10,000 sqft.	
* Type of access control to well site *(fencing, building, etc)*	fencing & Building	Actual
* Surface Seal? (Concrete slab)("YES", "NO" or "UNKNOWN")	Yes	Actual
* Dimensions of concrete slab: Length(ft)/ Width(ft)/ Thick(in)	40 in. x 39 in. x 12 in.	Actual
* Within 100 year flood plain? ("YES", "NO" or "UNKNOWN")	No	Actual
* Drainage away from well? ("YES" or "NO")	Yes	Actual
ENCLOSURE/HOUSING		
Enclosure Type *(building, vault, none, etc.)*	Building (Block)	
Floor material	Concrete	
Located in Pit? ("YES" or "NO")	No	
Pit depth (feet) (if applicable)	N/A	
WELL CONSTRUCTION		
Date drilled	1960	Estimated
Drilling Method	Rotary	Actual
Depth of Bore Hole (feet below ground surface)	880 ft.	Actual
Casing Beginning Depth/Ending Depth(ft below surface); 2nd Casing Beginning Depth/Ending Depth; 3rd Casing, etc.	0 to 800 ft. / 0 to 50 ft.	Actual
Casing Diameter (inches); 2nd Casing Diameter; 3rd Casing, etc.	16 in.	Actual
Casing Material; 2nd Casing Material; 3rd Casing, etc.	Steel	Actual

	(separate multiple entries in field with semi-colon)	Actual, Estimated or Default?
WELL CONSTRUCTION (continued)		
Conductor casing used? ("YES", "NO" or "UNKNOWN") *(See Note 2)*	Yes	
Conductor casing removed? ("YES", "NO" or "UNKNOWN")	Unknown	
* Depth to highest perforations/screens (ft below surface) (or "UNKNOWN")	420 ft.	
Screened Interval Beginning Depth/Ending Depth (ft below surface); 2nd Screened Interval Beg. Depth/Ending Depth; 3rd Screened Interval, etc.	420 ft. to 800 ft.	
* Total length of screened interval (ft) *(default = 10% pump capacity in gpm)* (or "UNKNOWN")	380 ft.	
* Annular Seal?("YES", "NO" or "UNKNOWN") *(See Note 3)*	Yes	Actual
* Depth of Annular Seal (ft)	50 ft.	
Material of Annular Seal *(cement grout, bentonite, etc.)*	Cement	
Gravel pack, Depth to top (ft below ground surface)	0 to 800 ft.	Actual
Total length of gravel pack (ft)	800 ft.	Actual
AQUIFER		
* Aquifer Materials *(list all that apply: sand, silt, clay, gravel, rock, fractured rock)*	Clay, Gravel & Sand	
* Effective porosity (decimal percent) *(default = 0.2)* (or "UNKNOWN")	Unknown	
* Confining layer (Impervious Strata) above aquifer? ("YES", "NO" or "UNKNOWN")	N/A	
Thickness of confining layer, if known (ft)	N/A	
Depth to confining layer, if known (ft below ground)	N/A	
* Static water level (ft below ground surface)	626 ft.	
Static water level measurement: Date/Method	Sep-09	Transducer
Pumping water level (ft below ground surface)	684 ft.	
Pumping water level measurement: Date/Method	Sep-09	Transducer
WELL PRODUCTION		
Well Yield (gpm)	1080 gpm	
Well Yield Based On (i.e., pump test, etc.)	18.62 (Specific capacity)	
Date measured	Sep-09	PWD Well Sounding
Is the well metered? ("YES" or "NO")	Yes	
Production (gallons per year)	443 M.G. (Est.)	PWD Production Reports
Frequency of Use (hours/year)	Daily	
Typical pumping duration (hours/day)	Summer 12 to 16 Hrs/day	Winter 4 to 6 hrs/day
PUMP		
Make	Ingersoll Rand	12M75
Type	Turbine	
Size (hp)	600 Hp (Gear Drive)	
* Capacity (gpm)	1,100 gpm	Estimated
Depth to suction intake (ft below ground surface)	740 ft.	
Lubrication Type	Oil	
Type of Power: *(i.e., electric, diesel, etc.)*	Gas	
Auxiliary power available? ("YES" or "NO")	No	
Operation controlled by: *(i.e., level in tank, pressure, etc.)*	SCADA	
Pump to Waste capability? ("YES" or "NO")	Yes	

Discharges to: *(i.e., distribution system, storage, etc.)*	Desert Floor (through air gap)	

REMARKS AND DEFECTS (use additional sheets as necessary)

NOTES

I = Industrial, Mu = Municipal, P = Pristine, O = Other

2. Conductor Casing - Oversized casing used to stabilize bore hole during well construction. Should be removed during installation of annular seal

3. Annular Seal - Seal of grout in the space between the well casing and the wall of the drilled hole. Sometimes called "sanitary seal".

DUPLICATE
File Original, Duplicate and Triplicate with the
REGIONAL WATER POLLUTION
CONTROL BOARD No. 6 (Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
No. 47154
State Well No. 6N/12W
Other Well No.

(1) OWNER:
Name Palmdale Irrigation District
Address 816 Ave. Q-7
Palmdale

(2) LOCATION OF WELL:
County L.A. Owner's number, if any—
R. F. D. or Street No. 40th St. East & Ave. S-4
Palmdale

(3) TYPE OF WORK (*check*):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (*check*):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐

From	ft. to	ft.	Diam.	Gage or Wall
0	to 50	ft.	26"	conductor pipe
50	" 550	"	14" ID	x 1/4" water well casing

If gravel packed

Diameter of Bore	from ft.	to ft.

Type and size of shoe or well ring
Describe joint butt welded
Size of gravel: special

(7) PERFORATIONS:
Type of perforator used machine cut
Size of perforations 1/8" in., length, by 2 in.

From ft. to	ft.	Perf. per row	Rows per ft.
0 to 220	ft.	solid	
220 " 550	"	perforated	

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☒ Yes ☐ No To what depth 50 ft.
Were any strata sealed against pollution? ☐ Yes ☐ No If yes, note depth of strata

From ft. to	ft.

Method of Sealing cement under pressure

(9) WATER LEVELS:
Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating 260 ft.

(10) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes, by whom? driller
Yield: 575 gal./min. from 375 ft. draw down after 10 hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:
Total depth 585 ft. Depth of completed well 550 ft.
Formation: *Describe by color, character, size of material, and structure.*

0 ft. to	20 ft.	surface soil
20 "	40 "	sand
40 "	75 "	coarse sand
75 "	85 "	sand and boulders
85 "	105 "	" "
105 "	135 "	coarse sand and boulder
135 "	165 "	hard packed sand
165 "	180 "	sand
180 "	217 "	coarse sand
217 "	235 "	sandy clay
235 "	252 "	sand and boulders
252 "	270 "	coarse sand
270 "	335 "	sandy clay
335 "	360 "	coarse sand and clay
360 "	405 "	coarse sand
405 "	460 "	" "
460 "	475 "	" " & boulders
475 "	505 "	" "
505 "	515 "	" "
515 "	525 "	sand and boulders
525 "	535 "	boulders
535 "	540 "	packed sand and boulder
540 "	550 "	bed rock
550 "	585 "	rock

MICROFILMED

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

CONFIDENTIAL
In Accordance With
Section 7076.1 of the Water Code
State of California

Work started 2/16/60 Completed 2/24/60 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address 121 W. Ave. I
Lancaster, Calif.
[SIGNED] Frank Rottman
Well Driller
License No. 117561 Dated 3/10, 1960

95689 3-54 50M QUIN ⓐ SFO

DWR FORM NO. 246 (REV. 3-54)

WELL No. 16

TRIPLICATE
File Original, Duplicate and Triplicate with the REGIONAL WATER POLLUTION CONTROL BOARD No.
(Insert appropriate number)

WATER WELL DRILLERS REPORT
(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Resolution

Do Not Fill In
No. 47153H
State Well No.
Other Well No. 19276

(1) OWNER:
Name
Address Palmdale Irrigation District
616 Avenue Q-7
Palmdale, Calif.

(2) LOCATION OF WELL:
County Los Angeles Owner's number, if any—
R. F. D. or Street No. 40th St. East & Ave. S-4
Palmdale

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☒
Irrigation ☐ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☐ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
0	50	26" OD	conductor pipe
0	550	16" ID x 1/4"	casing

Type and size of shoe or well ring
Describe joint special butt welded

If gravel packed

Diameter of Bore	from ft.	to ft.

Size of gravel:

(7) PERFORATIONS:
Type of perforator used machine cut
Size of perforations 1/8" in., length, by 2 in.

From ft.	to ft.	Perf. per row	Rows per ft.
0	220	solid	
220	550	perforated	

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☐ No To what depth ft.
Were any strata sealed against pollution? ☒ Yes ☐ No If yes, note depth of strata 50

From ft.	to ft.

Method of Sealing cement under pressure

(9) WATER LEVELS:
Depth at which water was first found ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☐ Yes ☐ No If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☐ No

(11) WELL LOG:
Total depth 585 ft. Depth of completed well 550 ft.
Formation: Describe by color, character, size of material, and structure.

ft. to		
0	20	surface soil
20	40	sand
40	75	coarse sand
75	85	sand and boulders
85	105	sand and boulders
105	135	coarse sand & boulders
135	165	hard packed sand
165	180	sand
180	217	coarse sand
217	235	sandy clay
235	252	sand and boulders
252	270	coarse sand
270	335	sandy clay
335	360	coarse sand and clay
360	405	coarse sand
405	460	" "
460	475	" " & boulders
475	505	" "
505	515	" "
515	525	sand and boulders
525	535	boulders
535	540	packed sand and bpulder
540	550	bed rock
550	585	rock

Work started 2/16/60 Completed 2/24/60

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address 121 E. Ave. I
Lancaster

[SIGNED] Well Driller

License No. 117561 Dated 3/ , 19

DEPARTMENT OF PUBLIC HEALTH

Portion of NE¼ — K1

WELL DATA — Palmdale Hills, S17, T5NR11W SBBM — WELL #18

(1) Place and Owner: ~~Albert Gale Jr.~~ „Par-Tain Exploration Inc Bakersfield, Calif.

(2) Source of Information: ~~Del R. Combs, Peerless Pumps, Lancaster, Calif~~"

Collected by: ~~Albert Gale~~ Jr. — Date: 1955 ~~Oct 1954~~

(3) Number or Name	#1		
Date drilled	October 1954		
(4) Location: Neighborhood	~~Palmdale, Barrel Springs Road~~	Residential	
Size of lot	~~Por. of above Section~~	Not in subdivision	
Distance to: Sewer	No sewer		
Sewage disposal	~~individual septic tanks~~ 100' min		
Abandoned well	none		
Nearest property line	50' to road		
(5) Housing: Type	~~Corrugated metal pump house to be built~~ Enclosed pump house new		
Condition			
Pit depth (if any)			
Floor (material)	~~concrete~~		
Drainage	sump		
(6) Well Depth	137' ✓ 108'		
(7) Casing: Depth			
Diameter	8"		
Kind	8 ga		
Height above floor	18"		
Distance to highest perforations	20'		
Surface sealed (yes or no)	yes slab		
Gravel pack (yes or no)	yes		
Second casing depth	—		
Second casing diameter	—		
Annular seal (depth)	—		
(8) Impervious Strata: Penetrated — Thickness	10 to 74' clay and boulders		
Depth to			
(9) Water Levels: Depth to — Surface	37 below curb		
Static	37		
When pumping	85' with a draw of 171 GPM		
(10) Pump: Make	Pump to be installed ~~not installed to date, will be Peerless~~		
Type	turbine		
Capacity, g.p.m.	~~150 at operating head ±65~~ 170 GPM		Field Head 86'
Lubrication	Oil		
Power	Electrical		
Auxiliary power			
Control	~~pressure switch~~ Automatic		
Discharge location	10,000 storage tank		
Discharge to	" "		
(11) Frequency of Use	~~intermittent~~		
(12) Flood Hazard	none		
(13) Remarks and Defects (Use other side if necessary)			

(14) Show well log on other side.

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

37636 12-50 3M SPO

(REV. 1-1-51)
FORM SE-1402

From	to	
0		
10	10	sand
20	20	~~sand silt clay~~ - Lumby silt with clay
~~30~~	30 37	Clay
37-	~~37~~	~~Clay~~
50	50 74	clay & boulders
~~60~~	60	~~clay and boulders~~
74	~~74~~	~~clay and boulders~~
~~90~~	90 00	gravel and water.
130	~~130~~	~~gravel and water~~
	137	Boulders

Hole cased to 108 feet, gravel packed 13 inch hole with 8 inch casing water level stood at 37 feet from below curbing when cased.

with casing from gravel between 74 & 130 Ft.

per PAR TAIN EXPLORATION INC WELL LOG

QUINTUPLICATE
RETAIN THIS COPY

Well # 19

WATER WELL DRILLERS REPORT

(Sections 7076, 7077, 7078, Water Code)

STATE OF CALIFORNIA

Do Not Fill In
No 40890
State Well No.
Other Well No.

(1) OWNER:
Name Albert Gale
Address 4630 Palmdale Hls. Drive
Palmdale, Calif.

(2) LOCATION OF WELL:
County L.A. Owner's number, if any—
R. F. D. or Street No.
approx. 46 th st. East & Barrell Springs Road

(3) TYPE OF WORK (check):
New well ☒ Deepening ☐ Reconditioning ☐ Abandon ☐
If abandonment, describe material and procedure in Item 11.

(4) PROPOSED USE (check):
Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(5) EQUIPMENT:
Rotary ☒
Cable ☐
Dug Well ☐

(6) CASING INSTALLED:
SINGLE ☒ DOUBLE ☐

From ft.	to ft.	Diam.	Gage or Wall
"	"	"	"
"	"	"	"
"24" hole	"	"	"
"14" OD x 1/4" casing	"	"	"
"80 ft. solid	"	"	"
270 "	perforated	"	"

Type and size of shoe or well ring
Describe joint butt welded

If gravel packed

Diameter of Bore	from ft.	to ft.
"	"	"
"	"	"
"	"	"
"	"	"
"	"	"

Size of gravel: No. 3 & 4

(7) PERFORATIONS:
Type of perforator used machine cut
Size of perforations in. by in.

From ft.	to ft.	Perf. per row	Rows per ft.
"	"	" " "	" " "
"	"	" " "	" " "
"	"	" " "	" " "
"	"	" " "	" " "

(8) CONSTRUCTION:
Was a surface sanitary seal provided? ☐ Yes ☒ No To what depth ft.
Were any strata sealed against pollution? ☐ Yes ☒ No If yes, note depth of strata

From ft.	to ft.
"	"

Method of Sealing

(9) WATER LEVELS:
Depth at which water was first found static water level 54 ft.
Standing level before perforating ft.
Standing level after perforating ft.

(10) WELL TESTS:
Was a pump test made? ☒ Yes ☐ No If yes, by whom? driller
Yield: 115 gal./min. with 116 ft. ft. draw down after 15 hrs.
Temperature of water Was a chemical analysis made? ☐ Yes ☒ No
Was electric log made of well? ☐ Yes ☒ No

(11) WELL LOG:
Total depth 393 ft. Depth of completed well 350 ft.
Formations Describe by color, character, size of material, and structure.

0	ft. to	10	ft. sand
10	"	15	" sand and rocks
15	"	25	" sand and gravel
25	"	48	" sand
48	"	86	" sand and clay streaks
86	"	170	" sand and clay streaks
170	"	205	" coarse sand, gravel
	"		" and clay streaks
205	"	215	" hard packed sand
215	"	220	" tight hard packed sand
220	"	245	" coarse sand and gravel
245	"	262	" coarse sand and clay
262	"	316	" sand and clay streaks
316	"	340	" coarse sand
340	"	350	" hard packed sand
350	"	393	" hard packed sand

Copy of log send to District by Rottman Drilling Co. 4/1/70

"Typing penciled over by Ken Faulkow, 4/1/70

Work started 6/23/61 19 Completed 6/30/61 19

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address 121 W. Ave. I
Lancaster

[SIGNED] Well Driller

License No. Dated , 19

80989 9-56 50M QUIN ⊙ BPO

DWR FORM NO. 246 (REV. 9-54)

PWD #22

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES
WATER WELL DRILLERS REPORT

Do Not Fill In
No 78359 01

ORIGINAL with DWR APR 5 0 1974

State Well No. 6N/11W-34K2
Other Well No.

OWNER:
Name Palmdale Water District
Address 2005 E. Ave. Q
Palmdale, Calif. 93550

(2) LOCATION OF WELL: Pearland Wtr. Well
County Los Angeles Owner's number, if any Spec. 7305
Township, Range, and Section Sec. 34, T6N; R11W
Distance from cities, roads, railroads, etc. northeast corner of 55th St. E. and Ave. S, Palmdale, Ca.

(3) TYPE OF WORK *(check)*:
New Well [X] Deepening [ ] Reconditioning [ ] Destroying [ ]
If destruction, describe material and procedure in Item 11.

(4) PROPOSED USE *(check)*:
Domestic [ ] Industrial [ ] Municipal [X]
Irrigation [ ] Test Well [ ] Other [ ]

(5) EQUIPMENT:
Rotary [X]
Cable [ ]
Other [ ]

(6) CASING INSTALLED:
X STEEL: OTHER:
SINGLE [ ] DOUBLE [ ]

From ft.	To ft.	Diam.	Gage or Wall	Diameter of Bore	From ft.	To ft.
	400'	16"	1/4"	40"	0	50'
	50'	32"	1/4"	30"	50'	400'

Conductor pipe
Shoe or well ring: 16" Size of gravel: #5 Cabbaic rock
Joint: Welded with collars

If gravel packed

PERFORATIONS OR SCREEN:
Type of perforation or name of screen Louvre

From ft.	To ft.	Perf. per row	Rows per ft.	Size in. x in.
190'	400'	Aperature size: 1/8" with 45 openings per lineal foot.		

(8) CONSTRUCTION:
Was a surface sanitary seal provided? Yes [X] No [ ] To what depth 50' ft.
Were any strata sealed against pollution? Yes [ ] No [ ] If yes, note depth of strata
From ft. to ft.
From ft. to ft.
Method of sealing Cement top 50'

(9) WATER LEVELS:
Depth at which water was first found, if known 130' ft.
Standing level before perforating, if known ft.
Standing level after perforating and developing ft.

(10) WELL TESTS:
Was pump test made? Yes [X] No [ ] If yes, by whom? Rottman Drilling
Yield: gal./min. with ft. drawdown after hrs.
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]
Was electric log made of well? Yes [ ] No [X] If yes, attach copy

(11) WELL LOG:
Total depth 400' ft. Depth of completed well 400' ft.
Formation: *Describe by color, character, size of material, and structure*

ft.	to ft.	
0'	6'	Top Soil
6'	30'	Med. to coarse sand & gravel
30'	65'	Coarse sand and gravel with small to medium boulders
65'	130'	Coarse sand & small gravel
130'	200'	Med. sand with clay streaks
200'	250'	Coarse sand
250'	340'	Med. to coarse sand with clay streaks
340'	370'	Clay with Med. sand
370'	390'	Firm packed sand
390'	400'	Hard packed sand
400'	422'	Granite

CONFIDENTIAL - NOT FOR PUBLIC RELEASE

Water Performance:
April 17, 1974:
485 GPM @ 198' Clear
480 GPM @ 199' "
485 GPM @ 198' "
475 GPM @ 198' "
460 GPM @ 200' "
450 GPM @ 192' "
Increased RPM:
490 GPM @ 205' "
475 GP @ 215' "
Decreased RPM:
460 GPM : 200' "
End test.

Work started 3-5 1974 Completed 17 APR 1974

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Rottman Drilling Co.
(Person, firm, or corporation) (Typed or printed)
Address 121 W. Avenue I
Lancaster, Calif. 93534
[SIGNED] Jay A. Rottman
(Well Driller)
License No. 117561 Dated April 18, 1974

SKETCH LOCATION OF WELL ON REVERSE SIDE

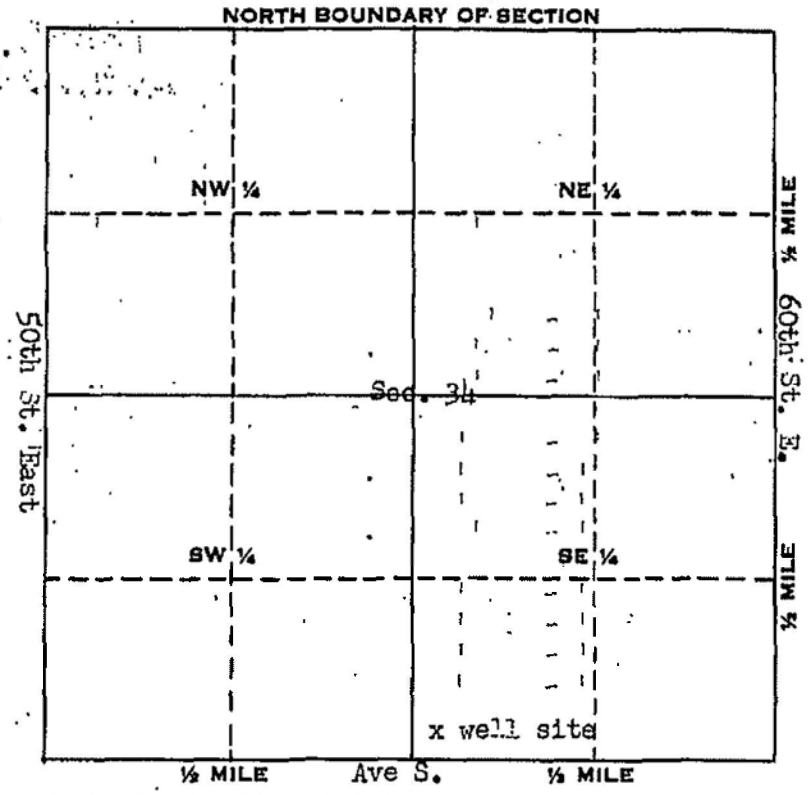
DWR 188 (REV. 9-68)

OVER

25179-950 9-68 50M YNIP AD OSP

WELL LOCATION SKETCH

78359 #22



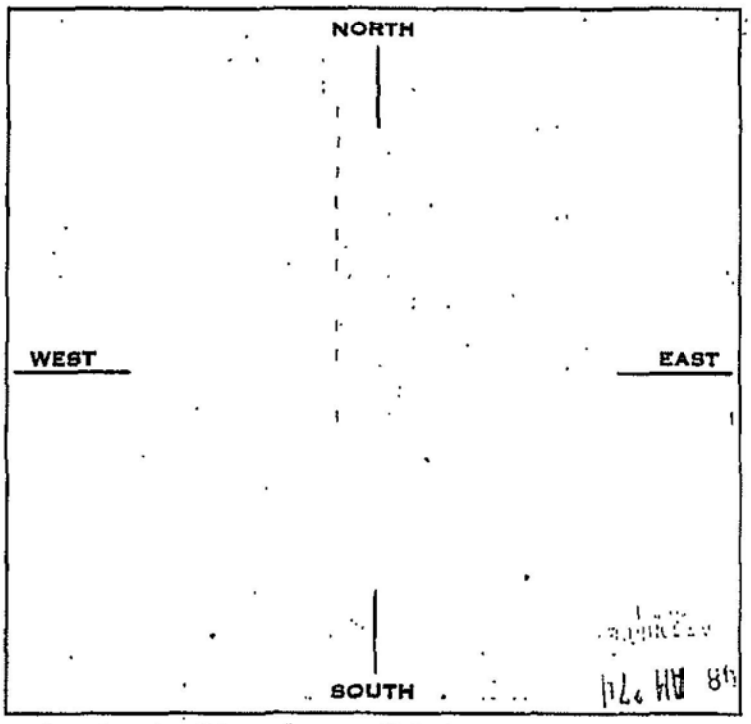
Township T-6N N/S

Range R11W E/W

Section No. Sec. 34

In Los Angeles County:
Palmdale...well site located northeast corner of 55th St. E. and Avenue S.

A. Location of well in sectionized areas.
Sketch roads, railroads, streams, or other features as necessary.



B. Location of well in areas not sectionized.
Sketch roads, railroads, streams, or other features as necessary.
Indicate distances.

RECEIVED
7 JUL 22 AM '74

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 489102

DWR USE ONLY — DO NOT FILL IN
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. 23A
Date Work Began 5-6-91, Ended 5-22-91
Local Permit Agency L.A. County Dept. of Health Services
Permit No. N/A Mr. Hopper Permit Date 4-15-91

GEOLOGIC LOG

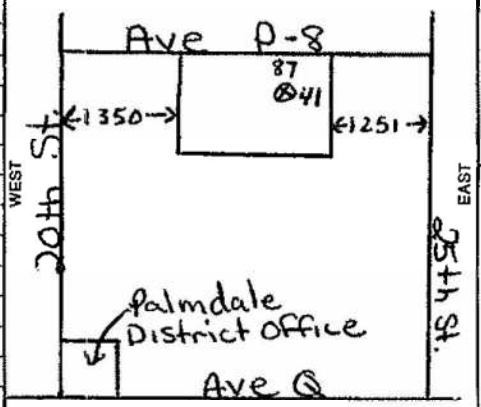
ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER ___ (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	110	Clay - Gravel
110	120	Sand - clay
120	240	Gravel - clay - gravel clay
240	250	Gravel - rock
250	260	Clay - gravel
260	290	Gravel - clay
290	300	Clay- gravel
300	320	Gravel - clay
320	350	Clay - Gravel
350	360	Gravel - clay
360	410	Clay- Gravel
410	460	Gravel - clay
460	470	Gravel
470	500	Gravel - clay
500	520	Clay gravel
520	530	Gravel
530	550	Clay - gravel
550	600	Gravel - clay
600	610	Gravel - rock
610	620	Clay - gravel
620	630	Gravel - clay
630	650	Gravel
650	660	Clay
660	680	Gravel - clay
680	700	Clay
700	740	Gravel - clay
740	750	Clay
750	800	Gravel - clay
800	840	Granite - gravel
840	900	Granite

TOTAL DEPTH OF BORING 900 (Feet)
TOTAL DEPTH OF COMPLETED WELL 840' (Feet)

WELL OWNER
Name Palmdale Water District
Mailing Address 2005 East Avenue "Q"
City Palmdale CA 93350 (STATE / ZIP)

WELL LOCATION
Address P-8 and 22nd St. Pump Station 23
City Palmdale
County Los Angeles
APN Book ___ Page ___ Parcel 3022-12-919
or Township 6N Range 11W Section 19 Lot 11
or Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH
NORTH


SOUTH
Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)
X NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)
___ MONITORING
WATER SUPPLY
X Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)
Municipal

DRILLING METHOD Reverse Rotary FLUID water

WATER LEVEL & YIELD OF COMPLETED WELL
DEPTH OF STATIC WATER LEVEL ___ (Ft.) & DATE MEASURED ___
ESTIMATED YIELD* ___ (GPM) & TEST TYPE ___
TEST LENGTH ___ (Hrs.) TOTAL DRAWDOWN ___ (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL / GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	80	38			X		Steel	30"	5/16"	
0	600	28"	X				Rosco Ms	16"	5/16"	
600'	840'	28		X			Rosco Ms	16"	5/16	.030
0	85	28				X				

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	50'	X			9sk slurry
50'	900'				¼" Birdseye

ATTACHMENTS (✓)
X Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other ___
ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT
I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.
NAME Bakersfield Well & Pump Co., Inc. (PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS 1600 E. California Ave. CITY Bakersfield STATE CA ZIP 93307
Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE
DATE SIGNED 11-19-91
C-57 LICENSE NUMBER 551820

DWR 188 REV. 7-90
IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

ORIGINAL
File with DWR

Do not fill in

No. 277322

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 6N/11W-35 J01
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 E. Aveneu "Q"
City Palmdale, CA ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 25
Well address if different from above 70th St.
Township 6N Range 11W Section 35
Distance from cities, roads, railroads, fences, etc. _____

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐ (Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☐ No ☒ Size _____
Diameter of bore _____
Packed from _____ ft. to _____ ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	600	16	5/16

(8) PERFORATIONS:
Type of perforation or size of screen

From ft.	To ft.	Slot size
255	385	.060
385	405	.060
435	595	.060

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 80' ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing 30" Conductor Cemented in Place

(10) WATER LEVELS:
Depth of first water, if known 108 ft.
Standing level after well completion 108 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge 750 gal/min after 52½ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report N.A.

(12) WELL LOG: Total depth 602 ft. Completed depth 600 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	80	Conductor
80	96	Fine Sand, 8" - 10" Rocks
96	104	Fine Sand, Clay Spots
104	109	Sandy Clay
109	118	Sand, Gravel w/Sm. Rocks
118	128	Tan Clay
128	171	Fine Sand, Gravel & Traces of Clay
171	214	Clay
214	238	Coarse Sand, Streaks of Clay
238	239	Brown Sand & Clay
239	240	Gravel & Clay
240	354	Brown Sticky Clay w/Fine Sand
354	396	Clay, Fine Sand, Spots of Gravel
396	402	Sand, Gravel w/Clay Spots
402	448	Sandy Clay, Sand, Sm. Gravel
448	457	Sandy Clay, Sand, Sm. Gravel, Tight
457	463	Sand, Sm. Gravel
463	496	Sand, Sm. Gravel w/Spots of Clay
496	505	Sand, Sm. Gravel w/Gray Clay - Firm
505	549	D.C. Granite w/Clay Layers
549	558	Granite, White Quartz, Firm
558	607	Granite, D.C. Granite, Fine Sand

Work started 12-9 19 88 Completed 1-26 19 89

WELL DRILLER'S STATEMENT:

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

Signed _____ (Well Driller)
NAME McCalla Bros., Div. of Layne-Western Co. (Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 1-30-89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM. 86 96355

277322

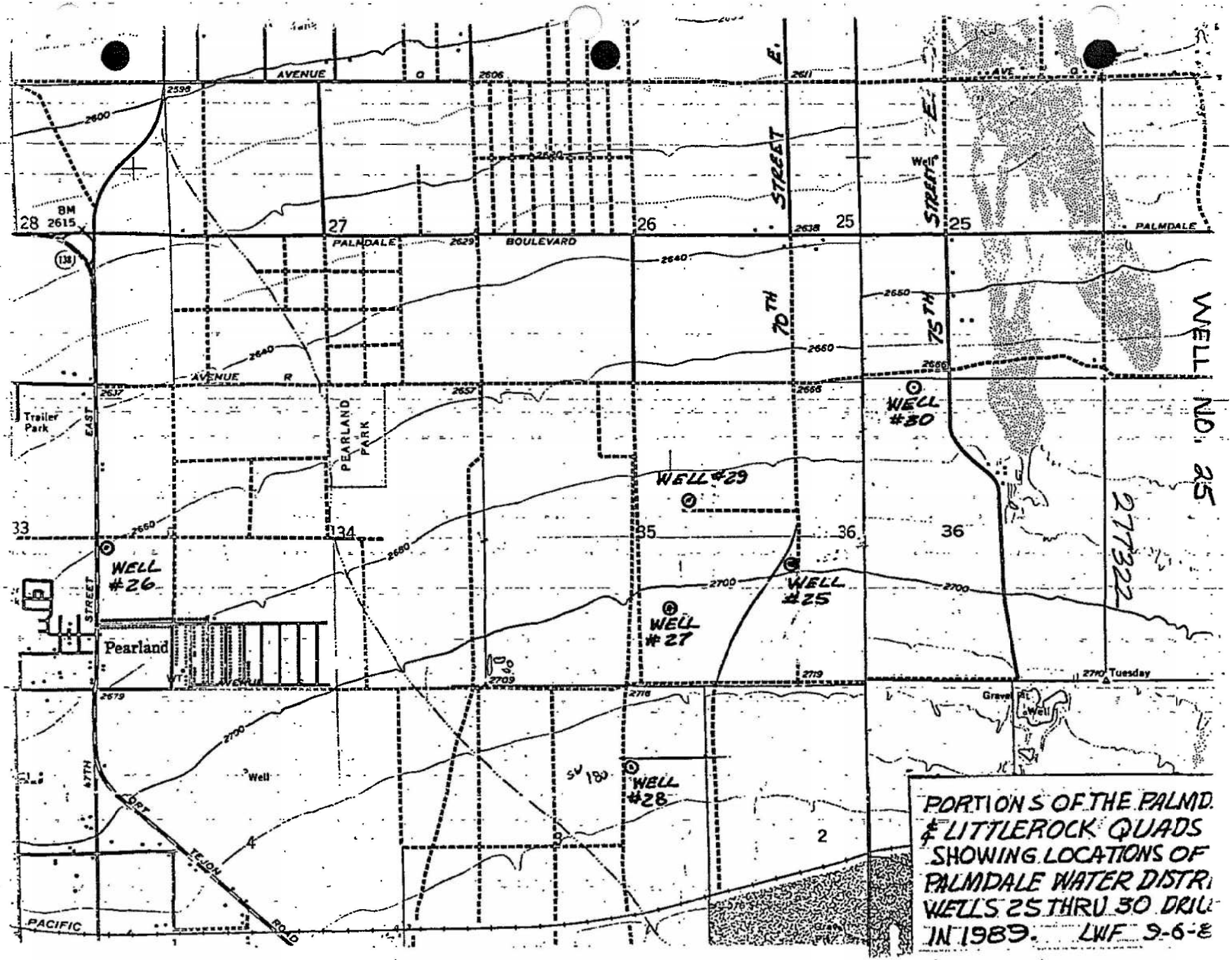
WELL NO. 25

LEGAL DESCRIPTION

That portion of the Southeast quarter of Section 35, T6N, R11W, SBM described as follows:

Beginning at the East quarter corner of said Section 35; thence North 89° 48' 35" West 30.00'; thence South 0° 02' 20" West 236.62' to the true point of beginning; thence South 0° 02' 20" West 440.65'; thence North 89° 16' 57" West 230.44' to an intersection with a 1550' radius curve which bears concave to the Northeast. The radial bearing from the center of said 1550' radius curve to said point of intersection bears South 63° 55' 47" East; thence Northeasterly along said 1550' radius curve through a central angle of 18° 22' 14" an arc distance of 496.97' to the true point of beginning.

The area of said site is equal to 1.015 acres.



PORTIONS OF THE PALMD.
& LITTLEROCK QUADS
SHOWING LOCATIONS OF
PALMDALE WATER DISTR
WELLS 25 THRU 30 DRIL
IN 1989. LWF 9-6-8

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

ORIGINAL with DWR

Do not fill in

No. 277330

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 6N/11W-33J02 S
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 East Avenue "Q"
City Palmdale, CA ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeeles Owner's Well Number 26
Well address if different from above Lot #1, Tract 43865
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc.
50' E. of 47th St.
50' N. of R-8

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: Monterey
Yes ☒ No ☐ Size 6 x 12
Diameter of bore 28"
Packed from 0' to 480' ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS:
Type of perforation or size of screen: Wire Wrap Screen

From ft.	To ft.	Dia. in.	Cage or Wall	From ft.	To ft.	Slot size
0	480	16	5/16	150	270	060
				310	470	060

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing 30" Conductor Cemented In Place

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion 180 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge 750 gal/min after 57½ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report N.A.

(12) WELL LOG: Total depth 484 ft. Completed depth 480 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Conductor
50	92	Fine Sand, Sm. gravel, Some Clay
92	137	Gravel, Fine Sand
137	149	Gravel & Rocks
149	177	Clay
177	179	Gravel, Rocks & Sand
179	193	Clay
193	196	Sandy Clay, Sm. Gravel
196	211	Gravel & Spots of Clay
211	216	Sandy Clay & Sm. Gravel
216	230	Clay & Gravel Streaks
230	248	Gravel, Sm. Rocks & Sand
248	268	Gravel w/Clay
268	290	Clay
290	293	Gravel, Sandy Clay
293	325	Clay
325	368	Sm. - Med. Gravel, Some Clay
368	397	Granite - Gravely & Gray Clay
397	406	Gray Clay, Very Little Gravel
406	423	Granite-Gravely, Some Clay
423	453	Decomposed Granite (firm)
453	468	Granite, Gravel & Clay
468	470	Granite (hard)
470	473	Granite & Spots of Clay
473	484	Granite (hard)

Work started 12-28 19 88 Completed 2-28 19 89

WELL DRILLER'S STATEMENT:

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

Signed _____ (Well Driller)

NAME McCalla Bros., div. of Layne-Western Co. (Person, firm, or corporation) (Typed or printed)

Address 3132 W. 17th St.

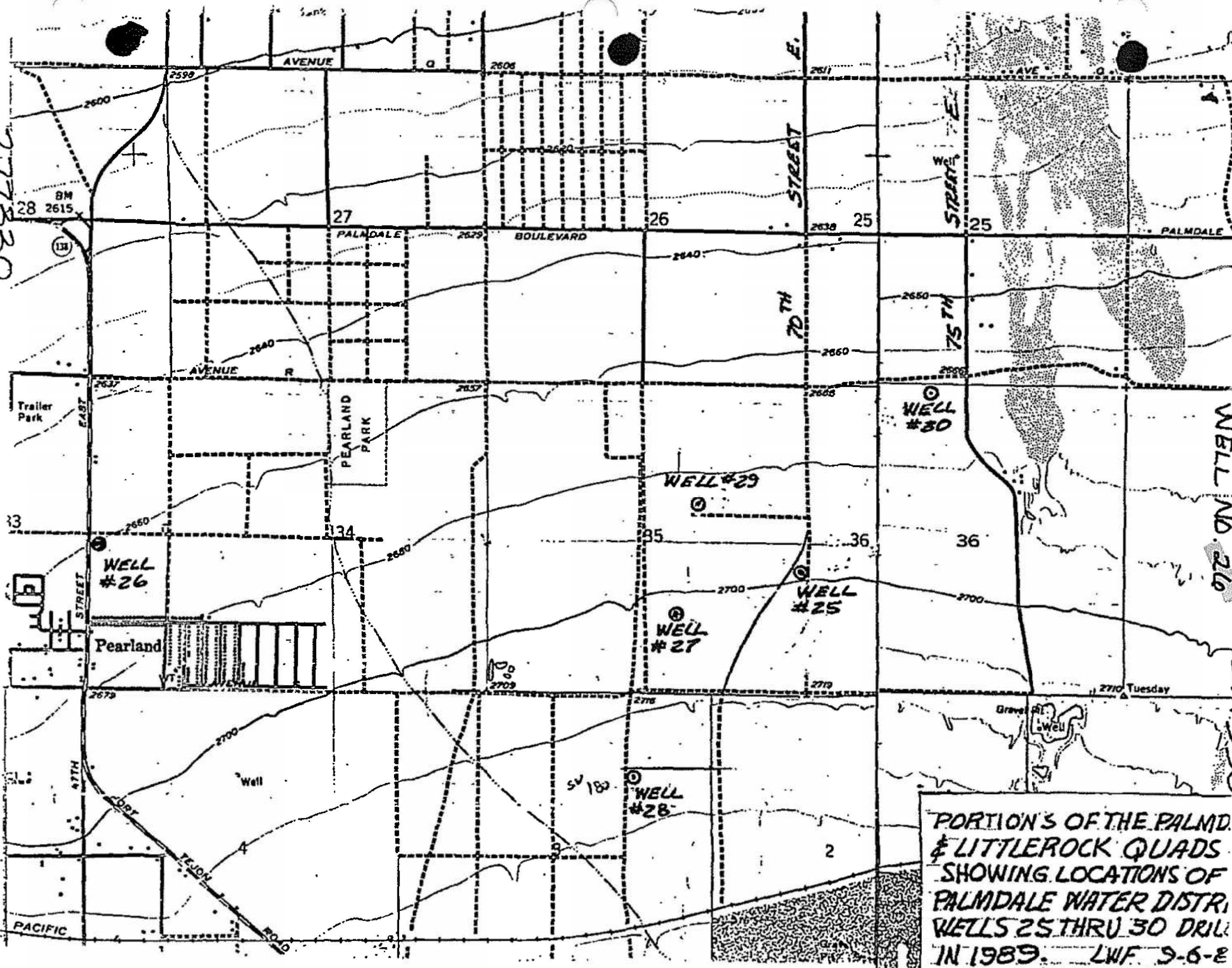
City Santa Ana, CA ZIP 92703

License No. 510011 Date of this report 3-17-89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

277330

WELL NO. 26



PORTION'S OF THE PALMD. & LITTLEROCK QUADS SHOWING LOCATIONS OF PALMDALE WATER DISTRI WELLS 25 THRU 30 DRILL IN 1989. LWF 9-6-8

277330

277330

WELL NO. 26

LEGAL DESCRIPTION

Lot 1 of Tract No. 43865 in the County of Los Angeles, State of California as per map recorded in Book 1043, Pages 79 to 84, inclusive, of Maps in the office of the County Recorder of said County.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

ORIGINAL
File with DWR

Do not fill in

No. 294155

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. 6N/11W-35G015
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 East Avenue "Q"
City Palmdale, CA ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 29
Well address if different from above _____
Township 6N Range 11W Section 35
Distance from cities, roads, railroads, fences, etc. _____

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐ (Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 Spec.
Diameter of bore 28
Packed from 0 to 370 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: Type of perforation or size of screen: Full Flo R/M Horizontal Louver

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	370	16	I.D.x5/16	190	370	.070

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval _____ ft.
Method of sealing 30" conductor Cemented in Place

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion 104 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge 350 gal/min after 34½ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 394 ft. Completed depth 370 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Sand, Gravel & Sm. Rocks
50	86	Sand, Gravel & Sm. Rocks
86	104	Fine Sand, Spots of Clay, Little Gra
104	119	Sand, Gravel, Some Clay
119	142	Sand & Gravel
142	147	Sand, Gravel & Rock
147	189	Sandy Clay
189	219	Sand, Gravel & Rock
219	231	Sand & Clay
231	273	Sand, Gravel, Spots of Sandy Clay
273	290	Sandy Clay
290	312	Sand, Gravel, Sandy Clay
312	328	Sand & Gravel
328	349	Sand & Gravel, Sandy Clay
349	356	Granite
356	394	Granite w/Gray Clay, Some Gravel

Work started 5-30 19 89 Completed 6-30 19 89

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of ~~my knowledge~~ and belief.

Signed _____ (Well Driller)

NAME McCalla Bros., Div. of Layne-Western Co.
(Person, firm, or corporation) (Typed or printed)

Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 8-31-89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

294155

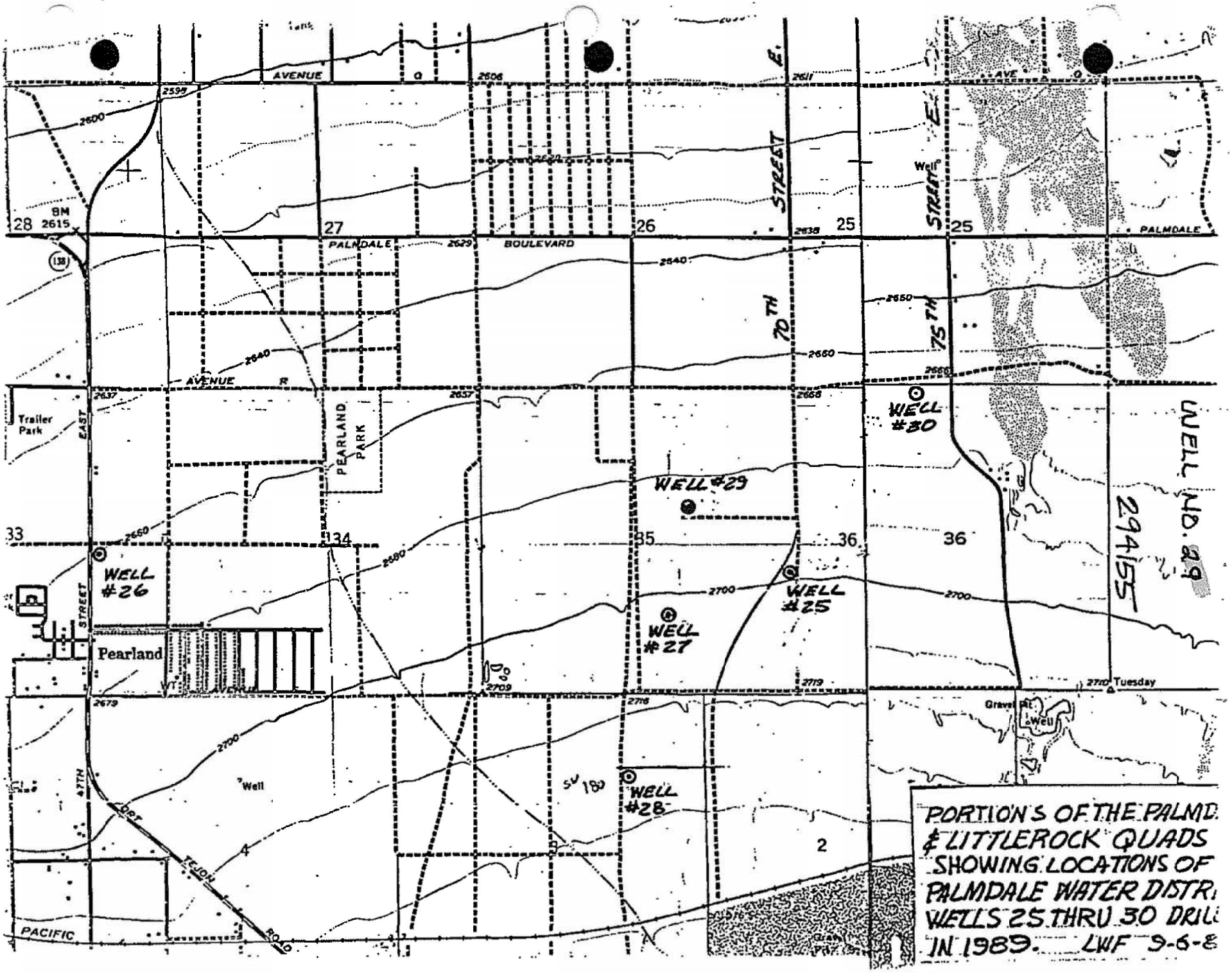
WELL NO. 29

LEGAL DESCRIPTION

A portion of the Southeast 1/4 of the Northeast 1/4 of Section 35, Township 6 North, Range 11 West, San Bernardino Meridian, County of Los Angeles, State of California.

Said land also described as Lot 215 of Tentative Tract No. 46768.

NOTE: Legal description will be forwarded when the tract is recorded.



PORTIONS OF THE PALMD
& LITTLEROCK QUADS
SHOWING LOCATIONS OF
PALMDALE WATER DISTR
WELLS 25 THRU 30 DRIL
IN 1989. LWF 9-6-8

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

TRIPLICATE
Owner's Copy

Do not fill in

No. 294156

Notice of Intent No. _____
Local Permit No. or Date _____

State Well No. _____
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 EastAvenue "Q"
City Palmdale, CA ZIP 93550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 30
Well address if different from above _____
Township 6N Range 11W Section 36
Distance from cities, roads, railroads, fences, etc.
1/2 Mile So. off 75th East

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☒
Irrigation ☒
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK:
Yes ☒ No ☐ Size 5/16 Spec.
Diameter of bore 28"
Packed from 0 to 410 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	410	16"	.188

(8) PERFORATIONS: Full Flo R/W Horizontal Louver
Typical perforation or size of screen

From ft.	To ft.	Slot size
200	410	070x2½

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☐ Interval _____ ft.
Method of sealing 30" Conductor Cemented In Place

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion 126 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros.
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge 1400 gal/min after _____ hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☐ No ☒ If yes, attach copy to this report

(12) WELL LOG: Total depth 425 ft. Completed depth 410 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Conductor
50	87	Sand, Gravel & Rock
87	103	Fine Sand, Some Clay & Rock
103	118	Fine Sand, Sandy Clay
118	124	Fine Sand, Some Clay & Gravel
124	156	Sandy Clay, Sand & Gravel
156	197	Clay
197	254	Sand, Small & Med. Gravel
254	266	Clay
266	316	Clay, Some Sand & Gravel
316	398	Sand & Gravel, Spots of Clay
398	411	Fine Sand, Gravel, Decomp. Granite
411	424	Granite

Work started 6-12 19 89 Completed 7-18 19 89

WELL DRILLER'S STATEMENT:

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

Signed _____ (Well Driller)
NAME McCalla Bros., Div. of Layne-Western Co. (Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 8-31-89

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

well # 32

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in
No. 294172

Notice of Intent No. 4
Local Permit No. or Date Oper Mit

State Well No. _____
Other Well No. _____

(1) OWNER: Name Palmdale Water District
Address 2005 E. Avenue Q
City Palmdale, CA ZIP 92550

(2) LOCATION OF WELL (See instructions): 32
County Los Angeles Owner's Well Number 31
Well address if different from above _____
Township _____ Range _____ Section _____
Distance from cities, roads, railroads, fences, etc.
50' N. R8
50' W. of 35th St. East

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: 5/16-Spec. Yes ☒ No ☐ Size
Diameter of bore 28"
Packed from 0 ft. to 580 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall
0	570	16	5/16

(8) PERFORATIONS: Horiz. Louver
Type of perforation or size of screen

From ft.	To ft.	Slot size
280	570	3/32x2½

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval _____ ft.
Method of sealing 30" conductor Cemented in Place

(10) WATER LEVELS:
Depth of first water, if known _____ ft.
Standing level after well completion 238 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test _____ ft. At end of test _____ ft.
Discharge 450 gal/min after 30 hours Water temperature _____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? _____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report N.A.

(12) WELL LOG: Total depth 580 ft. Completed depth 570 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Top Soil/Sand, Gravel w/Clay
50	60	Sand & Gravel, Some Rocks
60	70	Fine Gravel
70	80	Sand & Gravel
80	90	Fine Sand
90	100	Sand
100	110	Sandy Clay
110	120	Fine Sand
120	130	Med. to Coarse Sand, Some Clay
130	180	Fine to Coarse Sand, Some Clay
180	200	Fine to Coarse Sand
200	220	Fine to Coarse Sandy Clay
220	230	Fine Sand & Little Clay
230	240	Fine Sand & Mostly Clay
240	250	Fine & Coarse Sand
250	270	Fine Sand
270	280	Some Fine Sand & Mostly Clay
280	290	Fine Sand
290	310	Fine Sand & Little Clay
310	410	Fine Sand & Clay
410	450	Sand
450	460	Sand & Mostly Clay
460	470	Sand & Little Clay
470	480	Sand & Mostly Clay
480	490	Little Clay & Mostly Sand
490	500	Sand & Mostly Clay
500	510	Green Sandy Clay
510	530	Sandy Clay
530	550	Dark Sand & Some Gravel
550	560	Sand & Some Gravel
560	580	Hard Granite

Work started 10-19 19 89 Completed 11-27 19 89

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Signed _____ (Well Driller)
NAME McCalla Bros., Div. of Layne-Western Co. (Person, firm, or corporation) (Typed or printed)
Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 1-9-90

DWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

... WELL # 32

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 294172

State Well No. 6N/11W-32P35

Other Well No.

TRIPLICATE
Owner's Copy

Notice of Intent No. A

Local Permit No. or Date Dept. Hlth.

(1) OWNER: Name Palmdale Water District
Address 2005 E. Avenue Q
City Palmdale, CA ZIP 92550

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 31
Well address if different from above
Township ____ Range ____ Section ____
Distance from cities, roads, railroads, fences, etc.
50' N. R8
50' W. of 35th St. East

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

WELL LOCATION SKETCH

(5) EQUIPMENT:
Rotary ☒ Reverse ☐
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: 5/16-Spec.
Yes ☒ No ☐ Size
Diameter of bore 28"
Packed from 0 ft. to 580 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

From ft.	To ft.	Dia. in.	Gage or Wall	Slot size
0	570	16	5/16	3/32x2½

(8) PERFORATIONS: Horiz. Louver
Type of perforation or size of screen

From ft.	To ft.	Slot size
280	570	3/32x2½

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 50 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ____ ft.
Method of sealing 30" conductor Cemented in Place

(10) WATER LEVELS:
Depth of first water, if known ____ ft.
Standing level after well completion 238 ft.

(11) WELL TESTS:
Was well test made? Yes ☒ No ☐ If yes, by whom? McCalla Bros
Type of test Pump ☒ Bailer ☐ Air lift ☐
Depth to water at start of test ____ ft. At end of test ____ ft.
Discharge 450 gal/min after 30 hours Water temperature ____
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ____
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report N.A.

(12) WELL LOG: Total depth 580 ft. Completed depth 570 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	50	Top Soil/Sand, Gravel w/Clay
50	60	Sand & Gravel, Some Rocks
60	70	Fine Gravel
70	80	Sand & Gravel
80	90	Fine Sand
90	100	Sand
100	110	Sandy Clay
110	120	Fine Sand
120	130	Med. to Coarse Sand, Some Clay
130	180	Fine to Coarse Sand, Some Clay
180	200	Fine to Coarse Sand
200	220	Fine to Coarse Sandy Clay
220	230	Fine Sand & Little Clay
230	240	Fine Sand & Mostly Clay
240	250	Fine & Coarse Sand
250	270	Fine Sand
270	280	Some Fine Sand & Mostly Clay
280	290	Fine Sand
290	310	Fine Sand & Little Clay
310	410	Fine Sand & Clay
410	450	Sand
450	460	Sand & Mostly Clay
460	470	Sand & Little Clay
470	480	Sand & Mostly Clay
480	490	Little Clay & Mostly Sand
490	500	Sand & Mostly Clay
500	510	Green Sandy Clay
510	530	Sandy Clay
530	550	Dark Sand & Some Gravel
550	560	Sand & Some Gravel
560	580	Hard Granite

Work started 10-19 19 89 Completed 11-27 19 89

WELL DRILLER'S STATEMENT:

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

Signed ____ (Well Driller)

NAME McCalla Bros., Div. of Layne-Western Co.
(Person, firm, or corporation) (Typed or printed)

Address 3132 W. 17th St.
City Santa Ana, CA ZIP 92703
License No. 510011 Date of this report 1-9-90

OWR 188 (REV. 12-86) IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM 86 96355

FORM NO. 9-1904-A
Revised February 1987

~~24~~ 294172

Coded by Leighton
Checked by
Entered by

File Code 6N/11W-32P3S
Date 1/24/97

6N/11W-32P3S

U.S. DEPT. OF THE INTERIOR
GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

GROUND-WATER SITE SCHEDULE
General Site Data

AGENCY CODE (C4): USGS
SITE ID (C1): 341837118035901
PROJECT NO. (C5):

STATION NAME (C12): 006N011W32P03S

LATITUDE (C9): 341837
LONGITUDE (C10): 1180359
LAT-LONG ACCURACY (C11): (S) F T M (sec. 5 sec. 10 sec. min)

DISTRICT (C6): 06
STATE (C7): 06
COUNTY or TOWN (C8): Los Angeles — 037 (County code)

LAND NET (C13): ¼ ¼ ¼ S T R (section, township, range, meridian)

LOCATION MAP (C14): PALMDALE
MAP SCALE (C15): 24000

ALTITUDE (C16): 2675.
METHOD OF MEASUREMENT (C17): A L (M) (altimeter, level, map)
ACCURACY (C18): 10
HYDROLOGIC UNIT CODE (C20):

DRAINAGE BASIN CODE (C801):
TOPOGRAPHIC SETTING (C19): A B C D E F G H K L M O P S T U (V) W
(alluvial fan, playa, stream channel, depression, dunes, flat, flood plain, hilltop, sinkhole, lake or swamp, mangrove swamp, offshore, pediment, hillside, terrace, undulating, valley flat, upland draw)

AGENCY USE (C803): (A) I O (active, inactive, inventory only)
DATE INVENTORIED (C711): 08 (month) - 08 (day) - 1995 (year)
STATION TYPE (C802) (Place a "Y" in the appropriate box): (W) Y (well)

DATA TYPE (C804) (Place an 'A' (active), an 'I' (inactive), or an 'O' (inventory) in the appropriate box)
WL cont., WL int., GW cont., GW int., State water use

INSTRUMENTS (C805) (Place a 'Y' in the appropriate box):
digital recorder, graphic recorder, telemetry land line, telemetry radio, telemetry satellite, AHDAS, deflection meter, bubble gage, CR type recorder, weighing rain gage, tipping bucket rain gage

REMARKS (C806):

294172

GROUND-WATER SITE DATA

DATA RELIABILITY (C3): (C) L M U — field checked, poor location, minimal data, unchecked

SITE TYPE (C2): C D E H I M O P R T (W) X — collector, drain, excavation, sinkhole, connector well, multiple wells, outcrop, pond, tunnel, well, test hole

DATE OF CONSTRUCTION (C21): 11 (month) - 27 (day) - 1989 (year)

USE OF SITE (C23): A C D E G H M O P R S T U (W) X Z — anode, standby, amer. supply, drain, geothermal, seismic, heat reservoir, mine, observation, oil or gas, recharge, repressurize, test, unused, withdrawal, waste, decayed.

SECONDARY USE OF SITE (C301) (SEE USE OF SITE): [ ]

TERTIARY USE OF SITE (C302) (SEE USE OF SITE): [ ]

USE OF WATER (C24): A B C D E F H I J K M N (P) Q R S T U Y Z — air cond., bottling, commercial, dewater, power, fire, domestic, irrigation, industrial (cooling), mining, medicinal, industrial, public supply, aquaculture, recreation, stock, institutional, unused, desalination, other

SECONDARY USE OF WATER (C25) (SEE USE OF WATER): [ ]

TERTIARY USE OF WATER (C26) (SEE USE OF WATER): [ ]

AQUIFER TYPE (C713): U N C M X — unconfined, single; unconfined, multiple; confined, single; confined, multiple; mixed

PRIMARY AQUIFER (C714): [ ]

HOLE DEPTH (C27): 580.1

WELL DEPTH (C28): 570.1

SOURCE OF DEPTH DATA (C29): A (D) G L M O R S Z — other gov't., driller, geologist, logs, memory, owner, other reported, reporting agency, other

WATER LEVEL (C30): [ ]

DATE WATER LEVEL MEASURED (C31) (Mandatory if C30, water level, has a value): [ ] (month) - [ ] (day) - 19[ ] (year)

METHOD OF WATER-LEVEL MEASUREMENT (C34): A B C E G H L M N R S T V Z — airline, analog, calibrated airline, estimated, pressure gage, calibrated press. gage, geophysical logs, manometer, non-rec. gage, reported, steel tape, electric tape, calibrated elec. tape, other

SITE STATUS FOR WATER LEVEL (C37): D E F G H I J N O P R S T V W X Z — dry, recently flowing, flowing, nearby flowing, nearby recently flowing, injector site, injector site monitor, measurement discon., obstruction, pumping, recently pumped, nearby pumping, nearby recently pumped, foreign substance, well destroyed, surface water effects, other

SOURCE OF WATER-LEVEL DATA (C33): A D G L M O R S Z — other gov't., driller, geologist, logs, memory, owner, other reported, reporting agency, other

---

CONSTRUCTION DATA

RECORD TYPE (C784): CONS

RECORD SEQUENCE NO. (C723): 001

DATE OF CONSTRUCTION (C60): 11 (month) - 27 (day) - 1989 (year)

NAME OF CONTRACTOR (C63): LAMNE-WESTERN

SOURCE OF DATA (C64): A (D) G L M O R S Z — other gov't., driller, geologist, logs, memory, owner, other reported, reporting agency, other

METHOD OF CONSTRUCTION (C65): A B C D (H) J P R T V W Z — air-rotary, bored or augered, cable tool, dug, hydraulic rotary, jetted, air percussion, reverse rotary, trenching, driven, drive wash, other

TYPE OF FINISH (C66): C (F) G H O P S T W X Z — porous concrete, gravel w/perf., gravel screen, horiz. gallery, open end, perf. or slotted, screen, sand point, walled, open hole, other

TYPE OF SEAL (C67): B C (G) N Z — bentonite, clay, cement grout, none, other

BOTTOM OF SEAL (C68): 50

METHOD OF DEVELOPMENT (C69): A B C J N P S Z — air-lift pump, bailed, compressed air, jetted, none, pumped, surged, other

HOURS OF DEVELOPMENT (C70): [ ]

SPECIAL TREATMENT (C71): C D E F H M Z — chemicals, dry ice, explosives, deflocculent, hydrofracturing, mechanical, other

294172

CONSTRUCTION LIFT DATA

RECORD TYPE (C752): LIFT | RECORD SEQUENCE NO. (C254): 001 | TYPE OF LIFT (C43): A B C J P R S T U Z (air, bucket, centrifugal, jet, piston, rotary, submersible, turbine, unknown, other)

DATE RECORDED (C38): __ - __ - 19__ (month - day - year) | PUMP INTAKE DEPTH (C44): | TYPE OF POWER (C45): D E G H L N W Z (diesel, electric, gasoline, hand, LP gas, natural gas, windmill, other)

HORSEPOWER RATING (C46): . | MANUFACTURER (C48): | SERIAL NO. (C49):

POWER COMPANY (C50): | POWER COMPANY ACCOUNT NUMBER (C51):

POWER METER NUMBER (C52): | PUMP RATING (C53) (million gallons/unit of fuel): . | ADDITIONAL LIFT (C255):

PERSON OR COMPANY MAINTAINING PUMP (C54): | RATED PUMP CAPACITY (gpm) (C268): | STANDBY POWER (C56) (see TYPE OF POWER):

HORSEPOWER OF STANDBY POWER SOURCE (C57): .

MISCELLANEOUS OWNER DATA

RECORD TYPE (C768): OWNR | RECORD SEQUENCE NO.(C718): 001 | DATE OF OWNERSHIP (C159): 11 - 27 - 1989 (month - day - year)

NAME (C161): PALMDALE WATER DISTRICT

EXAMPLES: JONES, RALPH A.
JONES CONSTRUCTION COMPANY

MISCELLANEOUS OTHER ID DATA

RECORD TYPE (C770): OTHD | RECORD SEQUENCE NUMBER (C736): 001 | OTHER ID (C190): 294172

32

ASSIGNER (C191): D.LOG

OWNER

MISCELLANEOUS OTHER DATA

RECORD TYPE (C772): OTHR | RECORD SEQUENCE NUMBER (C312): 1

OTHER DATA TYPE (C181):

OTHER DATA LOCATION (C182): C D R Z (Cooperator's Office, District Office, Reporting Agency, other) | DATA FORMAT (C261): F M P Z (files, machine readable, published, other)

MISCELLANEOUS VISIT DATA

RECORD TYPE (C774): VIST | RECORD SEQUENCE NO.(C737): 001 | DATE OF VISIT (C187): 08 - 08 - 1995 (month - day - year)

NAME OF PERSON (C188): METZGER, W. F.

TRIPLICATE
Owner's Copy

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

WATER WELL DRILLERS REPORT

Do not fill in

No. 322406

Notice of Intent No. ______
Local Permit No. or Date ______

State Well No. ______
Other Well No. ______

(1) OWNER: Name Palmdale Water District
Address 2005 East Ave. Q
City Palmdale ZIP 93350

(2) LOCATION OF WELL (See instructions):
County Los Angeles Owner's Well Number 33
Well address if different from above ______
Township 6N Range 11W Section 36
Distance from cities, roads, railroads, fences, etc.
1/4 mile west of 75th st. on R

WELL LOCATION SKETCH

(3) TYPE OF WORK:
New Well ☒ Deepening ☐
Reconstruction ☐
Reconditioning ☐
Horizontal Well ☐
Destruction ☐ (Describe destruction materials and procedures in Item 12)

(4) PROPOSED USE:
Domestic ☐
Irrigation ☐
Industrial ☐
Test Well ☐
Municipal ☒
Other ☐
(Describe)

(5) EQUIPMENT:
Rotary ☐ Reverse ☒
Cable ☐ Air ☐
Other ☐ Bucket ☐

(6) GRAVEL PACK: 4x8/6x12 Blend
Yes ☐ No ☐ Size
Diameter of bore 26"
Packed from 0 to 465 ft.

(7) CASING INSTALLED:
Steel ☒ Plastic ☐ Concrete ☐

(8) PERFORATIONS: S.S. wire wrap screen
Type of perforation or size of screen

From ft.	To ft.	Dia. in.	Gage or Wall	From ft.	To ft.	Slot size
0	220	16"	.250	220	240	.040
240	280	16"	.250	280	460	.070
460	465	16"	.250			

(9) WELL SEAL:
Was surface sanitary seal provided? Yes ☒ No ☐ If yes, to depth 80 ft.
Were strata sealed against pollution? Yes ☐ No ☒ Interval ______ ft.
Method of sealing 30" conductor cemented in place

(10) WATER LEVELS:
Depth of first water, if known 130 ft.
Standing level after well completion 130 ft.

(11) WELL TESTS:
Was well test made? Yes ☐ No ☐ If yes, by whom? West Coast Drilling
Type of test Pump ☐ Bailer ☐ Air lift ☐
Depth to water at start of test 130 ft. At end of test 240 ft.
Discharge 1000 gal/min after 68 hours Water temperature ______
Chemical analysis made? Yes ☐ No ☒ If yes, by whom? ______
Was electric log made Yes ☒ No ☐ If yes, attach copy to this report

(12) WELL LOG: Total depth 465 ft. Completed depth 465 ft.

from ft.	to ft.	Formation (Describe by color, character, size or material)
0	80	Conductor (Sand)
80	100	Sand
100	150	Sand, Gravel
150	210	Sand Clay
210	245	Gravel and Sand
245	280	Clay, Sand
280	360	Gravel and Sand
360	400	Sandy Gravel
400	410	Sand/Clay
410	455	Gravel and Sand
455	469	Decomposed granite, Bedrock

Work started 3/8/91 19__ Completed 4/27/91 19__

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Signed [signature] (Well Driller)
NAME West Coast Drilling
(Person, firm, or corporation) (Typed or printed)
Address 11060 Calabash Ave.
City Fontana CA. ZIP 92335
License No. 600680 Date of this report 5/1/91

DWR 188 (REV. 12-86)

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

86 96355

ORIGINAL
File with DWR

Page 1 of 1

STATE OF CALIFORNIA
WELL COMPLETION REPORT
Refer to Instruction Pamphlet

No. 402641

DWR USE ONLY — DO NOT FILL IN
05N/11W03W015
STATE WELL NO./STATION NO.
LATITUDE LONGITUDE
APN/TRS/OTHER

Owner's Well No. 35
Date Work Began 6-27-91, Ended 7-30-91
Local Permit Agency L.A. County Health
Permit No. 61385 Permit Date 7-3-91

GEOLOGIC LOG

ORIENTATION (✓) X VERTICAL ___ HORIZONTAL ___ ANGLE ___ (SPECIFY)
DEPTH TO FIRST WATER 174 (Ft.) BELOW SURFACE

DEPTH FROM SURFACE Ft.	to Ft.	DESCRIPTION *Describe material, grain size, color, etc.*
0	60	Sand, Gravel, Cobbles
60	260	Sand, Gravel & Clay
260	310	Sand, Clay Layered
310	450	Sand, Gravel & Light Clay
450	460	Clay, Sand & Gravel
460	520	Clay & Gravel
520	630	Clay
630	800	Clay w/Sand & Gravel
800	810	Clay, hard packed
810	820	Granite

TOTAL DEPTH OF BORING 500 (Feet)
TOTAL DEPTH OF COMPLETED WELL 500 (Feet)

WELL OWNER

Name Palmdale Water Dist.
Mailing Address 2005 E. Ave. "Q"
City Palmdale, State CA Zip 93550

WELL LOCATION

Address
City Palmdale
County Los Angeles
APN Book 3051 Page 14 Parcel 13
Township 5N Range 11W Section 3
Latitude ___ DEG. ___ MIN. ___ SEC. NORTH Longitude ___ DEG. ___ MIN. ___ SEC. WEST

LOCATION SKETCH

NORTH / WEST / EAST / SOUTH

Illustrate or Describe Distance of Well from Landmarks such as Roads, Buildings, Fences, Rivers, etc. PLEASE BE ACCURATE & COMPLETE.

ACTIVITY (✓)

XX NEW WELL
MODIFICATION/REPAIR
___ Deepen
___ Other (Specify)
___ DESTROY *(Describe Procedures and Materials Under "GEOLOGIC LOG")*

PLANNED USE(S) (✓)

___ MONITORING
WATER SUPPLY
XX Domestic
___ Public
___ Irrigation
___ Industrial
___ "TEST WELL"
___ CATHODIC PROTECTION
___ OTHER (Specify)

DRILLING METHOD Reverse Rotary FLUID Water

WATER LEVEL & YIELD OF COMPLETED WELL

DEPTH OF STATIC WATER LEVEL 174 (Ft.) & DATE MEASURED 7-91
ESTIMATED YIELD* 800 (GPM) & TEST TYPE Pump
TEST LENGTH 63 (Hrs.) TOTAL DRAWDOWN 207 (Ft.)
* *May not be representative of a well's long-term yield.*

CASING(S)

DEPTH FROM SURFACE Ft.	to Ft.	BORE-HOLE DIA. (Inches)	TYPE (✓) BLANK	SCREEN	CONDUCTOR	FILL PIPE	MATERIAL/GRADE	INTERNAL DIAMETER (Inches)	GAUGE OR WALL THICKNESS	SLOT SIZE IF ANY (Inches)
0	200	28	X				Steel	16	5/16"	.060

ANNULAR MATERIAL

DEPTH FROM SURFACE Ft.	to Ft.	TYPE CEMENT (✓)	BENTONITE (✓)	FILL (✓)	FILTER PACK (TYPE/SIZE)
0	100	X			6x12

ATTACHMENTS (✓)

___ Geologic Log
___ Well Construction Diagram
___ Geophysical Log(s)
___ Soil/Water Chemical Analyses
___ Other

ATTACH ADDITIONAL INFORMATION, IF IT EXISTS.

CERTIFICATION STATEMENT

I, the undersigned, certify that this report is complete and accurate to the best of my knowledge and belief.

NAME McCalla Div. of Layne-WEstern
(PERSON, FIRM, OR CORPORATION) (TYPED OR PRINTED)
ADDRESS P.O. Box 13990 CITY Palm Desert, STATE CA ZIP 92255-3990
Signed [signature] WELL DRILLER/AUTHORIZED REPRESENTATIVE
DATE SIGNED 6-17-92
C-57 LICENSE NUMBER 510011

DWR 188 REV. 7-90

IF ADDITIONAL SPACE IS NEEDED, USE NEXT CONSECUTIVELY NUMBERED FORM

APPENDIX B

Inventory of Available Downhole Video Surveys

KYLE Groundwater

Inventory of Available Downhole Video Surveys

Well_Name	Date	Format	Notes	Company
15th Street	22-Feb-90	VHS		McCalla Water Well Services Company
Well 2A	07-May-01	VHS		Welenco
Well 2A	21-May-01	VHS		Welenco
Well 2A	27-Apr-10	DVD		Pacific Surveys, LLC
Well 2A	09-May-10	VHS		Welenco
Well 2A	22-Jun-10	DVD		Pacific Surveys, LLC
Well 3	25-Apr-12	DVD	Pre Video	Layne Christensen Company
Well 3	24-May-12	DVD	After Brushing	Layne Christensen Company
Well 3A	16-Nov-92	VHS		Layne Christensen Company
Well 3A	23-Dec-92	VHS		McCalla Water Well Services Company
Well 3A	29-Jan-93	VHS		McCalla Water Well Services Company
Well 3A	20-Jul-04	DVD		Layne Christensen Company
Well 3A	04-Aug-04	DVD	After Brushing	Layne Christensen Company
Well 3A	25-Aug-04	DVD	After Patching	Layne Christensen Company
Well 4	10-Nov-97	VHS		Barbour Well Surveying Corporation
Well 4	08-Dec-97	VHS		Barbour Well Surveying Corporation
Well 4	22-Dec-97	VHS		Barbour Well Surveying Corporation
Well 4	15-May-01	VHS		Welenco
Well 4	24-May-01	VHS		Welenco
Well 5	16-Jul-02	VHS		Layne Christensen Company
Well 6	10-Jul-98	VHS		Layne Christensen Company
Well 6	21-Aug-98	VHS		Layne Christensen Company
Well 6	29-Oct-03	DVD		Layne Christensen Company
Well 6	24-Nov-03	DVD	After Brushing	Layne Christensen Company
Well 6	28-Sep-05	DVD		Layne Christensen Company
Well 6	19-Jan-06	DVD		Layne Christensen Company
Well 6	30-Mar-18	DVD		Well Rehabilitation Services, Inc.
Well 6	15-May-18	DVD		Well Rehabilitation Services, Inc.
Well 6 (Dupe)	24-Nov-03	VHS	After Brushing	Layne Christensen Company
Well 6A	12-Jan-93	VHS		McCalla Water Well Services Company
Well 7	24-Nov-08	DVD		Layne Christensen Company
Well 7	13-Feb-09	DVD	After Rehabilitation	Layne Christensen Company
Well 7	16-Mar-09	DVD	After Rehabilitation	Layne Christensen Company
Well 7	28-Apr-09	DVD	After Patch	Layne Christensen Company
Well 7	07-May-18	DVD		Pacific Surveys, LLC
Well 7	25-Jun-18	DVD		Pacific Surveys, LLC
Well 7	09-Jul-18	DVD		Pacific Surveys, LLC
Well 7A	04-May-20	DVD	Screen Rupture	Unknown
Well 8	07-Nov-07	DVD		Layne Christensen Company
Well 8	27-Nov-07	DVD		Layne Christensen Company
Well 8A	20-Nov-00	VHS		Welenco
Well 8A	18-Jan-16	DVD		Pacific Surveys, LLC

Inventory of Available Downhole Video Surveys

Well_Name	Date	Format	Notes	Company
Well 8A	22-Feb-17	DVD		Pacific Surveys, LLC
Well 9	23-Dec-92	VHS		McCalla Water Well Services Company
Well 9	29-Apr-97	VHS		Welenco
Well 9	12-May-97	VHS		Welenco
Well 10	23-Dec-92	VHS		McCalla Water Well Services Company
Well 10	05-Feb-93	VHS		McCalla Water Well Services Company
Well 10	07-Apr-05	DVD		Layne Christensen Company
Well 10	25-Apr-05	DVD		Layne Christensen Company
Well 10	16-Jul-09	DVD		Layne Christensen Company
Well 10	12-Apr-17	DVD		Water Well Redevelopers
Well 10	31-Aug-17	DVD		Well Rehabilitation Services, Inc.
Well 10	08-Sep-17	DVD		Well Rehabilitation Services, Inc.
Well 11	23-Oct-07	DVD		Layne Christensen Company
Well 11A	01-Mar-99	VHS		Welenco
Well 11A	09-Apr-99	VHS		Groundwater Data, Inc.
Well 11A	23-Aug-99	VHS		Welenco
Well 11A	20-Sep-99	VHS		Welenco
Well 11A	07-Apr-05	DVD		Layne Christensen Company
Well 11A	29-Apr-05	DVD		Layne Christensen Company
Well 11A	23-Oct-07	DVD		Layne Christensen Company
Well 11A	07-Jan-08	DVD		Layne Christensen Company
Well 11A	25-Jan-08	DVD		Layne Christensen Company
Well 11A	19-Mar-08	DVD		Layne Christensen Company
Well 11A	06-Oct-08	DVD		Layne Christensen Company
Well 11A	13-Oct-11	DVD	General Inspection	Layne Christensen Company
Well 11A	14-Mar-12	DVD	After Liner	Layne Christensen Company
Well 14	16-Dec-03	DVD		Layne Christensen Company
Well 14	30-Jan-04	DVD	After Brushing	Layne Christensen Company
Well 14	10-Mar-14	DVD		Pacific Surveys, LLC
Well 14	20-May-14	DVD		Pacific Surveys, LLC
Well 15	28-Sep-94	VHS		McCalla Water Well Services Company
Well 15	16-Nov-94	VHS		McCalla Water Well Services Company
Well 15	09-Sep-04	DVD	After Patching	Layne Christensen Company
Well 15	22-Sep-04	DVD	After Brushing	Layne Christensen Company
Well 15	24-Nov-15	DVD	General Inspection	Layne Christensen Company
Well 15	14-Jan-16	DVD	After Brushing	Layne Christensen Company
Well 15	08-Nov-16	DVD	General Inspection	Layne Christensen Company
Well 15	12-Dec-16	DVD	Mid Rehabilitation	Layne Christensen Company
Well 16	03-May-91	VHS		Layne Christensen Company
Well 16	21-May-91	VHS		Layne Christensen Company
Well 16	13-Sep-94	VHS		McCalla Water Well Services Company
Well 16	16-Nov-94	VHS		McCalla Water Well Services Company

Inventory of Available Downhole Video Surveys

Well_Name	Date	Format	Notes	Company
Well 16	28-Aug-07	DVD		Layne Christensen Company
Well 16	19-Sep-07	DVD		Layne Christensen Company
Well 16	31-Mar-08	DVD		Layne Christensen Company
Well 17	16-Apr-97	VHS		Welenco
Well 17	19-May-97	VHS		Welenco
Well 18	15-Nov-16	DVD		Water Well Redevelopers
Well 18	08-Dec-16	DVD		Water Well Redevelopers
Well 19	02-Nov-10	DVD	General Inspection	Layne Christensen Company
Well 19	09-Dec-10	DVD	General Inspection	Layne Christensen Company
Well 20	06-Mar-89	VHS		McCalla Water Well Services Company
Well 21	24-Nov-04	DVD		Layne Christensen Company
Well 21	17-Jan-05	DVD		Layne Christensen Company
Well 21	04-Apr-13	DVD		Water Well Solutions
Well 22	16-Jul-01	VHS		Layne Christensen Company
Well 22	27-Jul-01	VHS	After Brushing	Layne Christensen Company
Well 22	24-Nov-04	DVD		Layne Christensen Company
Well 22	29-Feb-16	DVD	General Inspection	Layne Christensen Company
Well 22	15-Mar-16	DVD	Post Rehabilitation	Layne Christensen Company
Well 23	07-May-01	VHS		Layne Christensen Company
Well 23	24-May-01	VHS	After Brushing	Layne Christensen Company
Well 23	09-Dec-05	DVD		Layne Christensen Company
Well 23	22-Feb-06	DVD		Layne Christensen Company
Well 23	25-Apr-12	DVD	Pre Video	Layne Christensen Company
Well 23	24-May-12	DVD	After Brushing	Layne Christensen Company
Well 23A	27-Mar-93	VHS		McCalla Water Well Services Company
Well 25	13-Nov-03	DVD		Layne Christensen Company
Well 25	27-May-16	DVD		Water Well Redevelopers
Well 25	17-Jun-16	DVD		Water Well Redevelopers
Well 25	05-Nov-18	DVD		Well Rehabilitation Services, Inc.
Well 25	23-Apr-19	DVD		Well Rehabilitation Services, Inc.
Well 26	17-Nov-00	VHS		Welenco
Well 26	29-Nov-00	VHS		Welenco
Well 26	04-Dec-00	VHS		Welenco
Well 26	17-Jun-05	DVD		Layne Christensen Company
Well 26	25-Jul-05	DVD		Layne Christensen Company
Well 26	11-Aug-05	DVD		Layne Christensen Company
Well 26	14-Jun-16	Report Only		Water Well Redevelopers
Well 27	23-Oct-07	DVD		Layne Christensen Company
Well 29	19-May-18	DVD		Well Rehabilitation Services, Inc.
Well 29	25-Jun-18	DVD		Well Rehabilitation Services, Inc.
Well 29	19-Jul-18	DVD		Well Rehabilitation Services, Inc.
Well 29	10-Aug-18	DVD		Well Rehabilitation Services, Inc.

Inventory of Available Downhole Video Surveys

Well_Name	Date	Format	Notes	Company
Well 29	10-Oct-18	DVD		Well Rehabilitation Services, Inc.
Well 30	19-Mar-03	DVD		Layne Christensen Company
Well 30	05-Apr-04	DVD		Layne Christensen Company
Well 30	05-May-04	DVD		Layne Christensen Company
Well 30	21-May-04	DVD	Re-Video After Brushing	Layne Christensen Company
Well 30	24-Nov-15	DVD	General Inspection	Layne Christensen Company
Well 30	14-Jan-16	DVD	After Brushing	Layne Christensen Company
Well 32	30-Jan-04	DVD		Layne Christensen Company
Well 32	23-Feb-04	DVD	After Brushing	Layne Christensen Company
Well 32	26-Feb-04	DVD	After Brushing	Layne Christensen Company
Well 32	18-Sep-07	DVD		Welenco
Well 32	15-Jul-13	DVD	General Inspection	Layne Christensen Company
Well 32	12-Aug-13	DVD	After Brushing	Layne Christensen Company
Well 33	13-Oct-97	VHS		Welenco
Well 33	22-Jul-08	DVD		Layne Christensen Company
Well 33	07-Aug-08	DVD	After Brushing	Layne Christensen Company
Well 35	14-Jul-06	DVD		Layne Christensen Company
Well 35	15-Aug-06	DVD	Post Rehabilitation	Layne Christensen Company
Well 35	16-Apr-18	DVD		Well Rehabilitation Services, Inc.
Well 35	30-Apr-18	DVD		Well Rehabilitation Services, Inc.

Source of Video Surveys: Palmdale Water District (2020).

APPENDIX C

Video Survey Reports (Active Wells)

KYLE Groundwater

Video Log

McCalla Water Well Services Co. Div. of Layne Inc.
13855 Central Ave. Chino Ca. 91710, (909) 627-1521

CLIENT : PALMDALE WATER DISTRICT
ADDRESS : ---
PHONE # : ---

LOCATION : WEST OFF 10TH SOUTH OF P NORTH SIDE OF TRACKS

WELL # : 6A JOB # :56-5638

INSPECTED BY : CHRIS BONADURER DATE :1-12-93

STATIC WATER LEVEL : 507 FEET TOTAL DEPTH :998 FEET

WATER CONDITION : GOOD

CASING DIAMETER : 16 INCH

TYPE OF PERFORATIONS : HORIZONTAL LOUVER 'FACT.'

LOCATION OF PERFORATIONS : 481 FEET TO BELOW T.D. AT 998 FEET

NOTES : SOME BUILD-UP ON CASING. PERFS SEMI-OPEN FROM 600 TO 700 FEET. MOST ALL PERFS ARE BLOCKED PAST 700 FEET BY SCALE AND BUILD-UP. NO VISIBLE DAMAGE

-

Pacific Surveys

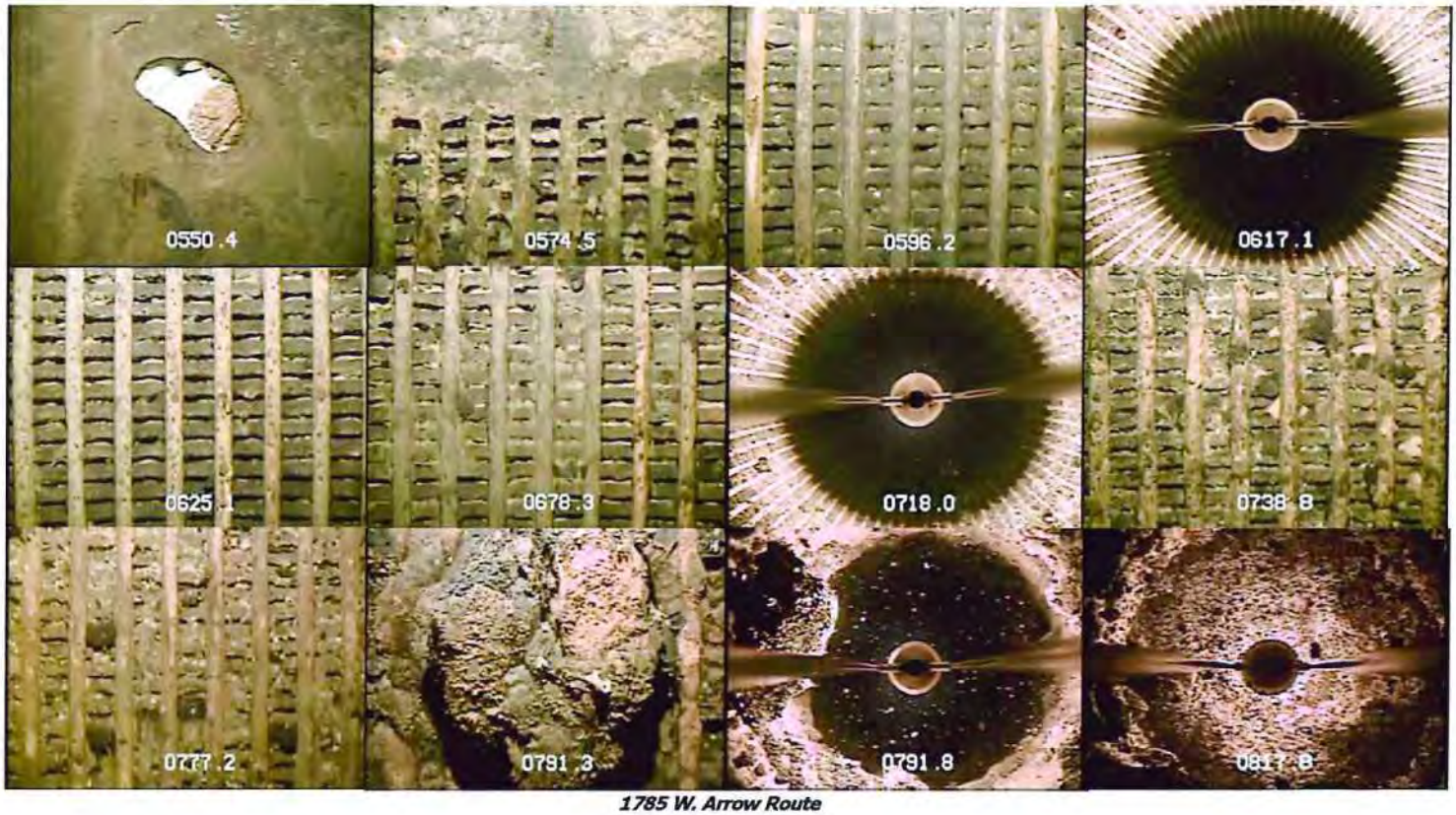
a full service geophysical well logging company

Video Survey Report

Company:	Best Drilling and Pump	**Date:**	07-May-18
Well:	Palmdale Water District Well #7	**Run No.**	One **Truck** PS-3
Field:	Palmdale	**Job Ticket:**	24028
State:	California	**Total Depth:**	820.9 ft
Location:	39395 25th St. E	**Water Level:**	536.0 ft SWL
		Oil on Water:	No **Amount:** N/A
GPS:	34.5983271 -118.0856966	**Operator:**	Villalobos
Zero Datum:	Top of CSG **Tool Zero:** Side-Scan		**Dead Space** 2.50 ft
Reason for Survey:	General Inspection	**Guides Set @**	14.5 in

Depth	Observations
0.0 ft	Begin survey from top of casing.
15.0 ft	Minor scaling observed on well casing.
436.0 ft	Increase in scaling from minor to moderate.
536.0 ft	SWL: water is clear. Visibility is good.
550.4 ft	Observed a hole in the casing.
574.5 ft	Top of SST wire-wrap screen: appears mostly open. Minor bio-growth on screen.
577.0 ft	Small bio-growth nodules appears sporadically on screen.
611.0 ft	Screen appears fairly open.
625.0 ft	Screen appears mostly open.
678.0 ft	Screen appears fairly open.
708.0 ft	One side of the screen appears plugged with bio-growth. The other side appears open.
712.0 ft	Decrease in bio-growth. Screen appears mostly open.
777.0 ft	Screen appears mostly plugged. Moderate bio-growth observed on screen.
791.0 ft	Large bio-growth nodules appear on screen. Screen appears plugged.
820.5 ft	Top of fill. Still in screen: appears plugged.
820.9 ft	Top of hard bottom.

Well Details	
Perforation:	**From Survey**
Wire-Wrap	574.50 ft to 820.50 ft
Casing Size:	**From Survey**
15.5 in ID	0.00 ft to 820.90 ft
Casing Material	Mild Steel
Screen Material	SST



1785 W. Arrow Route
Bldg. D, Suite 3 and 4
Upland, CA 91786
www.pacificsurveys.com

800.919.7555
909.625.6262

fax: 909.399.3180

Pacific Surveys

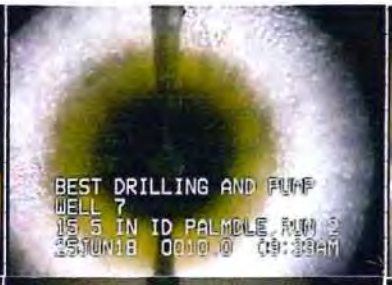
a full service geophysical well logging company

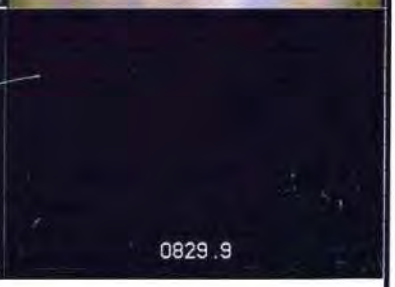
Video Survey Report

Company:	Best Drilling and Pump, Inc.	**Date:**	25-Jun-18		
Well:	Palmdale Water District Well 7	**Run No.**	Two	**Truck**	PS-7
Field:	Palmdale	**Job Ticket:**	24251		
State:	California	**Total Depth:**	832.5 ft		
Location:	39395 25th St E	**Water Level:**	532.5 ft	SWL	
		Oil on Water:	No	**Amount:**	N/A
GPS:	34.5983 -118.0856	**Operator:**	Medrano		
Zero Datum:	Top of Cement Pad **Tool Zero:** Side-Scan			**Dead Space**	2.50 ft
Reason for Survey:	Concrete Plug Inspection	**Guides Set @**	14.5 in		

Depth	Observations
10.0 ft	Begin survey 10 feet below top of cement pad.
50.0 ft	Casing appears in good condition on downview.
532.5 ft	Static Water Level - Moderate visibility.
547.5 ft	Top of casing patch. Appears to be in good condition.
552.5 ft	Bottom of casing patch.
570.0 ft	Visibility of the water improves.
573.9 ft	Top of screened interval. Screen appears mostly open consistent with previous video survey.
771.8 ft	Camera enters area with zero visibility.
773.1 ft	Side scan camera enters area of zero visibility. Camera completely black.
832.5 ft	Camera stops at top of concrete plug. With zero visibility survey has ended. Pickup from bottom @ 832.5'

Well Details	
Perforation:	**As-Built**
Wire-Wrap	574 ft to 820 ft
Casing Size:	**From Survey**
15.5 in ID	0 ft to 833 ft
Casing Material	Mild Steel
	SST





1785 w. arrow route
bdg d, suite 3 4
upland, ca 91786
www.pacificsurveys.com

800.919.7555
909.625.6262

fax: 909.399.3180

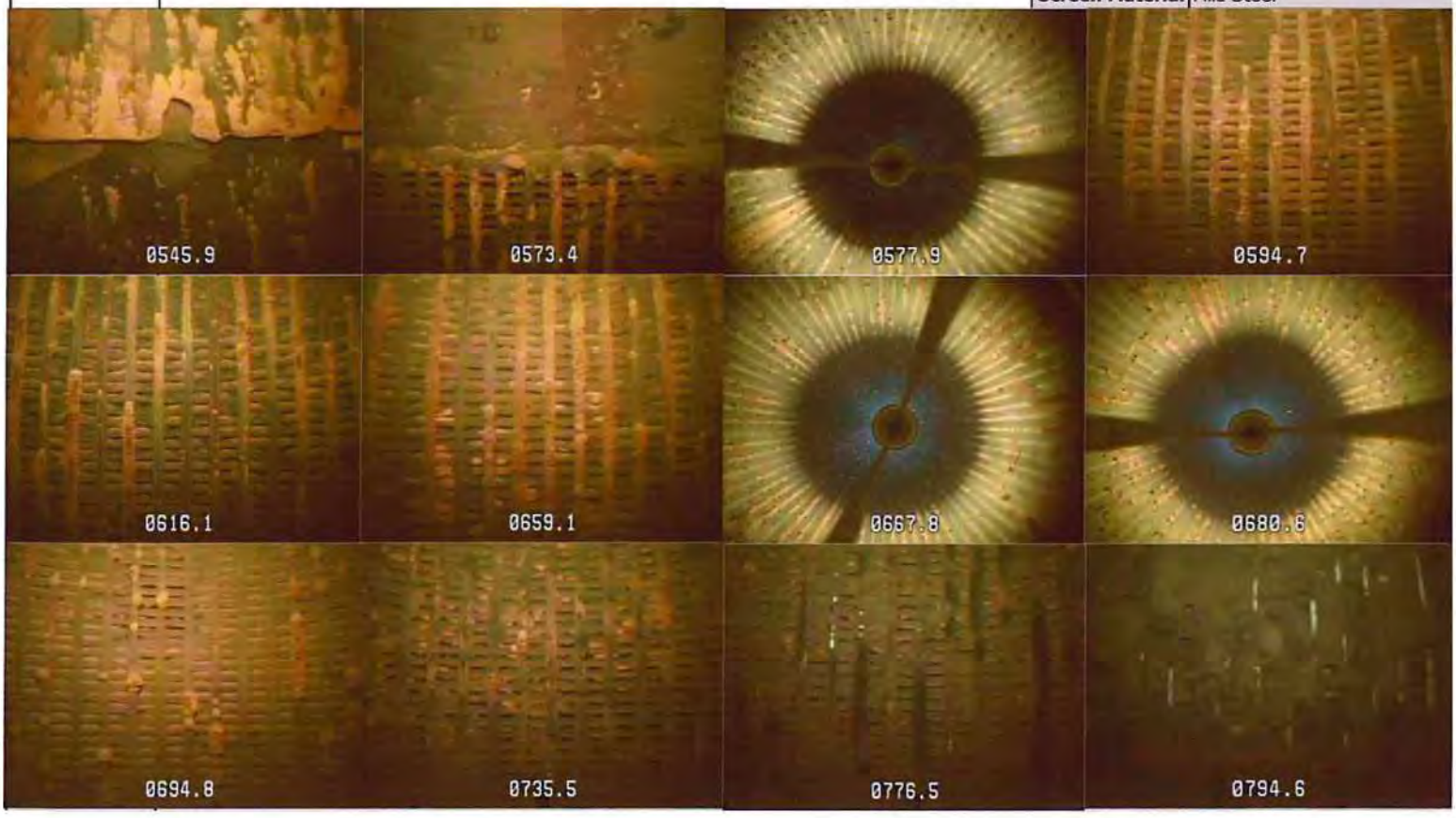
Pacific Surveys

a full service geophysical well logging company

Video Survey Report

Company:	Best Drilling and Pump	**Date:**	09-Jul-18		
Well:	Palmdale Water District Well #7	**Run No.**	Three	**Truck**	PS-6
Field:	Palmdale	**Job Ticket:**	24608		
State:	California	**Total Depth:**	831.7 ft		
		Water Level:	534.9 ft	SWL	
Location:	39595 25th St. E.	**Oil on Water:**	No	**Amount:**	N/A
	GPS: 34.5983271, -118.0856966	**Operator:**	Conner		
Zero Datum:	Top of CSG **Tool Zero:**	Side-Scan		**Dead Space**	1.75 ft
Reason for Survey:	General Inspection	**Guides Set @**	14.5 in		

Depth	Observations		
0.0 ft	Began survey at top of well casing.	**Perforation:**	**From Survey**
534.9 ft	SWL; water is cloudy; visibility is fair.	Wire-Wrap	573.40 ft to 825.00 ft
542.0 ft	Patch in casing; appears to be in good condition; ends at 545.9 ft.		
547.0 ft	Patch in casing; appears to be in good condition; ends at 552 ft.		
570.0 ft	Water in column clears.		
573.4 ft	Top of wire wraps screen; appears to be mostly open.		
635.0 ft	Water in column becomes cloudy to 664 ft then clears.		
665.0 ft	Screen appears to be open.		
700.0 ft	Screen appears to be mostly open.		
776.0 ft	Some nodule growth on screen.		
794.0 ft	Screen appears to be mostly plugged.		
825.0 ft	Last visible screen noticed; water becomes turbid; visibility poor.	**Casing Size**	**From Survey**
829.4 ft	Camera enters soft fill material.	15.5 in	0.00 ft to 831.70 ft
831.7 ft	Camera tags bottom.		
	Survey ends.		
		Casing Material	Mild Steel
		Screen Material	Mild Steel



1785 W. Arrow Route
Bldg D, Suite 3 and 4
Upland, CA 91786
www.pacificsurveys.com

800.919.7555
909.625.6262

fax: 909.399.3180

Pacific Surveys

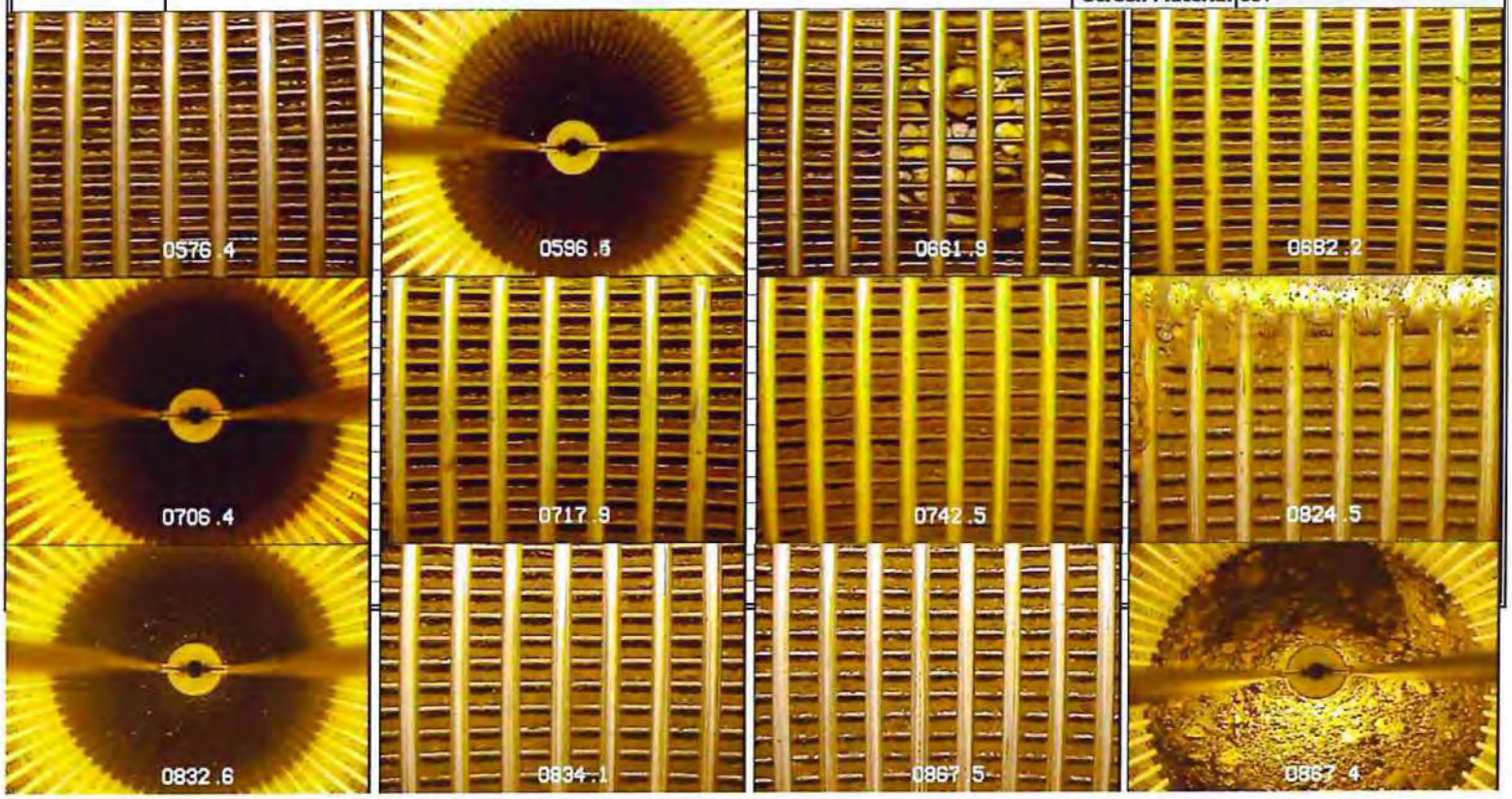
a full service geophysical well logging company

Video Survey Report

Company:	Best Drilling and Pump	**Date:**	18-Jan-17
Well:	Palmdale Water District Well #8A	**Run No.**	One **Truck** PS-3
Field:	Palmdale	**Job Ticket:**	22368
State:	CA	**Total Depth:**	870.1 ft
		Water Level:	565.7 ft SWL
Location:	2200 E. Ave P	**Oil on Water:**	No **Amount:** N/A
	GPS 34.6013°-118.0894°	**Operator:**	Villalobos
Zero Datum:	Top of CSG **Tool Zero:**	Side-Scan	**Dead Space** 2.50 ft
Reason for Survey:	General Inspection	**Guides Set @**	15 in

Depth	Observations
0.0 ft	Begin survey from top of well casing.
10.0 ft	Minor scaling observed on casing. At 98 ft. scaling increases to moderate. At 377 ft. increases to heavy.
563.4 ft	Top of screen: appears open.
565.7 ft	SWL: water is clear. Visibility is good.
576.0 ft	Gravel pack is visible through screen.
661.9 ft	Observed a small section where the size of the gravel behind the screen appears very large.
735.7 ft	Increase in bio-growth on screen; appears mostly open.
740.0 ft	Increase in bio-growth on screen; appears mostly plugged.
743.2 ft	Bottom of screen: appears mostly plugged.
824.4 ft	Top of screen: one side appears mostly plugged; the other side appears moderately plugged.
869.8 ft	Top of fill. Still in screen; appears mostly plugged.
870.1 ft	Camera light-bar touches top of hard bottom. End survey.

Perforation:	**From Survey**
Wire-Wrap	563.40 ft to 743.20ft
	824.40 ft to 869.80ft
Casing Size	**From Survey**
16.25 in ID	0.00 ft to 870.10ft
Casing Material	Mild Steel
Screen Material	SST



800.919.7555
909.626.6262

4456 via st ambrose
claremont ca 91711
www.pacificsurveys.com

fax: 909.399.3180

Pump Data Sheet - Flowserve

Company: Flowserve
Name: Ian Sellers
Date: 1/20/2017

Pump:

Size: 14M160 (9 stage)

Type: Groundwater
Synch speed: 1800 rpm

Speed: 1775 rpm
Dia: 11.25 in

Impeller Type: Enclosed

Thrust K Factor: 8.41 lb/ft

Specific Speeds:

Ns: 2450
Nss: —

Dimensions:

Suction: —
Discharge: —

Vertical Turbine:

Bowl size: 13.4 in
Max lateral: —
Thrust K factor: 8.41 lb/ft

Pump Limits:

Temperature: 140 °F
Pressure: 392 psi g
Sphere size: 0.5 in

Power: —
Eye area: 35.3 in²

Search Criteria:

Flow: 2000 US gpm

Head: 805 ft

Fluid:

Water
Density: 62.32 lb/ft³
Viscosity: 0.9946 cP

Temperature: 68 °F
Vapor pressure: 0.3391 psi a
Atm pressure: 14.7 psi a

NPSHa: —

Motor:

Standard: —
Enclosure: —

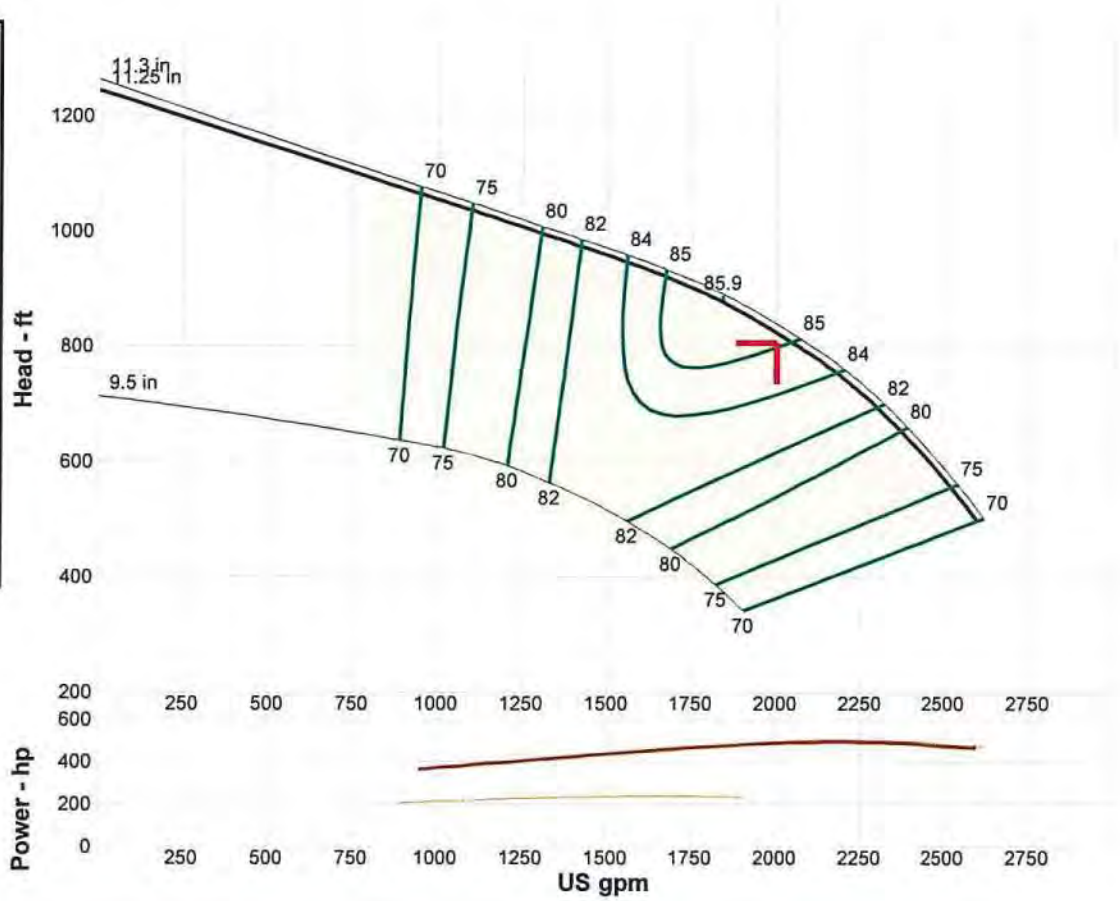
—
Speed: —
Frame: —

Sizing criteria: Max Power on Design Curve

Pump Selection Warnings:

Pump shutoff dP exceeds limit for the pump.

---- Data Point ----	
Flow:	2000 US gpm
Head:	822 ft
Eff:	85.2%
Power:	487 hp
NPSHr:	20.9 ft
---- Design Curve ----	
Shutoff head:	1244 ft
Shutoff dP:	538 psi
Min flow:	---
BEP:	85.9% @ 1840 US gpm
NOL power:	493 hp @ 2175 US gpm
-- Max Curve --	
Max power:	502 hp @ 2200 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Efficiency %	Power hp	NPSHr ft
2400	1775	632	78.9	484	32.5
2000	1775	822	85.2	487	20.9
1600	1775	937	84.4	448	14.2
1200	1775	1016	77.5	396	12
800	1775	1093	65.1	345	11.7

FLOWSERVE

Headshaft Size:	2.44 Rationalized 10-TPI		
Pump Model (06ELM or 06L6 or 10EJY if Single stage):	14M160	8.41	K = Imp Thrust Factor Std Imp
Bowl Head in Feet for Standard Model:	805.0		H
Multi Stage Low NPSH Model (10EJY or 10JKYH or NONE):	NONE	0.00	K_L = Imp Thrust Factor Low NPSH
Bowl Head in Feet for Low NPSH Model:	0.0		H_L
SG:	1.00		SG
Lineshaft Diameter:	1.9375	2.9483	A_S = Cross Section Area (in^2)
Largest Column Pipe Diameter & Wall Thickness:	12" Nom. X AG Thd Wall (.330)		
Largest Column Diameter Length in Feet:	760.00		L = Length of Largest Dia Col
Enclosing Tube Diameter & Wall Thickness:	3.5" Nominal Tube Sch 80		
Smallest Column Pipe Diameter & Wall Thickness:	N/A		
Smallest Column Diameter Length in Feet:			L_S = Length of Smallest Dia Col
Drive Collet or Keyed Impeller:	Drive Collet Impeller Lateral		H_T = Total Bowl Head = 805.0

$$\text{Shaft Stretch in Inches} = \frac{[(K \times H) + (K_L \times H_L)] \times SG \times (L + L_S)}{2.5 \times 10^8 \times A_S} = + 0.6981$$

Largest Diameter Col		Smallest Diameter Col		Tube Area	
Pipe O.D.	12.750 D_{LCO}	Pipe O.D.	0.000 D_{SCO}	Pipe O.D.	4.000 D_{TO}
Wall	0.330	Wall	0.000	Wall	0.318
Pipe I.D.	12.090 D_{LCI}	Pipe I.D.	0.000 D_{SCI}	Pipe I.D.	3.364 D_{TI}
Area O.D.	127.676	Area O.D.	0.000	Area O.D.	12.566
Area I.D.	114.800	Area I.D.	0.000	Area I.D.	8.888
X-Sect Area	12.876 A_{LC}	X-Sect Area	0.000 A_{SC}	X-Sect Area	3.678 A_T
Tube/Shf Area	12.566	Tube/Shf Area	12.566		
Net Area H_2O	102.234	Net Area H_2O	0.000		
Vol H_2O/Ft Col	1226.804	Vol H_2O/Ft Col	0.000		
Lbs H_2O/Ft Col	44.282	Lbs H_2O/Ft Col	0.000		
Average K & K_L	8.41	Average K & K_L	8.41		
Lbs H_2O - Avg. K	35.872 K_{LC}	Lbs H_2O - Avg. K	0.000 K_{SC}		
Area Col + Area Tube	16.555 A_{LCT}	Area Col + Area Tube	0.000 A_{SCT}		
Head @ Base of Col	805.0 H_{LCB}	Head @ Base of Col	805.0 H_{SCB}		
Head @ Top of Col	45.0 H_{LCT}	Head @ Top of Col	805.0 H_{SCT}		

$$\text{Large Diameter Column Stretch in Inches} = \frac{(F_{LC1} - F_{LC2} + F_{LC3}) \times SG \times L}{2.5 \times 10^8 \times A_{LCT}} = - 0.3227$$

$$F_{LC1} = K_{LC} \times H_{LCB} = 28876.5615$$

$$F_{LC2} = \frac{C_{LC} \times 2.5 \times 10^6 \times A_{LC}}{L} = 12251.1754$$

Where

$$C_{LC} = \frac{.5022\,(D_{LCI})^2 \times L \times (H_{LCT} + H_{LCB})}{(D_{LCO}^2 - D_{LCI}^2) \times 10^7} = 0.2892$$

$$F_{LC3} = \frac{E_T \times 2.5 \times 10^6 \times A_T}{L} = 948.4996$$

Where

$$E_T = \frac{.5022\,(D_{TI})^2 \times L \times (H_{LCT} + H_{LCB})}{(D_{TO}^2 - D_{TI}^2) \times 10^7} = 0.0784$$

$$\text{Small Diameter Column Stretch in Inches} = \frac{(F_{SC1} - F_{SC2} + F_{SC3}) \times SG \times L_S}{2.5 \times 10^8 \times A_{SCT}} = - 0.0000$$

$$F_{SC1} = K_{SC} \times H_{SCB} = 0.0000$$

$$F_{SC2} = \frac{C_{SC} \times 2.5 \times 10^6 \times A_{SC}}{L_S} = \text{\#DIV/0!}$$

Where

$$C_{SC} = \frac{.5022\,(D_{SCI})^2 \times L_S \times (H_{SCT} + H_{SCB})}{(D_{SCO}^2 - D_{SCI}^2) \times 10^7} = \text{\#DIV/0!}$$

$$F_{SC3} = \frac{E_{TS} \times 2.5 \times 10^6 \times A_T}{L_S} = \text{\#DIV/0!}$$

Where

$$E_{TS} = \frac{.5022\,(D_{TI})^2 \times L_S \times (H_{SCT} + H_{SCB})}{(D_{TO}^2 - D_{TI}^2) \times 10^7} = 0.0000$$

FLOWSERVE

IMPELLER SETTING CALCULATION

Headshaft Size = 2.44 Rationalized 10-TPI
Threads/Inch = 10
One Turn of Nut = 0.1000
Each Face of Nut = 0.0167

Relative Shaft Stretch	=	0.3753
Standard Impeller Setting	=	+ 0.2500
Total Impeller Setting	**=**	**0.6253**
Drive Collet Impeller Lateral	=	0.75
Face Turns of Headshaft Nut if Hollow Shaft Driver	**=**	**37.52**

Quotation Form

Customer: Palmdale Water District
2029 East Avenue Q
Palmdale, CA 92550
P: (661) 947-4111

Job Number: 20916
Contact: Kelly Jeters
Date: 1/20/2017

Well or Description of Work: Well #8A - Well Chlorination, Swab and Airlift

Terms: Due Upon Receipt

Quantity	Description	Price	Unit	Total
1	Mobilization & demobilization of all tooling, equipment, material, personnel and 20,000 gallon neutralizing containment tank required to chlorinate, swab and airlift approximately 250' x 16-1/4" wire-wrap casing	$7,640.00	L.S.	$7,640.00
1	Install approximately 870' x 5" tremmie pipe and inject 15 gallons Sodium Hypochlorite 12.5% and 35 gallons Nu-Well 410 Chlorine Enhancer evenly throughout 250' x 16-1/4" wire-wrap screen	$13,125.00	L.S.	$13,125.00
1	Swab chlorine solution throughout 16-1/4" wire-wrap screen for 20 minutes per 20' section and airlift total chlorine solution from well until neutral	$10,720.00	L.S.	$10,720.00
1	On-site disinfection of all pump equipment upon reinstallation	$720.00	EA	$720.00
		TOTAL		$32,205.00

If above referenced quote meets your approval, please sign below and return.

Authorized Signature: _____ **Title:** _____

Date: _____ **Purchase Order No.:** _____

Best Drilling and Pump, Inc. does not assume liability for pump/motor suppliers delays in manufacturing, testing or deliveries. Best Drilling and Pump is not responsible for labor or rig cost associated with replacement of manufactures equipment failures or warranty replacement.
Best does not take any responsibility for any damage to the well casing, screen, gravel pack, pump equipment, motors, valves, pump house and any other damage arising in the course of any well work including but not limited to: inspection, cleaning, repairing, chemical treatment, brushing, bailing, or replacement of any new or defective parts manufactured or installed by others.

2/6/17

1640 Pellisier Road, Colton, CA 92324
Telephone: (951) 684-1952 Fax: (951) 684-3852 Email: TGarcia@BestDrillingandPump.com
Contractor No.: C-57, 826672

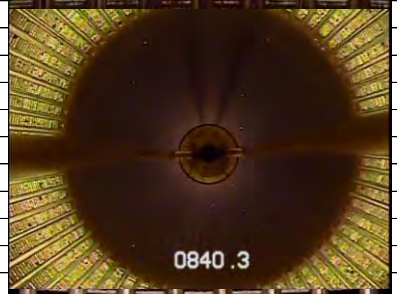
Pacific Surveys

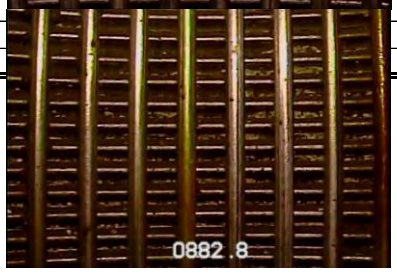
a full service geophysical well logging company

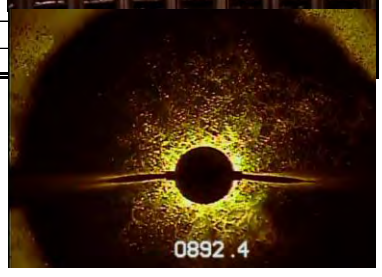
Video Survey Report

Company:	Best Drilling and Pump	**Date:**	22-Feb-17		
Well:	Palmdale Water District Well #8A	**Run No.**	Two	**Truck**	PS-3
Field:	Palmdale	**Job Ticket:**	22498		
State:	CA	**Total Depth:**	895.1 ft		
		Water Level:	545.1 ft	SWL	
Location:	2200 E. Ave P	**Oil on Water:**	No	**Amount:**	N/A
	GPS 34.6013°-118.0894°	**Operator:**	Villalobos		
Zero Datum:	Top of CSG	**Tool Zero:**	Side-Scan	**Dead Space**	2.50 ft
Reason for Survey:	Post Remediation	**Guides Set @**	15 in		

Depth	Observations		
0.0 ft	Begin survey from top of well casing.	**Perforation:**	**From Survey**
300.0 ft	Casing appears normal and in good condition.	Wire-Wrap	563.40 ft to 743.20ft
545.5 ft	SWL: water is mostly clear. Visibility is good.		824.40 ft to 883.40ft
561.5 ft	Casing transitions from mild steel to stainless steel.		
563.4 ft	Top of screen: appears open and in good condition.		
575.0 ft	Gravel pack is visible through screen.		
650.0 ft	Water is clear. Visibility is good.		
743.2 ft	Bottom of screen: appears open. Entire perforated interval appears open.		
824.4 ft	Top of screen: appears open.		
883.4 ft	Bottom of screen: appears open. Entire perforated interval appears open.		
894.8 ft	Top of fill.		
895.1 ft	Camera light-bar touches top of hard bottom. End survey.	**Casing Size**	**From Survey**
		16.25 in ID	0.00 ft to 895.10ft
		Casing Material	Mild Steel
		Screen Material	SST







800.919.7555
909.626.6262

4456 via st ambrose
claremont ca 91711
www.pacificsurveys.com

fax: 909.399.3180

McCalla Video Log Sheet

Layne-Western Company, Inc.
13855 Central Ave. Chino Ca. 91710, (714) 627-1521

CLIENT : PALMDALE WATER DIST.
ADDRESS : ---
PHONE # : ---

LOCATION : WEST OF 40TH ST. SOUTH OF P ST.

WELL # : --- 10 JOB # : 56-5637

INSPECTED BY : CHRIS BONADURER DATE : 12-23-92

STATIC WATER LEVEL : 437 FEET. TOTAL DEPTH : 657 FEET.

WATER CONDITION : GOOD

CASING DIAMETER : 12 INCH

TYPE OF PERFORATIONS : HORIZONTAL SLOT

LOCATION OF PERFORATIONS : 622 FEET TO 657 FEET T.D..

NOTES : HEAVY GROWTH ON PERFS LIGHT GROWTH ON CASING.

Well Rehabilitation Services, Inc.

PO Box 80365 Bakersfield, CA 93380
(661) 587-0914
Fax: (661) 587-0981
Shelley@Wellrehabservices.com
Lic No CA #983846

Invoice Number: 23139
Invoice Date: September 21, 2017
Page: 1
Duplicate

Palmdale Water Well #10

Roadrunner Pump Service
PO Box 1052
12130 Pearblossom Hwy
Pearblossom, CA 93553

Well# Palmdale Water Well #10
Job Date 08/31/17 - 09/08/17

Customer PO	Payment Terms		Due Date
	Net 30 Days		October 21, 2017

Item Qty	Description	Price Each	Amount
1.00	Video Survey Run 1	600.00	600.00
5.00	Mob/Demob to jobsite	225.00	1,125.00
5.00	Swage smooth existing patches @ 308' - 326'	225.00	1,125.00
1.00	Video Survey Run 2	600.00	600.00

Billed & Paid
Invoice 2084

Subtotal	3,450.00
Sales Tax	
Total Invoice Amount	3,450.00
Payment/Credit Applied	
TOTAL	**3,450.00**

Check/Credit Memo No:

pd 10/3/17 Ck# 9056

WATER WELL VIDEO REPORT

10

Palmdale W.D.

Water Well Redevelopers

2881 Blue Star St. Anaheim, CA. 92806
Phone: 7146327003 Fax: 7146327306 Web: sonar7003@sbcglobal.net

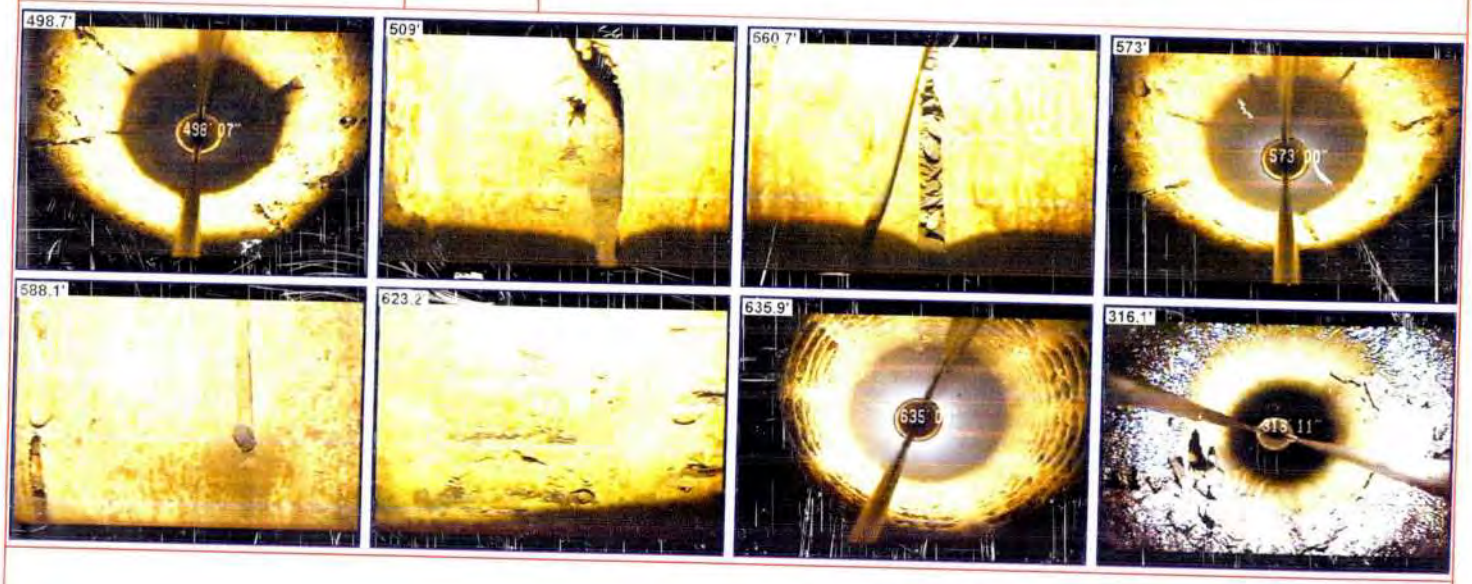
Client: Roadrunner Pump Service
Address: 12130 Pesrblossom Hwy.
City: Pearblossom, CA 93553
Requested By: Archie
Copy To: Palmdale W.D.
Reason For Survey: Verify condition of casing
Location: 3701 E. Ave. P8 Palmdale Ca.
Other Information:

Survey Date: April 12, 2017

Operator: John Mac Donald

T.W.D.: 642 Ft. Zero Ground Level
S.W.L.: 436 Ft. P.W.L. T.P.S.:

CASING INFORMATION		DEPTHS	VIDEO OBSERVATIONS
MK/Full full Louvers 496-605 Ft. 619-642 Ft.	T.W.D. 642 Ft. S.W.L 436 Ft.	498.7 Ft 509 Ft. 573 Ft. 588.11 Ft. 623.2 Ft 635.9 Ft. 316.11 Ft.	Open oversized perforations. Double cut perforation. Open oversized perforations. Open perforations Plugged perforations. Plugged perforations. Deteriorated liner. A light to moderate ferrous oxide deposit can be seen from 0' to 436' (Static). A light crusty tubercular mineral deposit is visible from 436'(Static) to 642' (Bottom). Mills knife perforations are open and oversized. Full flow louver perforations are plugged. Casing is in varying degrees of deterioration from 0' to 436' (Static).
Zero Datum Ground Level	12" Casing 0-642 Ft.		
Casing Buildup Light to Moderate			



DOWNHOLE VIDEO SURVEY

Well Rehabilitation Services, Inc.
Contractor License No.: CA. 983846
PO Box 80365 Bakersfield, CA. 93380
Phone: 661-587-0914 Fax: 661-587-0981 Web: Shelley@Wellrehabservices.com

Client: Road Runner Pump Service | Survey Date: August 31, 2017
Address: PO Box 1052 | Invoice: 23139 | Run: 1
City: Pearblossom Hwy | State: CA | Zip: 93553 | Well Name: #10
Requested By: Archie Floyds | P.O.: | Well Owner: Palmdale Water District
Copy To: | Camera: Aries BT9700 Color Camera
Reason For Survey: General Inspection | Zero Datum: Top Of Casing
Location: .22 miles West of 40th Street, 200' North of E Avenue P8, Palmdale
Field: | Depth: 629 ft. | Vehicle: VT2
County: Los Angeles | Country: | Type Perfs: Mill Knife Slots, Louvers
Perf Intervals: 499-606 ft. 620-629 ft.
1st Csg I.D.: 12.375 in. | Csg Weight: | From: 0 ft. | To: 629 ft. | 2nd Csg I.D.: | Csg Weight: | From: | To:
I.D Reference: Measured | Casing Buildup: Light | S.W.L.: 438 ft. | P.W.L.: | Pump Depth:
Operator: Montoya | Latitude: 34.595388° | Longitude.: 118.062475° | Section: | Range: | Township:
Other Information:

WELLBORE SNAPSHOTS	DEPTHS (SideScan-Feet)	WELLBORE / CASING INFORMATION
		Downview 24" deeper than sideviews
0' (See Other Side)  0' (See Other Side) 	0.0 Ft.	Sideview-Zero Datum
	20.4 Ft.	Sideview-Small lip at joint
	25.0 Ft.	Sideview-Test mill knife slot
20.4' (See Other Side)  25' (See Other Side) 	104.1 Ft.	Downview-Bare casing
	306.3 Ft.	Downview-Top of 10' patch, not flush with casing (1)
	308.2 Ft.	Sideview-Top of patch
104.1' (See Other Side)  306.3' (See Other Side) 	308.7 Ft.	Downview-Corrugations visible
	311.3 Ft.	Downview-Weld of additional 5' patch
	316.3 Ft.	Downview-Top of 10' patch, corrugations visible (2)
	318.3 Ft.	Sideview-Top of patch
308.2' (See Other Side)  308.7' (See Other Side) 	321.4 Ft.	Downview-Weld of additional 5' patch, corrugations visible
311.3' (See Other Side)  316.3' (See Other Side) 		
318.3' (See Other Side)  321.4' (See Other Side) 		

Notes: Original casing 16" Drilled 1920

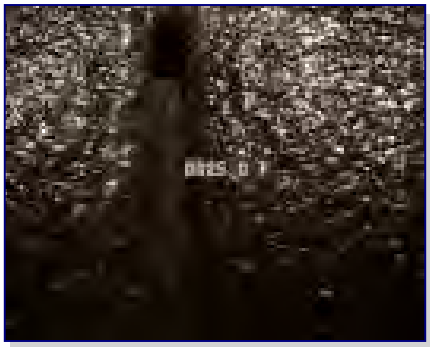
WELLBORE SNAPSHOT(S)

Depth: 0 Feet

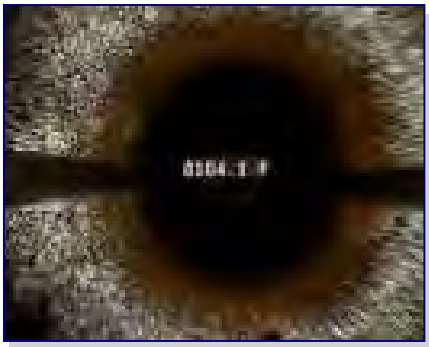
Depth: 0 Feet

Depth: 20.4 Feet

Depth: 25 Feet

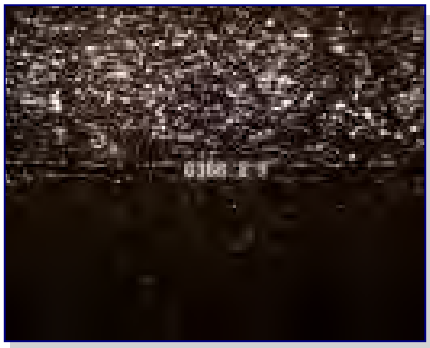


Depth: 104.1 Feet



Depth: 306.3 Feet

Depth: 308.2 Feet

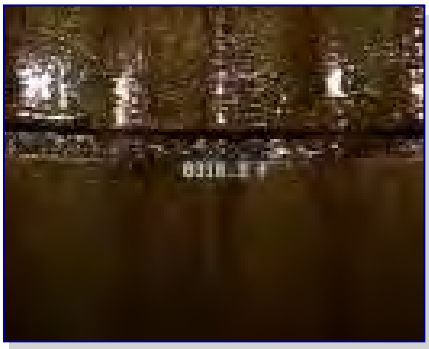


Depth: 308.7 Feet

Depth: 311.3 Feet

Depth: 316.3 Feet

Depth: 318.3 Feet

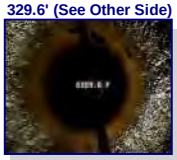
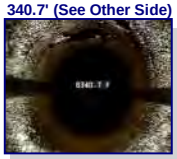


Depth: 321.4 Feet

DOWNHOLE VIDEO SURVEY

Well Rehabilitation Services, Inc.
Contractor License No.: CA. 983846
PO Box 80365 Bakersfield, CA. 93380
Phone: 661-587-0914 Fax: 661-587-0981 Web: Shelley@Wellrehabservices.com

Survey Date: **August 31, 2017**
Client: **Road Runner Pump Service**
Well Name: **#10**
Depth: **629 ft.**
1st Csg I.D.: **12.375 in.** From: **0 ft.** To: **629 ft.**
2nd Csg I.D.: From: To:
S.W.L.: **438 ft.** P.W.L.: Pump Depth:
Type Perfs: **Mill Knife Slots, Louvers**
Perf Intervals: **499-606 ft.** **620-629 ft.**

WELLBORE SNAPSHOTS	DEPTHS (SideScan-Feet)	WELLBORE / CASING INFORMATION
325.9' (See Other Side)  328.2' (See Other Side) 	325.9 Ft.	Downview-Corrugations visible, bottom piece pulled up
	328.2 Ft.	Sideview-Piece of patch pulled up
	328.3 Ft.	Sideview-Bottom of patch, corrugations visible
328.3' (See Other Side)  328.8' (See Other Side) 	328.8 Ft.	Downview-Small hole
	329.6 Ft.	Downview-Large holes
	331.7 Ft.	Downview-Large holes
329.6' (See Other Side)  331.7' (See Other Side) 	334.0 Ft.	Downview-Large split in reline, piece sticking inward
	336.3 Ft.	Downview-Casing deteriorated
	336.8 Ft.	Sideview-Deteriorated casing
	336.9 Ft.	Sideview-Split in reline
	340.7 Ft.	Downview-Casing deteriorated
334' (See Other Side)  336.3' (See Other Side) 	344.3 Ft.	Downview-Casing deteriorated
336.8' (See Other Side)  336.9' (See Other Side) 		
340.7' (See Other Side)  344.3' (See Other Side) 		

Notes: **Original casing 16" Drilled 1920**

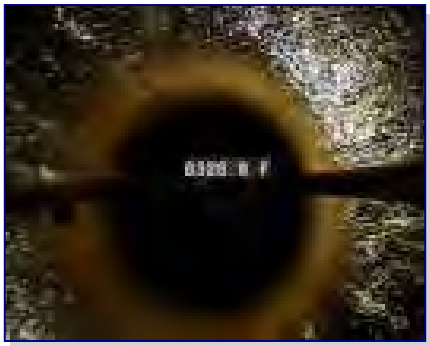
WELLBORE SNAPSHOT(S)

Depth: 325.9 Feet

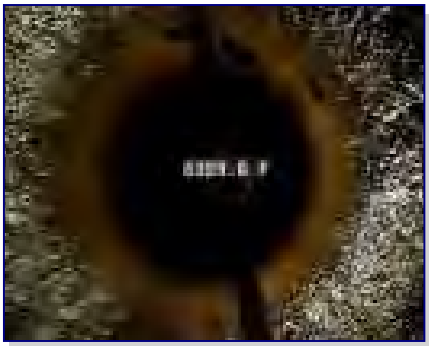
Depth: 328.2 Feet

Depth: 328.3 Feet

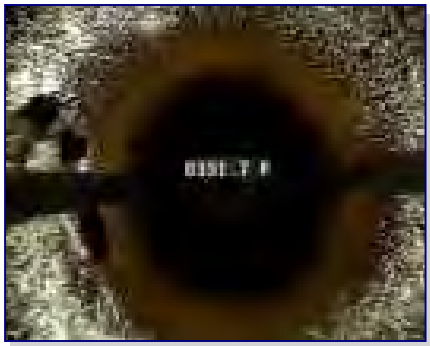
Depth: 328.8 Feet



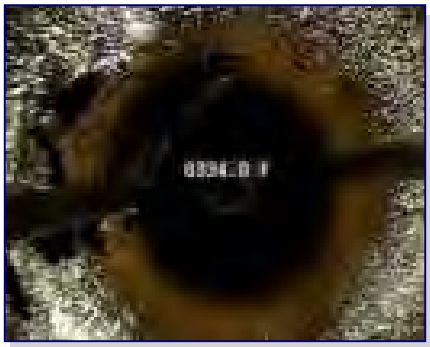
Depth: 329.6 Feet



Depth: 331.7 Feet



Depth: 334 Feet



Depth: 336.3 Feet

Depth: 336.8 Feet

Depth: 336.9 Feet

Depth: 340.7 Feet

Depth: 344.3 Feet

DOWNHOLE VIDEO SURVEY

Well Rehabilitation Services, Inc.
Contractor License No.: CA. 983846
PO Box 80365 Bakersfield, CA. 93380
Phone: 661-587-0914 Fax: 661-587-0981 Web: Shelley@Wellrehabservices.com

Survey Date: **August 31, 2017**
Client: **Road Runner Pump Service**
Well Name: **#10**
Depth: **629 ft.**
1st Csg I.D.: **12.375 in.** From: **0 ft.** To: **629 ft.**
2nd Csg I.D.: _____ From: _____ To: _____
S.W.L.: **438 ft.** P.W.L.: _____ Pump Depth: _____
Type Perfs: **Mill Knife Slots, Louvers**
Perf Intervals: **499-606 ft.** **620-629 ft.**

WELLBORE SNAPSHOTS	DEPTHS (SideScan-Feet)	WELLBORE / CASING INFORMATION
419' (See Other Side)  435.7' (See Other Side) 	419.0 Ft.	Downview-Bare casing
	435.7 Ft.	**Downview-Static water level, clear**
	447.8 Ft.	Downview-Light buildup
	497.6 Ft.	**Downview-Top of mill knife slots**
447.8' (See Other Side)  497.6' (See Other Side) 	499.0 Ft.	Sideview-Slots open
	530.4 Ft.	Downview-Light buildup, slots open
	587.7 Ft.	Sideview-Slots open
	606.0 Ft.	**Downview-End of mill knife slots**
499' (See Other Side)  530.4' (See Other Side) 	**620.1 Ft.**	**Downview-Top of louvers**
	627.6 Ft.	**Downview-Top of dropped patch, side smashed in, more well below**
		End of survey
587.7' (See Other Side)  606' (See Other Side) 		
620.1' (See Other Side)  627.6' (See Other Side) 		

Notes: **Original casing 16'' Drilled 1920**

WELLBORE SNAPSHOT(S)

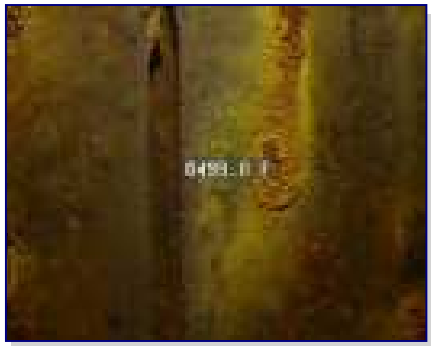
Depth: 419 Feet

Depth: 435.7 Feet

Depth: 447.8 Feet

Depth: 497.6 Feet

Depth: 499 Feet



Depth: 530.4 Feet

Depth: 587.7 Feet

Depth: 606 Feet

Depth: 620.1 Feet

Depth: 627.6 Feet

welenco
VIDEO SURVEY REPORT

Fax (805) 834-2550 • (800) 445-9914 • (805) 834-8100

Customer ROTTMAN DRILLING
Address NORTH DIVISION
City LANCASTER State CA Zip
Request By JORN Cust. P.O.
Copy To
Reason for Survey GENERAL INSPECTION

Job No. 26972 Run No. ONE
Well No. 11 A Date 3-1-1999
Location AVE P 2 & 15TH ST EAST
Zero Datum TOP OF CASING
Survey By D JACKSON Truck No. T-05

DEPTH	REMARKS
0'	TOP OF CASING DOWN VIEW
507'	TOP OF LOUVERS
519'	FALLING WATER
548'	STATIC WATER LEVEL
634'	DEBRIS IN WELL
754	DEBRIS
887'	BOTTOM OF WELL, FILL

NOTE:

CASING CONDITION:

ID at Surface 16" Reduces to N/A at : at : at

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☐ Heavy ☐ Increases with Depth

GDI WATER WELL VIDEO INSPECTION

GROUNDWATER DATA, INC.
23945 Old Wagon Road
Escondido, CA. 92027

(760) 751-1560 Fax # 751-1460

TO: **Rottman Drilling**
46471 N. Division St.
Lancaster, CA. 93535

April 09, 1999

GDI Log #99-04003

SITE: PALMDALE WATER DISTRICT - Well No. 11A / 15th St. East & Avenue P

*** Survey of well bore after chemical cleaning procedures**

Note: This survey is with a 3" DUAL LENS - COLOR CAMERA providing a side view as well as a down-hole view. The camera will descend down the bore hole with an expanded 15" centering guide on it. The survey starts inside the steel casing viewing the top edge of the 16 " casing with the side view camera. The footage is recorded on the VHS tape, in feet and tenths and is based on the center line view of the side scan camera (ss). The down-hole (dh) camera lens is 12" lower and the end of the light bar is 20" below that. The camera light intensity and focus maybe adjusted during the survey. There is music background.

Depth: **GENERAL DESCRIPTION of the WELL**

0.0 - ss Inside the 16" steel casing viewing the well head
11.1 - ss Horizontal weld between two blank sections of casing
22.0 - dh Going past horizontal weld
- dh Horizontal welds noted at the following footage and they all appear intact:

34.0	58.0	70.0	82.5	94.0	106.9	119.0	131.0
143.0	155.0	167.0	179.0	191.0	203.0	215.0	228.0
240.0	252.0	264.0 (*)	288.0	300.0	312.0	324.0	337.0
349.0	361.0	374.6 (ss)	397.0	421.0			

(*) 268.0 - dh Camera lens becomes foggy due to temperature changes done hole but will clear

507.0 - dh Louvered casing coming into view
509.3 - ss **START of LOUVERS** in the casing; dry with no seepage or cascading water
520.8 - ss Start of cascading water from the louvers
539.7 - ss **STATIC WATER LEVEL** - Water is slightly cloudy due to very fine material that is still in suspension after cleaning
546.0 - ss Louvers appear open with fine debris resting of each of the louver edges
566.5 - ss Same appearance with marks from cleaning tools on the casing
576.0 - ss Same
- dh Visibility with down-hole camera appears very cloudy. The camera light intensity was not changed during the survey hoping to see if we could identify if there was any clearing or flow going through the well.
596.2 - ss Visibility is cloudy. Louver outlines can be seen with debris of the louver edges.
- ss Side-scan and check louvers approximately every 10 feet going on down the bore hole
656.2 - ss Slightly larger particles of debris are in suspension

686.9 - ss Visibility is still cloudy and louvers appear the same. Tried adjusting side light intensity for better visibility but to no avail.
726.3 - ss Blank area of casing
727.5 - ss Start of louvers again
737.4 - ss Louver outline can be seen with debris resting on edge of the louvers
757.4 - ss Same. Vertical area between louvers appears slightly shiny; possibly from cleaning tools.
- ss Continue to survey with side-scan approximately every 10 feet
847.1 - ss LOUVERS appear open with tooling marks on casing down to 878.5
882.6 - dh Visibility is reducing
886.6 - dh Visibility is zero due to the the camera light descending down into the fine debris that has settled near the bottom of the bore hole
< 900.0 - Approximate depth of bore hole per verbal data on site >

We appreciate the opportunity to serve your water well needs and should you have any questions, please feel free to call upon us at (760) 751-1560.

welenco

VIDEO SURVEY REPORT

FAX (661) 834-2550 • (800) 445-9914 • (661) 834-8100

Customer Rottman Drilling
Address
City State Zip
Request By Cust. P.O.
Copy To
Reason for Survey

Job No. Run No.
Well No. 11A Date 8-23
Location Palmdale Water
W/S 15th St. E., 1/4 m
Ave. P Behind Terry
Zero Datum Top of casing
Survey By B. Newman Truck No.

DEPTH	REMARKS
506	Horizontal louvers
519	Falling water
560	Water level
874	Total Depth

NOTE:

CASING CONDITION:

ID at Surface 16" Reduces to _____ at _____ : _____ at _____ : _____ at _____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☐ Heavy ☐ Increases with Depth

welenco

VIDEO SURVEY REPORT

FAX (661) 834-2550 • (800) 445-9914 • (661) 834-8100

Customer Rottman Drilling
Address
City State Zip
Request By Cust. P.O.
Copy To
Reason for Survey

Job No. Run No. Three
Well No. 11A Date 9-20-99
Location W/s 15th St. E., 1/4 So. of Ave. P
Zero Datum Top of casing - sidescan lens
Survey By B. Newman Truck No. 105

DEPTH	REMARKS
506	Top of louvers
519	Falling water
550	Water level
877	Total Depth

NOTE:

CASING CONDITION:

ID at Surface 16" Reduces to ____ at ____ : ____ at ____ : ____ at ____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☐ Heavy ☐ Increases with Depth

Layne Christensen Co.

1717 W Park Ave.
Redlands, CA. 92373
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

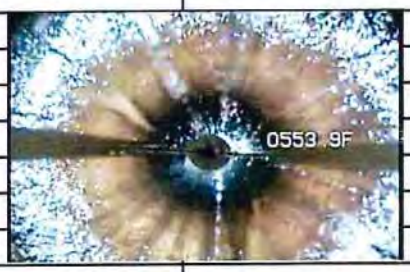
CLIENT:	Palmdale Water District		
ADDRESS:	BF		
CONTACT:	Kelly Jeters	**PHONE:**	661-456-1083
JOB LOCATION:	1003 East Avenue P, Palmdale, CA		
GPS LOCATION:	Latitude: N 34° 36.136'		Longitude: W 118° 06.658'

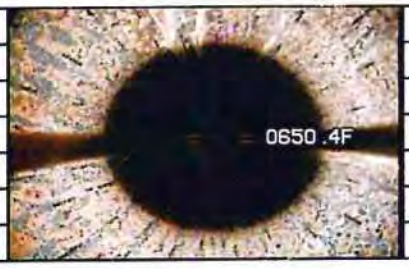
WELL NUMBER:	15	**General inspection**	**JOB NUMBER:** 38421
SURVEYED BY:	Joe Rocha		**DATE:** 24-Nov-15
REVIEWED BY:			**WATER LEVEL:** 564.9'
WATER CONDITION:	Clear		**TOTAL DEPTH:** Unknown
CASING DIAMETER:	16.00" ID		**SURVEY DEPTH:** 772.9'

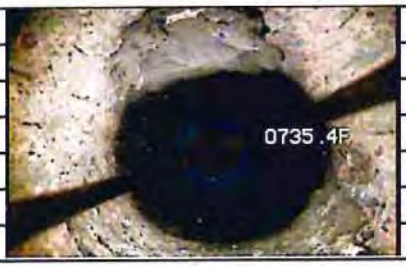
*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 564'	Casing appears to have mild to moderate scale
	and growth.
564 - 736'	Casing appears to have moderate scale and growth.
736 - 772'	Casing appears to have heavy scale, growth and
	nodules.
772.9'	Camera comes to rest on top of fill.
535 - 564'	Water jetting in through perforations.

Perforations:	
Mills Slot	320 - 772'







Layne Christensen Co.
Redlands, CA. 92373
Phone: (909) 390-2833
CA Lic.#: 510011

Well Inspection Report

CLIENT:	Palmdale Water District		
ADDRESS:	BF		
CONTACT:	Kelly Jeters	**PHONE:**	661-456-1083
JOB LOCATION:	1003 East Avenue P, Palmdale, CA		
GPS LOCATION:	Latitude: N 34° 36.136'		Longitude: W 118° 06.658'

WELL NUMBER:	15 Post brush	**JOB NUMBER:**	38421
SURVEYED BY:	Joe Rocha	**DATE:**	14-Jan-16
REVIEWED BY:		**WATER LEVEL:**	570.9'
WATER CONDITION:	Clear / Cloudy	**TOTAL DEPTH:**	Unknown
CASING DIAMETER:	16.00" ID	**SURVEY DEPTH:**	774.8'

*All Depths Shown are relative to the center of the side camera perspective.

DEPTH	REMARKS
0 - 774'	Casing appears to have mild to moderate scale
	and growth.
774.8'	Camera comes to rest on top of fill.
536 - 570'	Water jetting in through perforations.

Perforations:	
Mills Slot	320 - 772'

McCalla Bros. Video Log Sheet

Layne-Western Company, Inc.
13855 Central Ave. Chino Ca. 91710, (714) 627-1521

CLIENT : City of Palmdale
ADDRESS : ---
PHONE # : Mack & Dennis 1-805-947-4111

LOCATION : East of 40th North side of S4 ave.

WELL # : 16 JOB # : 56-6686

INSPECTED BY : Chris Bonadurer DATE : 5-21-91

STATIC WATER LEVEL : 202 TOTAL DEPTH : ?

WATER CONDITION : Good to cloudy to O.K.

CASING DIAMETER : 14 inch

TYPE OF PERFORATIONS : VERTICAL SAW CUT

LOCATION OF PERFORATIONS : 237 feet to ?

NOTES : Water got cloudy from 350 feet to 500 feet. 526 feet to ?, pump or "pipe on pump" could not get past it.

-

-

welenco

VIDEO SURVEY REPORT

FAX (661) 834-2550 • (800) 445-9914 • (661) 834-8100

Customer ROTTMAN DRILLING
Address
City State Zip
Request By JOHN Cust. P.O.
Copy To
Reason for Survey GENERAL INSPECTION

Job No. 33628 Run No. ONE
Well No. PALMDALE #26 Date 11-17-2000
Location 4701 KATRINA PLACE
PALMDALE CA.
Zero Datum
Survey By RUSS HOWLETT Truck No. T-05

DEPTH	REMARKS
0 *	TOP OF CASING, START RECORDING
150'	~~S.W.L.~~ SCREEN AND FALLING WATER
169'	S.W.L., VISIBILITY GOOD
185'	SCAN SIDES
190' *	SIDEVIEW SCREEN
200'	SCAN SIDES
215'	SCAN SIDES
252'	JOINT
272'	END SCREEN
313'	START 2ND SCREEN SECTION
325'	SCAN SIDES
351'	AIR LINES
360'	SCAN SIDES
395'	SCAN SIDES
440'	SCAN SIDES
471'	PLUS 2' FT. FILL AT BOTTOM OF WELL 473'
445'	END RECORDING ON PULLOUT

NOTE: ADD 2' FT. FOR DOWNVIEWS
* STILL SHOT TAKEN

CASING CONDITION:

ID at Surface 16" Reduces to ____ at ____ : ____ at ____ : ____ at ____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☒ Moderate ☐ Heavy ☒ Increases with Depth

welenco

VIDEO SURVEY REPORT

FAX (661) 834-2550 • (800) 445-9914 • (661) 834-8100

Customer ROTTMAN DRILLING
Address
City State Zip
Request By JORN Cust. P.O.
Copy To
Reason for Survey AFTER CLEANING

Job No. 33691 Run No. 2
Well No. PALMDALE #26 Date 11-29-06
Location 4701 KATRINA PL.
PALMDALE CA
Zero Datum TOC
Survey By L. Hawk Truck No. TV-3

DEPTH	REMARKS
0'	T.O.C.
152	TOP OF SCREEN WATER FALLING
161	SWG
180	SIDE VIEW
231	SIDE VIEW
255	SIDE VIEW
313	SIDE VIEW
328	SIDE VIEW
354'	SIDE VIEW
364	NO VISIBILITY
383	BLACK DISSIMILAR CNU VISIBILITY
412	SIDE VIEW
440	SIDE VIEW
475'	F.L.G. END OF SURVEY

NOTE:

CASING CONDITION:

ID at Surface 16" Reduces to _____ at _____ : _____ at _____ : _____ at _____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☑ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☑ Heavy ☐ Increases with Depth

Vid-Pac

Wellbore Video Report

welenco

Company ROTTMAN DRILLING
Address
City State Zip
Requested by JORN
Copy to
Reason for Survey GENERAL INSPECTION
Operator RUSS H.

Job Ticket 33673 Run No. THREE
Well No. PALMDALE 26
Date of Survey 12-4-2000
P.O.
Camera LAVAL SIDESCAN
Zero Datum SIDESCAN TOP OF CASING
Vehicle No. T-05

Location 4701 KATRINA PLACE, PALMDALE CA.
Casing I.D. at Surface I.D. Reference Build-Up

SELECTED SNAPSHOT IMAGES	DEPTHS	WELLBORE INFORMATION
	0	TOP OF CASING, START RECORDING
	153'	S.W.L. VISIBILITY HAZY
	230'	SIDE VIEW SCREEN, GRAVEL VISIBLE
	250'-260'	SCAN SIDES
	313'	SIDE VIEW SCREEN
	350'	SCAN SIDES VISIBILITY POOR
	370'	SCAN SIDES
	412'	SCAN SIDES
	468'	NEAR BOTTOM, LOSE VISIBILITY SIDE SCAN
	430'	END SURVEY ON PULL OUT

Notes: ADD 2' F.T. FOR DOWN VIEWS
CUSTOMER REQUEST BOTH COPIES

welenco, inc.
5201 Woodmere Dr.
Bakersfield, CA 93313
www.welenco.com
e-mail: welenco@welenco.com
Phone: 1-(800) 445-9914
Fax: 1-(661) 834-2550

WATER WELL VIDEO REPORT

26

Palmdale Water Dist.

Water Well Redevelopers

2881 Blue Star St. Anaheim, CA. 92806

Phone: 7146327003 Fax: 7146327306 Web: sonar7003@sbcglobal.net

Client: **Roadrunner Pump Services** Survey Date: **June 14, 2016**

Address: **12130 Pearblossom Hwy.**

City: **Pearblossom, CA 93553** Operator: **John Mac Donald**

Requested By: **Archie**

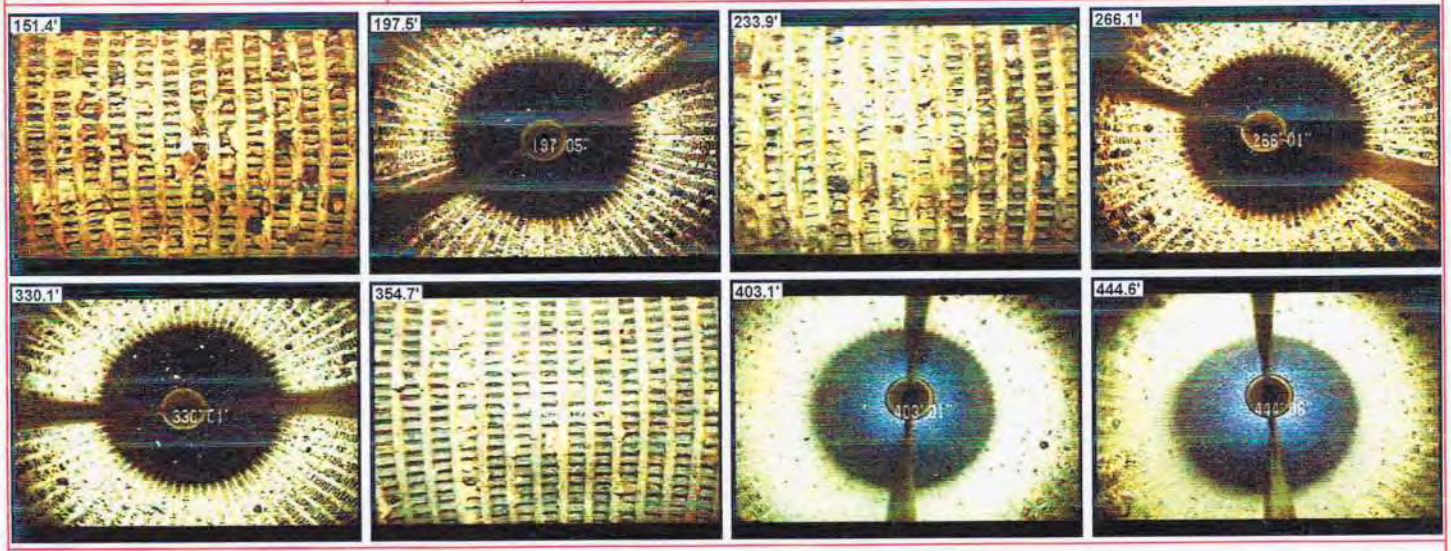
Copy To: **Archie** T.W.D.: **461 Ft.** Zero **Ground Level**

Reason For Survey: **Verify condition of casing** S.W.L.: **142 Ft.** P.W.L.: T.P.S.:

Location: **4701 Katrina Pl. Palmdale CA**

Other Information:

CASING INFORMATION		DEPTHS	VIDEO OBSERVATIONS
screen	**T.W.D.**	151.4 Ft.	Slightly restricted screen.
150-267 Ft.	461 Ft.	197.5 Ft.	Restricted screen.
308-461 Ft.		233.9 Ft.	Restricted to plugged screen.
	S.W.L	266.1 Ft.	Restricted screen.
	142 Ft.	330.1 Ft.	Restricted screen.
		354.7 Ft.	Restricted screen.
		403.1 Ft.	Plugged screen.
		444.6 Ft.	Plugged screen.
			A moderate ferrous oxide deposit can be seen from 0' to 142' (Static).
	16" Casing		A light crusty mineral deposit exhibiting small sporadic tubercular nodules is visible from 142' (Static) to 461' (Bottom).
Zero Datum	0-461 Ft.		
Ground Level			Majority if screen appears restricted to plugged with some open.
Casing Buildup			Other than above casing, joints and screen all appear in normal condition.
Light			



welenco
VIDEO SURVEY REPORT

Fax (805) 834-2550 • (800) 445-9914 • (805) 834-8100

Customer BAKERSFIELD WELL & PUMP
Address
City State Zip
Request By JOE LOPEZ Cust. P.O.
Copy To
Reason for Survey GENERAL INSPECTION

Job No. 28703 Run No. ONE
Well No. 33 (PALMDALE WATER DIST) Date 10-13-97
Location ½ MILE S.W. OF PALMDALE BL. & 75TH AVE
Zero Datum TOP OF CASING 22" AGL
Survey By C CORBELL Truck No. TOS

DEPTH	REMARKS
OFT	REC STARTS SIDESCAN ZEROED @ TOP OF CASING 2FT AGL
172	STATIC WATER LEVEL
222	TOP OF FIRST SCREEN INTERVAL
241	BOTTOM OF SCREEN
282	TOP OF 2ND SCREEN INTERVAL
448	SIDEVIEW OF SCREEN (PLUGGED)
460	SOFT FILL / BOTTOM OF SURVEY

NOTE:

CASING CONDITION:

ID at Surface 16 Reduces to _____ at _____ : _____ at _____ : _____ at _____

Diameter Reference: ☐ Caliper Survey ☐ Estimate from TV/Photo Survey ☐ Well Records

Corrosion/Incrustation Build-up ☐ Light ☐ Moderate ☐ Heavy ☐ Increases with Depth

APPENDIX D

Video Survey Review Notes

KYLE Groundwater

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 2A (also referred to as "2")

Survey Date: June 22, 2010 **Reference Point:** TOC

Survey Company: Pacific Surveys, LLC **Static Water Level:** 567.90 ft brp

Review Date: April 18, 2020 **Screen Interval(s):** 450-462; 480-900

Reviewer: RJK **Survey Depth:** 852.60 ft brp (fill)

Depth From	Depth To	Observations
0	450	Minor spalling. Increasing slightly below 350 feet.
	450	TOS. Louvers appear open on downview - difficult to see on side scan.
	567.9	SWL - no oil visible. Mineral encrustation below WL (light color). Small bubbles seen
		exiting louvers (sign of aquifer dewatering).
	581	Casing patch (581-586). Signs of recent brushing? - knocked off nodules? Louvers partially
		clogged - appear severely clogged on side scan view.
	680	Increasing encrustation. Evidence of biofouling? Fluffy gray material on top of encrusting
		material.
	730	Louvers almost completely obscured.
	750	Moderate to severe encrustation.
	763	Side scan showing severe cloffing/encrustation.
	775	Visibility decreasing.
	779	Section of air line stuck on screen.
	790	Visibility poor.
	800	No visibility on down view.
	850	No visibility on down view or side scan.
	852.6	Light bar enters fill (down view).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 3A (also referred to as "3")

Survey Date: August 25, 2004 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 586.5 ft brp

Review Date: April 19, 2020 **Screen Interval(s):** 450-462; 480-900

Reviewer: RJK **Survey Depth:** 807 ft brp (fill)

Depth From	Depth To	Observations
0	5	Moderate corrosion and spalling.
	97	Minor spalling.
	150	Spalling increasing.
	350	Minor spalling - increasing.
	390	Spalling on side scan.
	~398.5	TOS 1 - Spalling in screen. Louvers appear open.
	~540	BOS 1
	~581	TOS 1 - Louvers open.
	~586.5	SWL
	591	Bubbles observed exiting screen/ dewatering.
	600	Louvers appear open. (enlarged?)
	650	Louvers appear open. (enlarged?)
	705	Top of patch. (Corrosion observed on patch).
	710	Welded patch sections.
	715	Bottom of patch.
	735	Some evidence of biological activity.
	745	Louvers partially clogged.
790	806	Heavily clogged louvers. (encrustation/biogrowth)
	~807	Light bar enters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 4A (Post Cleaning)

Survey Date: May 24, 2001 (Post Cleaning) **Reference Point:** TOC

Survey Company: Welenco **Static Water Level:** 540 ft brp

Review Date: April 19, 2020 **Screen Interval(s):** 481-? (DWR log: 480-830)

Reviewer: RJK **Survey Depth:** 791 ft brp (fill)

Depth From	Depth To	Observations
	4	Access entry port (tube).
23	50	Minor spalling.
50	100	Minor spalling/ corrosion.
100	200	Less spalling/ corrosion.
	216	Small holes in blank casing.
216	480	Minor corrosion.
	481	TOS 1- louvers clean and open. (12 rows/ more louvers) FUL FLO.
	491	Water entering through louvers (one side of casing), flow increases with depth.
	511	Louver pattern changes. (10 rows/ less louvers) STANDARD FLO.
	520	Lot of cascading water, increasing with depth.
	540	SWL
	550	Louvers appear open & clean.
	600	Louvers appear open & clean.
	650	Louvers less clean but open.
	691	Louver pattern changes back to 12 rows, FUL FLO.
	700	Louvers clean & open.
	720	Louvers switch back to STANDARD FLO.
	750	Louvers clean & open.
	781	Louvers switch back to FLU FLO.
	791	Light bar enters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 6A

Survey Date: May 15, 2018 **Reference Point:** TOC (~1 ft ags)

Survey Company: Well Rehabilitation Services, Inc. **Static Water Level:** 535 ft brp

Review Date: April 20, 2020 **Screen Interval(s):** 480-? (DWR log: 480-1010)

Reviewer: RJK **Survey Depth:** 993 ft brp (fill)

Depth From	Depth To	Observations
	2	Access tube opening.
2	100	Minor to moderate spalling/ large sheets.
100	200	Minor to moderate spalling.
200	250	Moderate spalling/corrosion.
250	350	Moderate spalling/corrosion.
350	450	Moderate to severe spalling/corrosion.
	482	TOS
	535	SWL - louvers appear open- mild encrustation.
	550	Mild encrustation/ nodules / floating material.
	600	Evidence of increased biofouling - louvers obscured.
	650	Louvers still covered with bacterial growth. (Yellow patches/slime)
	730	Biogrowth increasing.
730	800	Moderate to severe biogrowth/ slime - louvers obscured.
800	900	Moderate to severe biogrowth/ slime - louvers obscured.
	980	Visibility decreasing.
	989	Heavy buildup on well screen.
	993	Light bar enters fill. (995 ft bgs)

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 7A

Survey Date: May 4, 2020 **Reference Point:** TOC

Survey Company: Unknown **Static Water Level:** 527.5 ft brp / some oil

Review Date: May 14, 2020 **Screen Interval(s):** 573.8-824 (fill) (DWR log: 570-900)

Reviewer: RJK **Survey Depth:** 824 ft brp (fill)

Depth From	Depth To	Observations
	2.8	Access tube opening.
0	50	Casing clean/ general corrosion & pitting.
	100	Casing clean/ general corrosion & pitting.
	150	Casing clean/ general corrosion & pitting.
	260	Minor spalling increasing with depth.
	400	Minor spalling increasing with depth.
	500	General corrosion/ minor spalling.
	527.5	SWL - some oil (<1 in.?), visibility poor
	542.2	Top of patch, folded over in places.
	546.3	Bottom of patch.
	547.4	Top of patch, folded over in places.
	552..4	Bottom of patch. Corrosion byproducts coming from bottom lip of patch.
	555	Knocked off nodules (side scan)/ down view visibility very poor.
	570.9	General corrosion/ pitting.
	573.8	Top of wire-wrap screen. Visible flow. Screen appears in poor condition, partially clogged.
		Corrosion of some rods.
	575	Heavily clogged/ bacterial growth.
	592.8	Some small amount of gravel visible in wire-wrap.
	610	Screen partially clogged/ fair condition.
	626.7	Structural abnormality, screen split open/hole.
	629	Large hole in screen (pushed outward/ separated wires/ bent rods). Broken wires.
	629.5	Large gaping hole/ rocks and cobbles behind.
	630.9	Bottom of rupture.
	632	Screen appears open.
	652	Corroded rods/ possible structural issues (small).
	670	~ 50 % clogged; bacterial growth.
	687	Corroded rods.
	694	Screen open/ minor growth/ corrosion.
	705.2	Clogged screen/ bacterial growth/ corroded rods.
	711/712	Fully clogged with bacterial growth.
	725	Heavy growth/ nodules present.
	736	Very heavy growth.
	780	Large growth mass. Visibility improving ~800 ft.
	820	Screen completely obscured.
	823.7	Camera stops in fill (side scan).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 7A (Post Rehab)

Survey Date: July 18, 2009 **Reference Point:** TOC

Survey Company: Pacific Surveys, LLC **Static Water Level:** 534.9 ft brp

Review Date: April 21, 2020 **Screen Interval(s):** 573.4-831.7 (fill) (DWR log: 570-900)

Reviewer: RJK **Survey Depth:** 831.7 ft brp (fill)

Depth From	Depth To	Observations
	~2.5	Access tube opening.
0	50	Blank casing clean/ good condition.
50	200	Blank casing clean/ good condition.
	~240	Minor spalling apparent/ increasing with depth.
240	350	Minor to medium spalling.
350	450	Minor spalling/ good condition.
	534.9	SWL/ no oil. Visibility moderate.
	542	Top of patch 1
	545.9	Bottom of patch 1
	547	Top of patch 2
	552	Bottom of patch 2
	573.4	Top of wire-wrap screen/ water clears/ evidence of bacterial growth obscuring screen/ open
		Regrowth following rehab.
	630	Water column visibility reduced/ cloudy.
	650	Visibility reduced side scan only.
	668	Continued biological growth/ column clears/ nodules apparent on rods and welds.
		Screen obscured but mostly open.
	~760	Patches/ mats of bacterial growth.
	790	Column becoming cloudy/ moderate to heavy bacterial growth.
	818	Heavily clogged/ obscured screen.
	825	Visibility poor, no longer can see the screen.
	829	Visibility zero on side screen.
	831.7	Camera encounters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 8A (Post Rehab)

Survey Date: February 22, 2017 **Reference Point:** TOC

Survey Company: Pacific Surveys, LLC **Static Water Level:** 545.5 ft brp

Review Date: April 23, 2020 **Screen Interval(s):** 562.9-742.7; 823.7-883.4; Screen 3 in fill

Reviewer: RJK **Survey Depth:** 895.7 ft brp

Depth From	Depth To	Observations
	~2	Access tube entry port
	50	Minor corrosion/ no spalling/ good condition
	100	Some minor spalling.
	200	No spalling/ good condition.
	250	Gray material on casing.
	350	Casing clean.
	450	Casing clean/ good condition.
	530	Minor spalling above water surface.
	545.5	SWL - no oil/ visibility fair.
	561.5	Transition from mild steel to stainless steel.
	562.9	TOS 1- wire-wrap open/ excellent condition/ gravel visible. Good visibility
	650	Screen in excellent condition/ clean.
	742.7	BOS 1- mild steel blank between screen intervals. Evidence of nodule growth that has been
		cleaned.
	823.7	TOS 2- bacterial growth/ corrosion byproducts bleeding down from mild steel
		intermediate blank.
	850	Screen Open/ excellent condition.
	861	Minor growth on screen from mild steel.
	883.4	BOS 2 - growth on screen from mild steel.
	892.4	Light bar enters fill (down view)
	893.2	Camera hits refusal (side scan) - 895.7 (down view) (calculated)

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 10

Survey Date: September 8, 2017 **Reference Point:** TOC

Survey Company: Well Rehabilitation Services, Inc. **Static Water Level:** 439.2 ft brp

Review Date: April 23, 2020 **Screen Interval(s):** 497-606; 620.6-628.2 (fill) (1987 liner)

Reviewer: RJK **Survey Depth:** 628.2 ft brp (fill)

Depth From	Depth To	Observations
	18.5	Structural issue (?) - crack in casing (?)
	23	Notch in casing (?) - mill slot (?)
	50	Casing in good condition aside from previous.
65	100	Minor spalling.
	144.3	Structural issue with casing or spalling (?)
144	200	Minor spalling.
250	300	Spalling and corrosion increases.
	308.8	Top of patch 1 (side scan) - corrugation not fully pressed.
	312 ?	Weld between patch sections (down view).
	316.9	Top of patch 2 - split at top, void visible behind corrugation visible - not fully pressed.
	319.2	Split on side scan.
	322.8	Weld between patch sections (down view).
	326.8	Ragged bottom of patch (down view).
	328.9	Bottom of patch 2 (side scan) - lip bent upward.
	334.4	Large hole/ rupture - casing is paper thin (down view).
	337.3	Large hole/ rupture - casing is paper thin (side scan).
334	~346	Several large holes/ ruptures/ deterioration. Casing is paper thin (down view).
	350	Heavy spalling
	439.2	SWL - poor visibility.
	464	Visibility clearing/ moderate to poor.
	497	Top of mill slots/ visibility clear/ open. Minor buildup on casing.
	~606	Bottom of mill slots/ buildup increasing.
	620.6	Top of louvers (down view).
	628.2	Light bar enters fill (down view).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 11A (Lined)

Survey Date: March 14, 2012 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 552 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 665-860.9 ft brp (fill)

Reviewer: RJK **Survey Depth:** 860.9 ft brp (fill)

Depth From	Depth To	Observations
0	50	Casing clean/ good condition.
50	150	Casing clean/ good condition.
150	250	Casing clean/ good condition.
250	350	Casing clean/ good condition.
350	450	Casing clean/ good condition.
450	550	Casing clean/ good condition.
	552	SWL - no oil, visibility poor, cloudy.
	575	Minor biogrowth on casing liner. Poor visibility.
	600	Minor biogrowth on casing liner. Poor visibility.
600	650	Minor biogrowth on casing liner. Poor visibility.
	665	TOS. Horizontal louvers. Minor buildup on louvers/ sediment/ biogrowth. Louvers
		appear open. Visibility clear.
665	750	Minor buildup on louvers/ sediment/ biogrowth. Louvers appear open. Visibility clear.
750	800	Minor buildup on louvers/ sediment/ biogrowth. Louvers appear open. Visibility clear.
	827	Evidence of filamentous bacteria. Visibility decreasing.
	860.9	Light bar enters fill (down view) - Still in louvers.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 14A

Survey Date: May 20, 2014 **Reference Point:** TOC

Survey Company: Pacific Surveys, LLC **Static Water Level:** 575.8 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 452.6-808.9 ft brp (fill)

Reviewer: RJK **Survey Depth:** 808.9 ft brp (fill)

Depth From	Depth To	Observations
0	50	Casing clean/ good condition.
50	100	Minor to moderate spalling evident.
100	150	Moderate spalling.
	210	Large sheets separating from casing.
210	350	Moderate spalling.
	399	Severe casing deterioration/ sheeting/ spalling.
	420	Severe casing deterioration/ sheeting/ spalling.
	449	Possible hole(s) (?)
	452.6	TOS. Louvers severely obscured/ mineral scale (?)
	500	Louvers appear more open.
	575.8	SWL - no oil - visibility good. Louvers show bacterial growth/ nodules but mostly open.
	636.7	Moderate to severe bacterial growth covering louvers. Partially open.
	715	Camera not centered/ Well may have alignment issues.
	808.9	Light bar enters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 15

Survey Date: December 12, 2016 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 558.7 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 320.4-? ft brp (fill)

Reviewer: RJK **Survey Depth:** 808.9 ft brp (fill)

Depth From	Depth To	Observations
	34	Minor spalling/corrosion.
89	94	Evidence of sheeting/spalling.
94	200	Minor spalling/corrosion.
	238	Moderate spalling/sheeting.
	320.4	TOS - Mill slots - vertical. (DWR reports 420 ft). Slots appear mostly open.
	400	Minor buildup. Slots difficult to see.
	450	Minor buildup. Slots difficult to see.
	500	Minor buildup. Slots difficult to see.
	551.5	Cascading water entering mill slots. Becomes abundant below this.
	558.7	SWL - no oil. Visibility good. Slots 60-80% plugged.
	570	Evidence of bacterial growth.
	588	Slots obscured by growth.
	601	Corrosion evident under brushed off nodules.
	625.5	Slots approx. 80% plugged.
	651	White starburst around open parts of slots (jetting?)
	655	Some slot openings visible again.
	699.6	Mill slots >50% open.
	736.8	Slots 80-90% clogged.
	741.8	Slots 50-60% open.
	751.8	White deposits around slots.
	761.3	Visibility becomes poor.
	762	Light enters fill (down view).
	763.6	Refusal (side scan).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 16

Survey Date: March 31, 2008 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 179.4 ft brp

Review Date: April 25, 2020 **Screen Interval(s):** 236.3-536.8 ft brp (fill)

Reviewer: RJK **Survey Depth:** 536.8 ft brp (fill)

Depth From	Depth To	Observations
	1.5	Access tube opening (x2).
0	50	Minor corrosion, spalling, sheets.
50	100	Minor corrosion, spalling, sheets/ with some dark concretions.
	160	Increased corrosion - iron oxide color.
	179.4	SWL - no oil - visibility poor/ cloudy.
	201	Moderate corrosion/ small hole visible.
	219	Visibility improving slightly.
	235	TOS - mill slotted. (down view)
	236.3	TOS - mill slotted (side scan)
	237	Slots appear approximately 30% open.
	260	Slots more heavily clogged (10-20% open)
	284	Slots more defined but still heavily clogged.
	289	Heavy corrosion/ iron oxide.
	307	Slots almost completely clogged/ bacterial growth?
	350	Heavy corrosion/ iron oxide/ bacterial growth. Slots almost 100% clogged/ obscured.
	400	Slots almost 100% clogged/ obscured.
	420	Buildup increasing (corrosion byproducts?). Slots not visible.
	450	Slots not visible.
	472	Sidescan showing severe corrosion/ iron oxide deposits. Likely holes here - difficult to see.
	480	Isolated slots become visible again.
	500	Heavy corrosion/ slots obscured.
	518.25	Visible slot on side scan.
	520.1	Spiral weld appears separated from corrosion.
	522	Spiral weld appears separated from corrosion.
	525	Increased buildup of material on casing.
	536.8	Depth of soft fill material per side scan (camera enters fill).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 18

Survey Date: December 8, 2016 **Reference Point:** TOC ?

Survey Company: Water Well Redevelopers **Static Water Level:** 48.6 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** ~20-92.75 ft brp (fill) (DWR log: 20-108)

Reviewer: RJK **Survey Depth:** 92.75 ft brp (fill)

Depth From	Depth To	Observations
0	SWL	Ground to SWL - poor resolution - appears to be heavy corrosion.
	20.25	Possible TOS (down view). Mill slots.
	~48	SWL (down view)
	53	Mill slots appear large, gravel visible in slots. Moderate corrosion/ iron oxide deposits.
	58	Growth on casing and slots.
	60	Severe corrosion - nodules knocked off showing corrosion.
	61.8	Moderate sized holes in casing.
	61.9	Ragged appearance to slots/ gravel can be seen.
	65.6	Large hole/rupture. Severe corrosion.
	76.6	Holes.
	80.25	Large hole/rupture.
	85.7	Massive rupture/ hole - borehole wall evident.
	88	Casing almost completely corroded/ disintegrated.
	92.75	Light bar enters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 19

Survey Date: December 10, 2009 **Reference Point:** TOC ?

Survey Company: Layne Christensen Company **Static Water Level:** 40.8 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 82-316 ft brp (fill) (DWR log: 80-350)

Reviewer: RJK **Survey Depth:** 316 ft brp (fill)

Depth From	Depth To	Observations
	1.9	Entry ports for access tubes (x2)
0	40	General corrosion/ no spalling. Casing in fair condition.
	40.8	SWL - no oil - visibility poor.
	51	Visibility clears. Some bacterial colonies/ nodules/ iron oxide.
	82	TOS - mill slots - mostly open.
	100	Bacterial growth increases/ iron oxide/ slots 80% clogged.
	125	Visibility decreases/cloudy.
	150	General buildup/ slots not visibility.
	200	No slots visible.
	216	Some isolated slots visible.
	226.5	Slots/bare metal visible. Bacterial colonies.
	245	Visibility clearing. Some slots visible/ moderate buildup.
	278	Visibility clearing. Some slots visible/ moderate buildup.
	300	Moderate to heavy buildup on casing/ no slots visible.
	316	Fill (side scan) - light bar in soft fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 21 (lined)

Survey Date: April 4, 2013 **Reference Point:** TOC

Survey Company: Water Well Solutions **Static Water Level:** 161.1 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 216.4-325.1 ft brp (fill)

Reviewer: RJK **Survey Depth:** 325.1 ft brp (fill)

Depth From	Depth To	Observations
	~2	Entry port for access tubing.
0	20	Visibility poor/ looks to be general corrosion (minor to moderate).
20	30	Severity of corrosion increases.
30	40	Severity of corrosion increases.
40	60	Moderate to severe spalling/ corrosion.
60	80	Moderate to severe spalling/ corrosion.
80	94	Severe corrosion & spalling.
	98	Possible structural issues.
98	108	Severe corrosion.
108	150	Severe corrosion and spalling.
	161.1	SWL - no oil - visibility fair. Casing appears coated (mineral?/bacterial?)
	190	Nodule growth (minor)
	216.4	TOS - mill slots ~ 30-50% open. Heavy nodules.
	229.5	Slots heavily obscured - heavy buildup in general, nodules.
	266	Slots heavily obscured - heavy buildup in general, nodules.
	270	Slots become more visible.
	278	Nodule growth increasing.
	285.5	Slots ~ 50% clogged.
	288	Very heavy growth.
	300	Massive growth.
	320.5	Small hole in casing.
	324.6	Light bar enters fill (down view).
	325.1	Refusal (down view).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 22 (Post Rehab)

Survey Date: March 15, 2016 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 113.8 ft brp

Review Date: April 24, 2020 **Screen Interval(s):** 189.4-394.6 ft brp (fill)

Reviewer: RJK **Survey Depth:** 394.6 ft brp (fill)

Depth From	Depth To	Observations
	~2	Entry port for access tube.
0	50	Minor to moderate spalling/ general corrosion.
	100	Moderate spalling/ sheets/ general corrosion.
102	112	Severe spalling above waterline.
	113.8	SWL (substance floating on water) - visibility poor/ none.
SWL	179	No visibility - water clears at 179 ft.
	189.4	TOS - louvers - sediment resting on louver shelves/ evidence of biogrowth/ nodules/
		corrosion. Louvers mostly open.
	225	Sediment on louvers - still open.
	260	Some louvers obscured by sediment.
	270	Sediment on louvers.
	275	Visibility decreasing.
	300	Visibility very poor/ increase growth.
	325	Evidence of biological activity/ growth/ encrustation/ sediment on louvers.
	330	Zero visibility.
	385	Zero visibility.
	394.6	Fill (side scan).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 23A

Survey Date: April 25, 2012 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 551.9 ft brp

Review Date: May 14, 2020 **Screen Interval(s):** 600.3-740 ft brp (debris) (DWR log: 600-840)

Reviewer: RJK **Survey Depth:** 740 ft brp (debris)

Depth From	Depth To	Observations
	3	Entry port for access tube.
0	50	General corrosion and pitting of blank. No spalling. Good condition.
80	82	Growth on casing emanating from section joint. (rust?)
50	100	General corrosion and pitting.
~105	!107	Spalling/ sheeting.
	123	Light to moderate spalling.
	150	General corrosion and pitting/ good condition.
	200	General corrosion and pitting/ good condition.
	215	Spalling begins - moderate.
	250	Corrosion/ spalling increasing.
300	500	Moderate corrosion/ spalling.
	551.9	SWL - no oil.
	553	Iron oxide, pitting below WL/ visibility fair on down view.
	575	Evidence of nodules and buildup. Increasing with depth.
	600.3	TOS. Louvered openings mostly open, sediment on louvers.
	650	Louvers open/ minor nodule growth/ buildup.
	700	Louvers open/ minor nodule growth/ buildup. Dark buildup increasing.
	736	Souder cable in well.
	738	Cable/ sounder.
	740	Rats nest of cable and tape. Cannot pass. End video.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 25

Survey Date: November 13, 2003 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 128.2 ft brp

Review Date: May 21, 2020 **Screen Interval(s):** 165.7-345; 386-405; 436-579 ft brp (fill)

Reviewer: RJK **Survey Depth:** 579 ft brp (fill)

Depth From	Depth To	Observations
	~1.8	Entry port for access tube.
	50	General corrosion/ pitting.
	55	Offset casing joint.
	100	General corrosion/pitting, increasing somewhat with depth.
	124	Severe spalling near water surface (splash zone).
	128.2	SWL - no oil.
	129	Severe spalling and corrosion below WL.
	150	Severe corrosion. Minor nodule growth.
	165.7	Top of wire-wrap screen. Screen in poor condition but open.
	176	Biogrowth/ some clogging of screen (~20-30%).
	200	Corroded rods. Some clogging (10-20%)
	215	Biogrowth increasing.
	250	Moderate biogrowth/ clogging.
	291.83	Top of PVC tubing.
	~319	Metal bracket (?) - knocked loose by camera.
	330	Clogging/growth increasing.
	340	Screen is heavily clogged.
	345	BOS 1 - Bottom of screen 1
	~362	Bracket from before - knocked loose from camera.
	~375	Bracket - stays put.
	386	TOS 2 - heavy growth (30-40% clogged).
	405	BOS 2 - very heavy growth/ encrusting material.
	436	TOS 3 - heavy growth/ clogging.
	450	Heavy growth/ clogging.
	476	Moderate clogging/ sand settled on weld rings.
	490	Less buildup/ screen open.
	500	Screen open.
	515	Nodule growth.
	550	Biogrowth on screen/ mostly open.
	570	Moderate to heavy clogging.
	575	Cable also present alongside PVC (or airline?)
	579	Debris in fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 25

Survey Date: April 23, 2019 **Reference Point:** TOC

Survey Company: Well Rehabilitation Services **Static Water Level:** 118.6 ft brp

Review Date: December 2, 2020 **Screen Interval(s):** 165.7-345.5; 386.3-405.7; 436.4-525 ft brp (fill)

Reviewer: RJK **Survey Depth:** 525 ft brp (fill)

Depth From	Depth To	Observations
	~1.8	Entry port for access tube.
	50	General corrosion/ pitting.
	100	General corrosion/ pitting.
	118.6	SWL - no oil.
	140.7	Visibility poor / minor nodule growth observed.
	165.7	Top of wire-wrap screen. Screen in poor condition but open.
	166	Abundant sediment resting within screen wire / generally open.
	173.7	Biogrowth observed clogging screen / possible damage to rods.
183.1	184.3	Vertical tear in wire-wrap.
	200	Heavily clogged screen / biogrowth and sediment.
201	202	Vertical tear in wire-wrap.
	226	Hole in wire-wrap.
	226.8	Vertical tear and hole in wire-wrap.
	250	Moderate biogrowth / heavy clogging.
291	298	Severe vertical tear in wire-wrap.
	300	Ruptured wire-wrap.
300	321	Numerous vertical tears and holes in wire-wrap.
323.5	325	Large vertical tear in wrie-wrap / heavily clogged.
	345.5	Bottom of wire-wrap screen section.
	386.3	Top of wire-wrap screen / heavily clogged with biogrowth.
	405.7	Bottom of wire-wrap screen section.
	436.4	Top of wire-wrap screen / heavily clogged with biogrowth.
	450	Heavily clogged with sediement and isolated biogrowth.
496.8	501	Severe vertical tear in wire-wrap.
506	510	Severe vertical tear in wire-wrap.
	525	Top of fill material in well.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 26

Survey Date: August 11, 2005 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 105.5 ft brp

Review Date: May 22, 2020 **Screen Interval(s):** 151.3-270.5; 311.1-459.8 ft brp (fill)

Reviewer: RJK **Survey Depth:** 459.8 ft brp (fill)

Depth From	Depth To	Observations
0	50	Moderate to severe corrosion/ spalling.
	75	General level of corrosion increasing.
	100	General level of corrosion increasing.
	105.5	SWL - no oil. Grass on water surface/ severe corrosion below water.
	126	Side scan of corrosion.
	140	Evidence of knocked off nodules.
	151.3	TOS 1 - wire-wrap.
		Moderate to severe corrosion of screen/ partly clogged (30-50%).
	200	Moderate corrosion, mostly open - can see gravel.
	225	Moderate corrosion. 20-30% clogged.
	245	Corrosion increasing.
	270.5	BOS 1.
	284	Evidence of knocked off nodules/ pits.
	311.1	TOS 2.
325	326	Moderate general corrosion/ screen open/ bent rod ?
	351	Increased clogged (60%) - visibility decreasing.
	357	Visibility zero.
	363	Visibility excellent - almost no corrosion - change in WQ? Anoxic?
	398	Screen clean/ open - sediment resting on wire. Stainless steel?
	425	Screen clean/ open - sediment resting on wire. Stainless steel?
	450	Screen filled with sediment?
	459	Drilling mud on screen.
	459.75	Camera enters fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 29

Survey Date: October 10, 2018 **Reference Point:** TOC

Survey Company: Well Rehabilitation Services, Inc. **Static Water Level:** 125.9 ft brp

Review Date: May 22, 2020 **Screen Interval(s):** 192.3-367.3 ft brp (fill)

Reviewer: RJK **Survey Depth:** 367.3 ft brp (fill)

Depth From	Depth To	Observations
0	20	General corrosion mild.
	50	General corrosion mild.
	100	General corrosion mild.
	125.9	SWL - no oil. Visibility poor below WL.
	150	Visibility zero.
	169	Visibility clearing slightly.
	192.3	TOS - louvers appear clogged/ visibility clears in screen.
	192.3	Enlarged louver - gravel visible.
	195	Severely clogged - sediment/bacteria? on louvers
	200	Louvers completely clogged or obscured (95%)
	249.7	Louvers completely clogged or obscured (95%), bacterial?
	254.4	Top of patch.
	259.4	Bottom of patch.
	260.2	Louvers clogged w/ bacterial growth.
	277	Louvers clogged w/ bacterial growth.
	295	Louvers completely clogged/ bacterial growth.
	296.5	Enlarged louver - gravel visible.
	320	Louvers completely clogged/ bacterial growth/ scale??
	314.9	Louvers enlarged - gravel visible.
	343.3	Louvers clogged.
	345	Louvers appear partly open from top.
	362.6	Severely clogged louvers with moderate to severe bacterial growth.
	364	Severe bacterial growth.
	365.8	Light bar enters soft fill.
	366	Severe bacterial growth.
	367.3	Camera meets refusal (side scan).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 30 (Post Brush)

Survey Date: January 14, 2016 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 147.1 ft brp

Review Date: May 23, 2020 **Screen Interval(s):** 202-408.3 ft brp (fill)

Reviewer: RJK **Survey Depth:** 408.3 ft brp (fill)

Depth From	Depth To	Observations
0	50	Casing clean and good condition.
	147.1	SWL - debris on surface, no oil.
		Casing below WL clean, moderate pitting/ bacterial growth.
	188	Evidence of nodules knocked off.
	202	TOS. Louvers appear open. Evidence of past/ returning bacterial growth.
	225	Clean well screen - remnants of bacterial growth.
	250	Clean well screen - remnants of bacterial growth.
	300	Clean well screen - remnants of bacterial growth.
	350	Clean well screen - remnants of bacterial growth.
	360	Visibility decreasing.
	366	Visibility poor/ sediment on louvers at depth/ no flow?
	408.3	Top of soft fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 32 (Post Brush)

Survey Date: August 12, 2003 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 202.2 ft brp

Review Date: May 23, 2020 **Screen Interval(s):** 332.6-483.1; 504.6-573.4 ft brp

Reviewer: RJK **Survey Depth:** 573.9 ft brp (fill)

Depth From	Depth To	Observations
	~2	Entry port for access tube.
	30	General corrosion/ spalling.
	100	Spalling/ corrosion increasing w/ depth.
	200	Spalling/ corrosion increasing w/ depth.
	202	SWL/ no oil/ visibility poor.
	210	Mild to moderate corrosion barely visible.
	220	Visibility improving/ mild corrosion.
	330	Abrupt change to excellent visibility/ evidence of knocked off nodules widespread.
	332.6	TOS 1 - louvers ~ 60-80% open.
	350	Sediment resting on louver shelves.
	400	Sediment resting on louver shelves, 60-80% open.
	427	Build up increasing.
	450	Moderate build up/ sediment on louvers.
	475	Build up/ growth increasing.
	483.1	BOS 1
	504.6	TOS 2 - louvers heavily clogged w/sediment (?) & growth.
	510	Visibility decreasing.
	550	Louvers heavily clogged w/ sediment/ growth/ poor visibility.
	560	Very poor visibility.
	570	Heavy growth on screen.
	573.4	BOS 2
	573.9	Fill.

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 33

Survey Date: August 7, 2008 **Reference Point:** TOC

Survey Company: Layne Christensen Company **Static Water Level:** 152.3 ft brp

Review Date: May 23, 2020 **Screen Interval(s):** 222-241.4; 282.25-454 ft brp (fill)

Reviewer: RJK **Survey Depth:** 454 ft brp (fill)

Depth From	Depth To	Observations
	2	Entry port for access tube.
	50	General corrosion/ pitting.
	100	General corrosion/ pitting, increasing with depth.
	108	Moderate spalling begins.
	152.3	SWL - no oil. Visibility fair.
	161	Spalling/ sheeting.
	171	Heavy general corrosion/ pitting.
	200	Heavy general corrosion/ pitting.
	222	TOS 1 - Stainless steel wire-wrap - excellent condition/ clean. (Mild steel against stainless steel)
	224	Gravel visible behind screen.
	241.4	BOS 1
	250	Mild steel blank/ moderate corrosion/ buildup.
	282.25	TOS 2
	300	Screen clean/ good condition/ sediment in openings.
	350	Screen clean/ good condition/ sediment in openings.
	400	Screen clean/ good condition/ sediment in openings.
	451	Sediment/ mud smeared in openings - 100% clogged.
	454	Camera meets refusal (side scan).

VIDEO SURVEY REPORT

Project No: 3020.001 **Well Name:** 35

Survey Date: April 30, 2018 **Reference Point:** TOC

Survey Company: Well Rehabilitation Services, Inc. **Static Water Level:** 173.2 ft brp

Review Date: May 23, 2020 **Screen Interval(s):** 194-476.6 ft brp (fill) (Ripped?)

Reviewer: RJK **Survey Depth:** 476.6 ft brp (fill/ripped bottom)

Depth From	Depth To	Observations
	~2	Entry port for access tube.
	10	Light to moderate spalling.
	27	Moderate to severe corrosion/ spalling (general)
	50	Moderate to severe corrosion/ spalling (general)
	100	Moderate to severe corrosion/ spalling (general)
	150	Moderate to severe corrosion/ spalling (general)
	173.2	SWL - no oil - visibility good - casing moderate to severe corrosion.
	192.6	Appears to be mild steel against S.S.
	194	TOS - stainless wire-wrap/ clean and open.
	195	Gravel visible behind screen.
	245.6	Screen very clean/ open/ gravel behind screen.
	300	Screen very clean/ open/ gravel behind screen.
	350	Screen very clean/ open/ gravel behind screen.
	377.4	Sidescan showing very clean screen/ gravel behind.
	427.4	Sidescan showing very clean screen/ gravel behind.
	435.9	Sidescan showing very clean screen/ gravel behind. Some sediment settled in openings.
	447.1	Sidescan showing very clean screen/ gravel behind. Some sediment settled in openings.
	454.7	Side scan showing screen - more sediment buildup.
	472.1	Openings completely clogged with sediment, otherwise clean.
	476.6	Camera meets refusal (sediment).
	475.6	Down view - screen appears ripped off at bottom/ ends raggedly with sediment/ fill below.

APPENDIX E

Video Survey Review Snapshots (Digital)

KYLE Groundwater

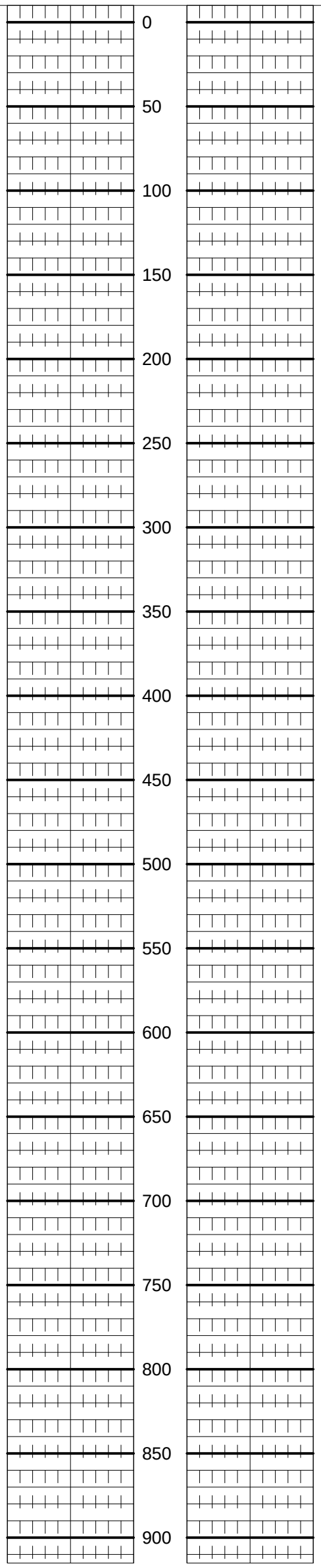
[PLACEHOLDER FOR APPENDIX E]

APPENDIX F

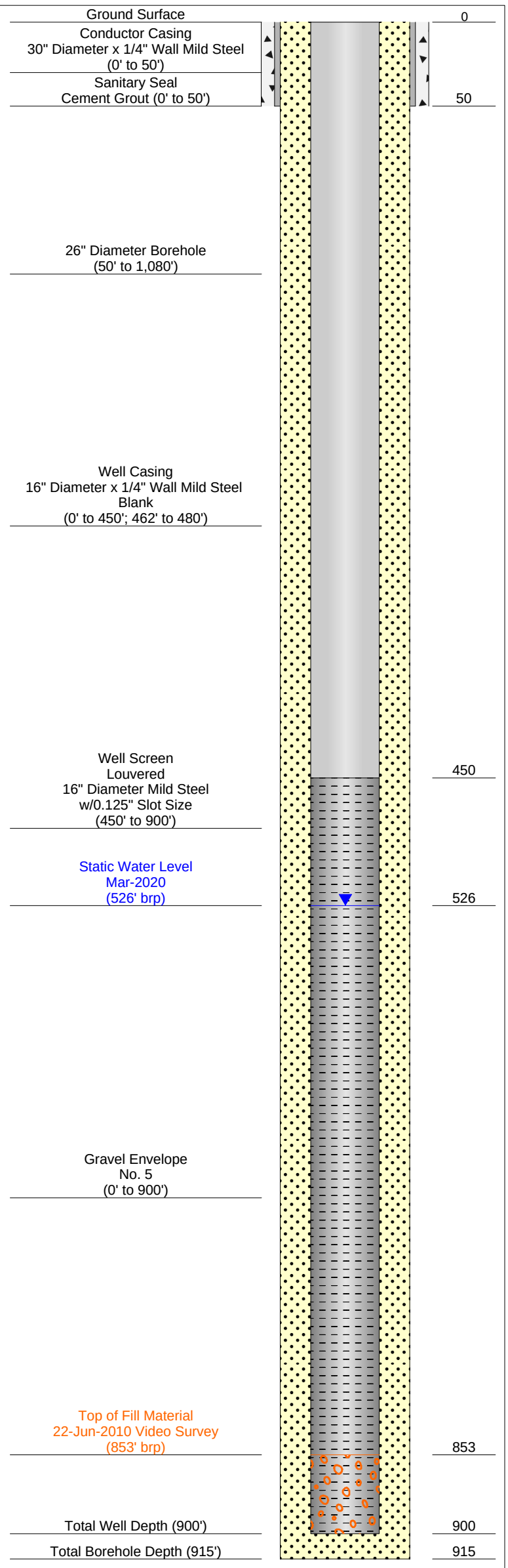
As-Built Well Profiles

KYLE Groundwater

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: fine sand, small gravel	SP
SAND: rocks, sand, gravel	SP
SAND: rocks, fine to medium to coarse sand	SP
SAND W/GRAVEL: rocks, medium to coarse sand, gravel	SP
SAND: medium to coarse sand	SP
SAND: medium to fine sand, clay streaks	SP
SAND: medium to coarse sand and rocks	SP
SAND: fine sand with clay streaks	SP
SAND W/CLAY: medium sand, coarse sand with clay	SP-SC
CLAY: clay	CL
SAND: sand, clay streaks	SP
SAND: hard to medium sand with clay streaks	SP
SAND: medium to coarse sand, gravel, small clay streaks	SP
SAND W/CLAY: coarse sand, small gravel, clay	SP-SC
CLAY: brown clay, streaks of sand	CL
SAND W/CLAY: medium sand, small clay streaks, clay	SP-SC
SAND: medium to coarse sand, small clay streaks	SP
SAND: coarse sand, gravel, clay	SP
SAND: medium sand, small clay streaks	SP
SAND: medium sand, small clay streaks	SP
SAND: medium to coarse sand, clay streaks	SP
SAND W/CLAY AND GRAVEL: medium gravel, sand, clay streaks, and fine sand	SP-SC
CLAY: blue clay	CL



As-Built Profile
(Based on 22-Jun-2010 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 2A

PALMDALE WATER DISTRICT
WELL 2A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.125 in
SCREEN INTERVALS (ft bgs): 450-900
CONSTRUCTION YEAR: 1968
STATE WELL NUMBER: 06N11W19E

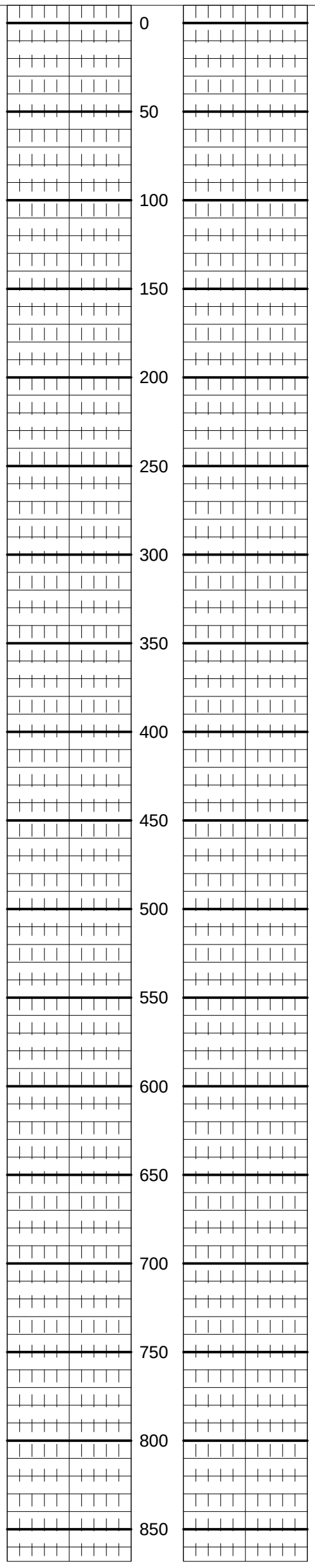
Notes:
Well details based on 22-Jun-2010 video survey and Well Drillers Report.

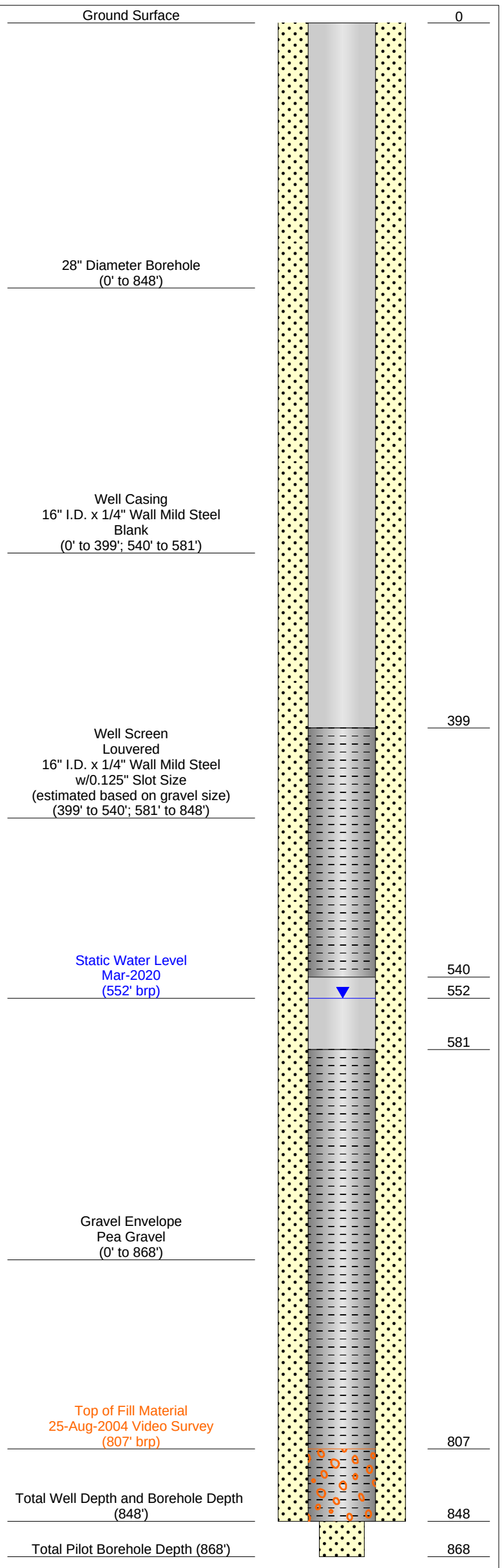
DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: surface sand & hardpan, sand & gravel, streaks of clay	SP
CLAY: clay, streaks of sand	CL
SAND: packed sand, streaks of clay	SP
SAND: sandy clay and sand	SP
SAND: hard sand, streaks of clay	SP
SAND: sand & gravel, clay streaks, hard sand	SP
SAND W/ GRAVEL: sand and gravel, clay streaks	SP
SAND: firm sand, clay streaks	SP
SAND: hard sand, thin streaks of soft clay	SP
SAND W/ CLAY: clay and sand	SP-SC
SAND: sand, streaks of clay	SP
SAND: sand, thin streaks of clay	SP
SAND: sand, clay streaks	SP
SAND: firm sand	SP
CLAY: clay, small amount of sand	CL
CLAY: clay, streaks of sand	CL
CLAY: clay, streaks of sand, thin streaks of sandy shale	CL
CLAY: clay, thin streaks of sand and brown shale	CL
SAND: sand and brown shale	SP
SAND: hard sand	SP
CLAY: clay, thin streaks of sand	CL





AS-BUILT PROFILE: WELL 3A

PALMDALE WATER DISTRICT
WELL 3A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.125 in (est.)
SCREEN INTERVALS (ft bgs): 399-540, 581-848
CONSTRUCTION YEAR: 1960
STATE WELL NUMBER: 06N11W19E

Notes:
Conductor casing / annular seal unknown.
Well details based on 25-Aug-2004
video survey and Well Drillers Report.

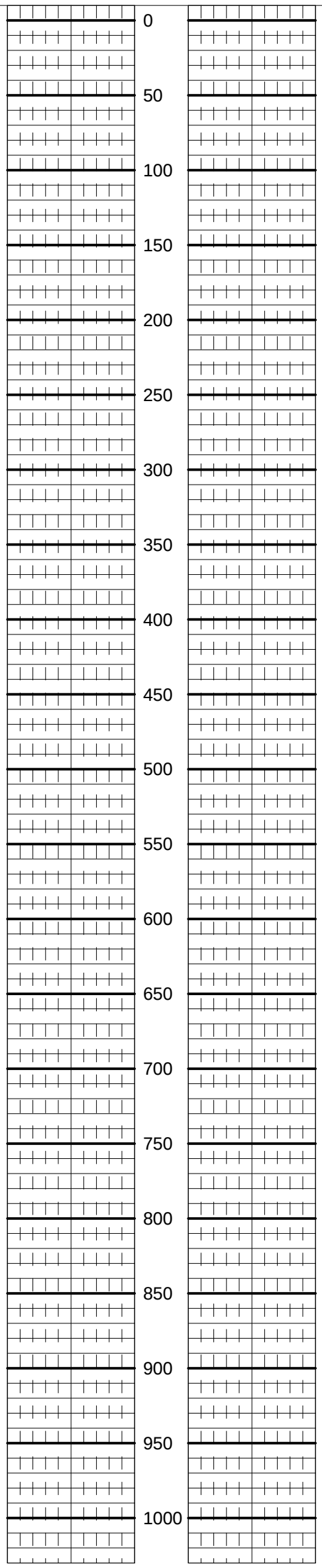
DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

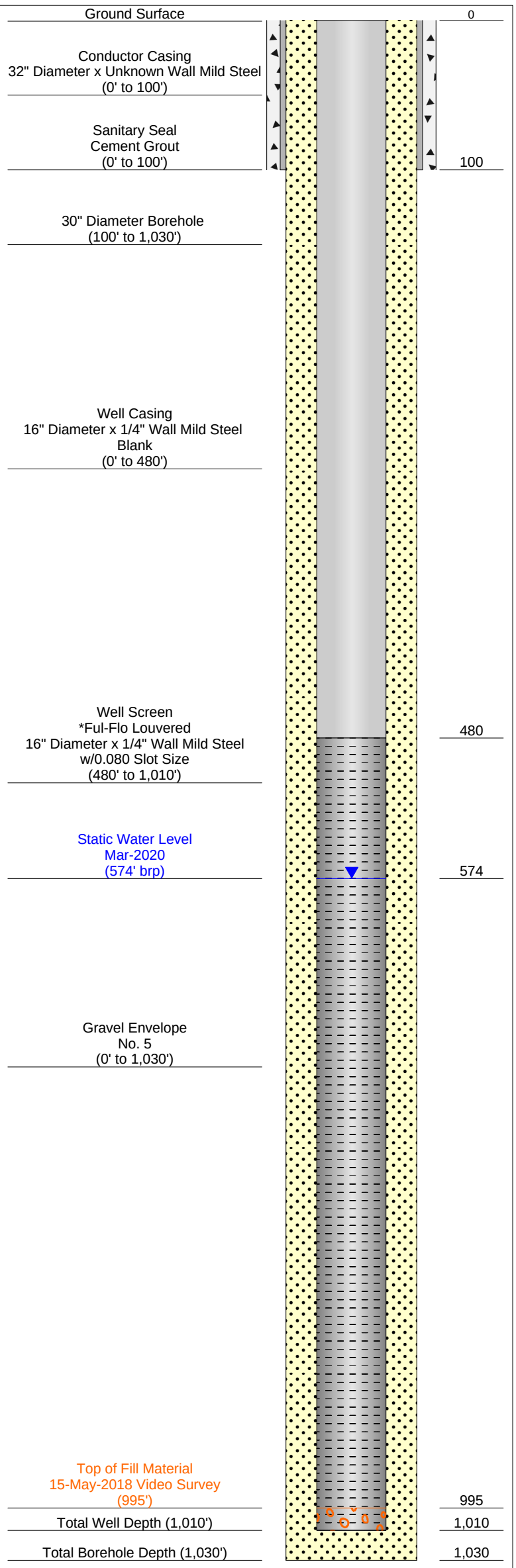
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: medium to coarse sand	SP
SAND W/CLAY: medium sand, coarse sand with clay	SP-SC
SAND: medium to coarse sand	SP
SAND: medium to coarse sand, gravel, small silt streaks	SP
SAND: medium to coarse sand, gravel	SP
SAND: medium to coarse sand	SP
SAND: fine to coarse sand	SP
CLAY: brown clay, streaks of sand	CL
SAND: medium to coarse sand	SP
SAND W/CLAY: fine to medium to coarse sand with clay	SP-SC
SAND: fine to coarse sand	SP
SAND: fine to coarse sand	SP
SAND: fine to medium sand	SP
SAND: hard packed fine sand	SP
SAND: fine to medium sand	SP
SAND W/CLAY: fine to medium sand with clay	SP-SC
SAND: fine to medium sand	SP
SAND: fine sand	SP
SAND W/CLAY: fine sand with clay	SP-SC
CLAY: brown clay with sand	CL
SAND W/CLAY: fine to medium sand with clay	SP-SC
CLAY: brown clay with sand	CL
SAND W/CLAY: fine to medium to coarse sand with clay	SP-SC
SAND W/GRAVEL: fine to medium to coarse sand, gravel	SP
SAND W/CLAY: medium to coarse sand, small gravel, clay	SP-SC
SAND W/CLAY: medium to coarse sand with clay	SP-SC
SAND: coarse sand with gravel	SP
SAND: coarse sand, gravel, clay	SP
SAND: medium to coarse sand, small clay streaks	SP
SAND: fine to coarse sand	SP





AS-BUILT PROFILE: WELL 6A

PALMDALE WATER DISTRICT
WELL 6A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: *Louvered / 0.080 in
SCREEN INTERVALS (ft bgs): 480-1,010
CONSTRUCTION YEAR: 1983
STATE WELL NUMBER: 06N12W23

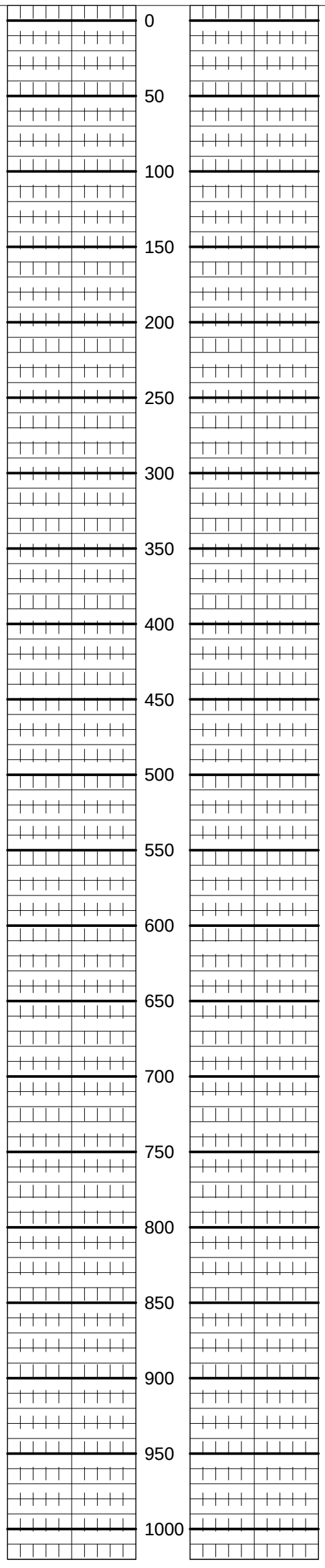
Notes:
*Mill slot on DWR log, louvered on videos surveys.
Well details based on 15-May-2018 video survey and Well Drillers Report.

DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

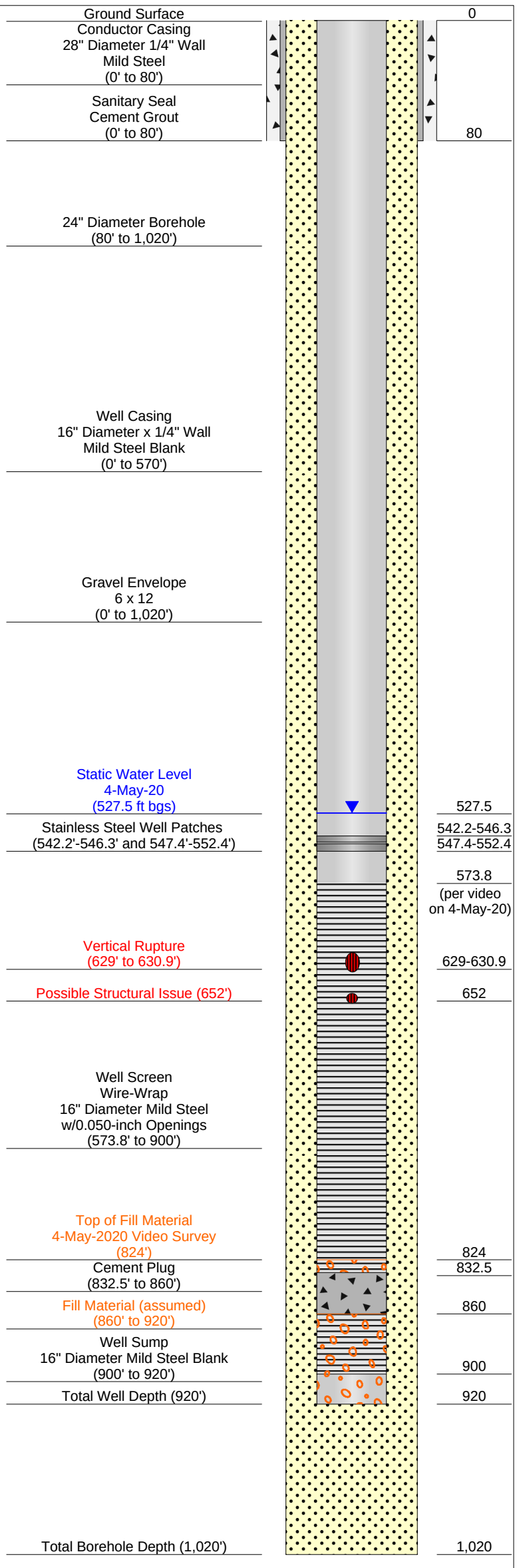
KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/CLAY: coarse sand, clay	SP-SC
SAND: medium sand, small clay streaks	SP
CLAY: clay, streaks of sand	CL
SAND: coarse sand	SP
SAND: sand, gravel	SP
SAND W/CLAY: sand, clay	SP-SC
SAND W/CLAY: sand, clay	SP-SC
SAND W/GRAVEL: sand and gravel	SP
CLAY: clay	CL
SAND: sand with clay streaks	SP
CLAY: clay with sand	CL
SAND W/CLAY: sand, clay	SP-SC
GRAVEL: gravel with clay	GP
SAND: sand, gravel, and clay	SP
CLAY: clay	CL
SAND W/GRAVEL: sand and gravel	SP
SAND: sand, gravel, and clay	SP
CLAY: clay	CL
SAND: sand, gravel, and clay	SP
CLAY: clay	CL
SAND W/GRAVEL: sand and gravel	SP
CLAY: clay	CL
SAND W/CLAY: sand, clay	SP-SC
CLAY: clay with sand	CL
SAND W/GRAVEL: sand and gravel	SP
CLAY: clay with gravel	CL
CLAY: clay, streaks of sand	CL
SAND W/CLAY: sand, clay	SP-SC
SAND: sand	SP
SAND: medium sand, fine gravel	SP
SAND: medium sand, clay streaks	SP
CLAY: hard clay	CL
SAND: medium to coarse sand	SP
CLAY: brown clay, streaks of sand	CL
SAND: fine sand with clay streaks	SP
CLAY: brown clay, fine to coarse sand	CL
CLAY: hard to soft clay	CL
SAND: medium to fine sand, clay streaks	SP
CLAY: clay, streaks of fine sand	CL
SAND: medium to fine sand, clay streaks	SP
CLAY: clay, streaks of coarse sand	CL
SAND: medium to fine sand, clay streaks	SP
CLAY: clay, streaks of coarse sand	CL
SAND: medium to fine sand, clay streaks	SP
CLAY: clay, streaks of coarse sand	CL
GRAVEL: gravel and sand, and granite	GP
GRANITE	Granite



As-Built Profile
(Based on 4-May-2020 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 7A

PALMDALE WATER DISTRICT
WELL 7A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire-Wrap / 0.050 in
SCREEN INTERVALS (ft bgs): 573.8-900
CONSTRUCTION YEAR: 1985
STATE WELL NUMBER: 06N11W19F

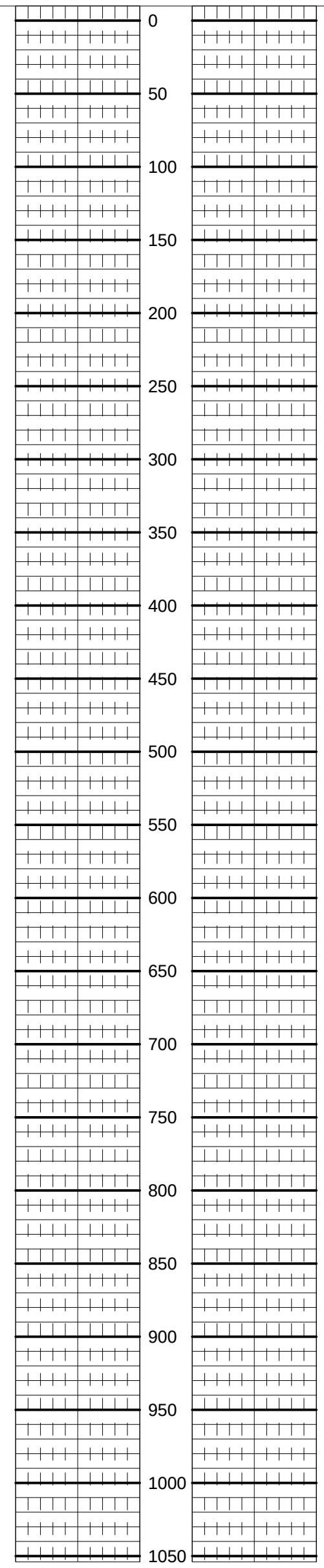
Notes:
Well details based on 4-May-2020 video survey and Well Drillers Report.

DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

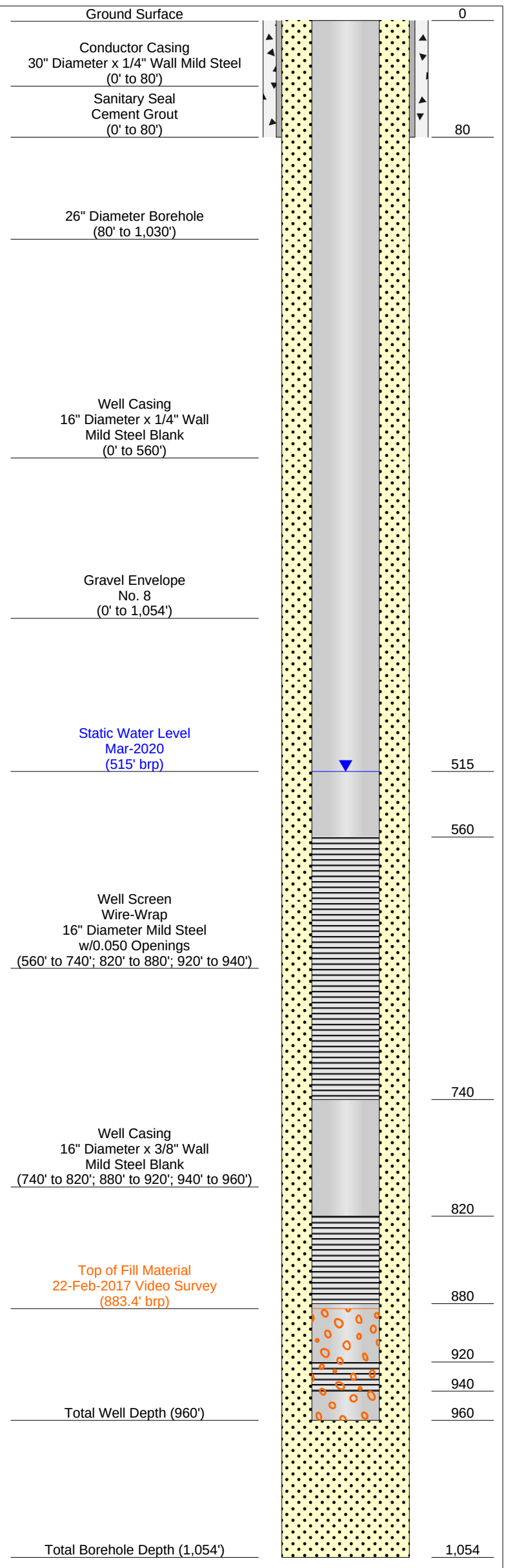
KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
CLAY: clay and sand	CL
SAND W/GRAVEL: sand, gravel, clay	SP
GRAVEL: gravel with sand	GP
SAND: sand, clay, gravel	SP
GRAVEL: gravel with sand	GP
SAND: sand, clay, gravel	SP
SAND: sand	SP
GRAVEL: gravel	GP
SAND: sand, clay streaks	SP
CLAY: clay	CL
CLAY: clay, gravel, and sand	CL
SAND: sand and gravel	SP
SAND: fine sand, gravel, some clay	SP
SAND: fine sand and clay	SP
SAND: fine sand	SP
GRAVEL: gravel	GP
GRAVEL: gravel with clay	GP
GRAVEL: gravel	GP
CLAY: clay	CL
GRAVEL: gravel with clay	GP
CLAY: clay	CL
CLAY: clay and gravel	CL
CLAY: clay, sand, and gravel	CL
CLAY: clay and sand	CL
CLAY: clay	CL
CLAY: clay and fine sand	CL
SAND: fine sand	SP
SAND W/CLAY: sand with clay	SP-SC
SAND: sand, clay, and gravel	SP
SAND W/GRAVEL: sand and gravel	SP
GRAVEL: gravel	GP
GRAVEL: gravel with sand	GP
CLAY: clay and sand	CL
GRAVEL: gravel with sand	GP
CLAY: clay, sand, and gravel	CL
GRAVEL: gravel with sand	GP
CLAY: clay	CL
CLAY: clay and sand	CL
CLAY: clay, sand, and gravel	CL
GRAVEL: gravel, sand, red clay	GP
CLAY: clay and gravel	CL
CLAY: clay	CL
CLAY: clay and gravel	CL
CLAY: clay	CL
CLAY: clay and gravel	CL
CLAY: clay	CL
GRAVEL: gravel with clay	GP
CLAY: clay	CL
GRAVEL: gravel, sand, clay	GP
CLAY: clay and gravel	CL
CLAY: clay	CL
GRAVEL: gravel with trace clay	GP
CLAY: clay and gravel, hardrock at base	CL



As-Built Profile



AS-BUILT PROFILE: WELL 8A

PALMDALE WATER DISTRICT
WELL 8A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire-Wrap / 0.050 in
SCREEN INTERVALS (ft bgs): 560-740; 820-880; 920-940
CONSTRUCTION YEAR: 1988
STATE WELL NUMBER: 06N11W19C

Notes:

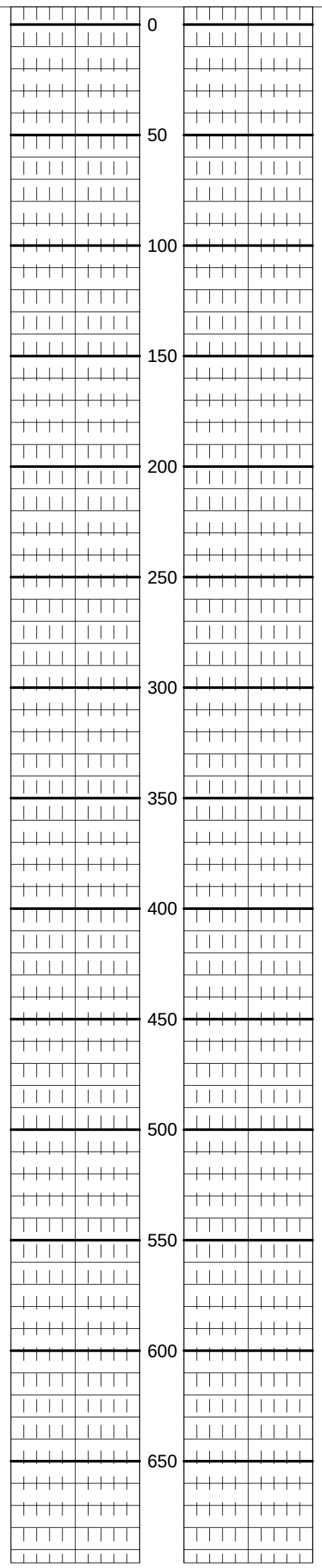
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

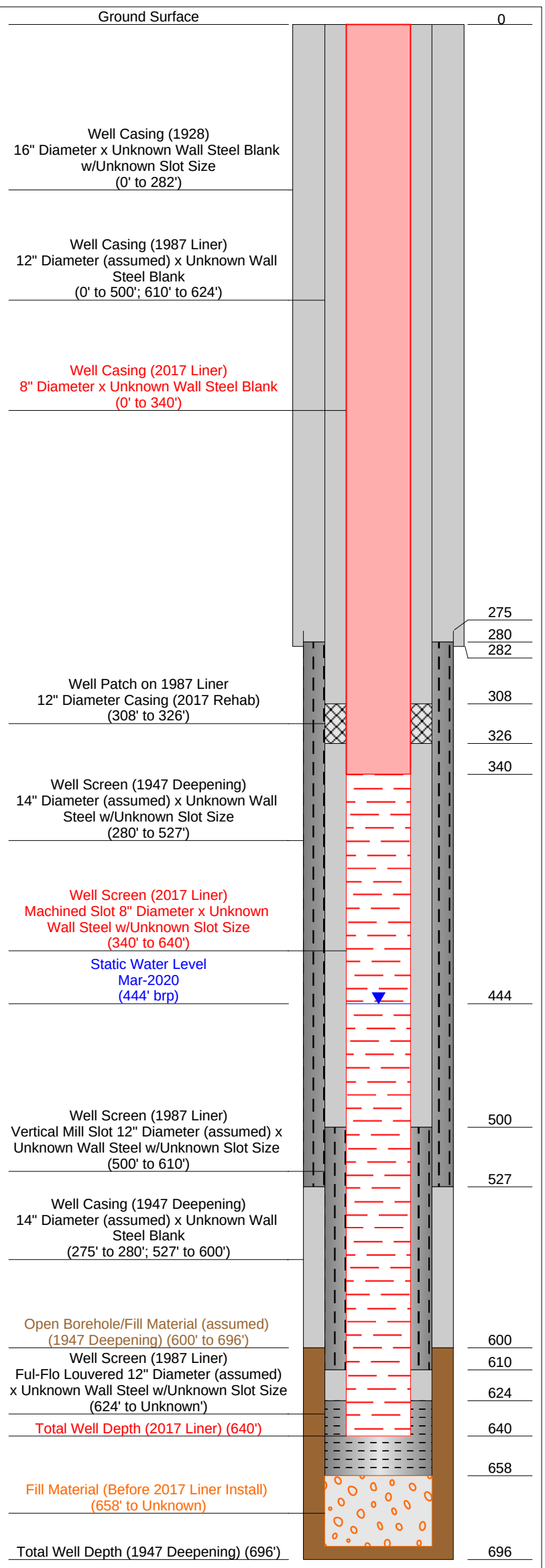
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
No Lithology Recorded	N/A
CLAY: hard clay	CL
GRAVEL W/SAND: coarse gravel and sand	GP
CLAYEY GRAVEL: clay and gravel	GC
GRAVEL W/SAND: gravel and sand	GP
CLAYEY GRAVEL: clay and gravel	GC
SAND W/GRAVEL: sand and gravel	SP
CLAYEY GRAVEL: clay and gravel	GC
CLAY: brown clay	CL
SAND: mud and sand	SP
SAND W/GRAVEL: sand and gravel	SP
CLAYEY GRAVEL: clay and gravel	GC
CLAY: hard decomposed gravel and clay composition of conglomerate shale	CL





AS-BUILT PROFILE: WELL 10

PALMDALE WATER DISTRICT
WELL 10
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Steel
PERFORATION TYPE/SIZE: See drawing above
SCREEN INTERVALS (ft bgs): See drawing above
CONSTRUCTION YEAR: 1928 (original), 1946 (deepened) 1987 (liner), 2017 (liner)
STATE WELL NUMBER: 6N11W20G1

Notes:
Well details based on Video Surveys and Well Drillers Reports/information.

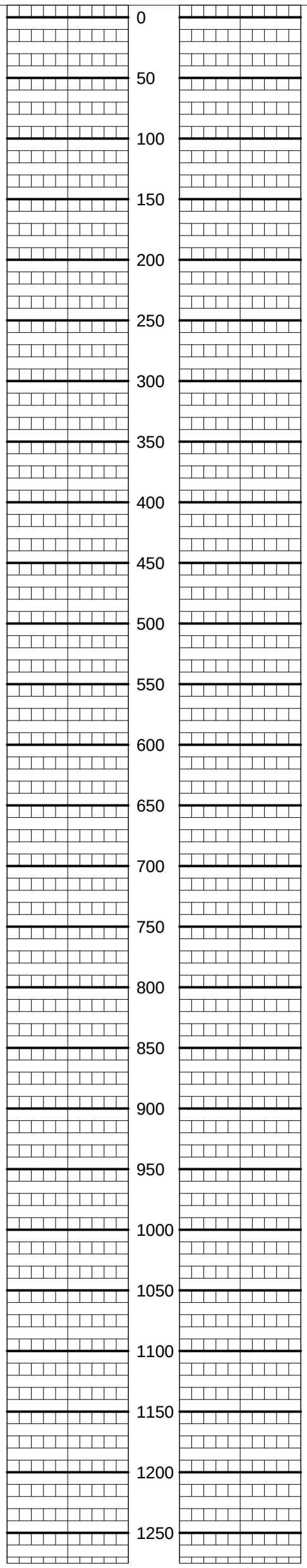
DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SOIL HARDPAN	SP
SAND: coarse sand	SP
CLAY: clay	CL
CLAY: brown clay	CL
CLAY: brown clay, streaks of sand	CL
SAND W/CLAY: coarse sand with clay	SP-SC
CLAY: brown clay, streaks of sand	CL
SAND W/CLAY: hard sand and clay, streaks of gravel	SP-SC
SAND: sand, clay streaks	SP
CLAY: clay, streaks of sand	CL
SAND: sand, clay streaks	SP
CLAY: clay and sand	CL
CLAY: brown clay, streaks of gravel, streaks of sand	CL
SAND W/CLAY: sand with sandy brown clay	SP-SC
SAND: hard sand with clay	SP
SAND: medium to coarse sand, clay streaks	SP
CLAY: brown clay, streaks of sand	CL
SAND W/GRAVEL: sand, gravel, some clay	SP
CLAY: brown clay, streaks of sand	CL
SAND: sand, clay streaks and cobbles	SP
CLAY: brown clay, streaks of sand	CL
SAND: medium to coarse sand, clay streaks	SP
CLAY: brown clay, streaks of sand	CL
SAND: sand and brown clay	SP
Unknown: assumed sand	SP
SAND: hard sand	SP
CLAY: blue clay, streaks of shale	CL
SHALE: shale with streaks of medium to coarse sand	Shale
SHALE: shale	Shale
SAND: sand, shale, and clay	SP
SHALE: shale with streaks of sand	Shale



As-Built Profile (Based on 14-Mar-2012 Video Survey and Well Drillers Report)	
Ground Surface	0
Conductor Casing 30" I.D. x 1/4" Wall Mild Steel (0' to 50') Sanitary Seal Cement Grout (0' to 50')	50
28" Diameter Borehole (50' to 900')	
Well Casing (Original) 16" I.D. x 1/4" Wall Mild Steel Blank (0' to 504')	
Well Casing (Liner) 12" Diameter x 5/16" Wall Mild Steel Blank (0' to 665')	
Gravel Envelope (Original) Pea Gravel (0' to 1,275')	
Gravel Envelope (Liner) (0' to 900')	
Well Screen (Original) Louvered 16" I.D. x 1/4" Wall Mild Steel w/0.125 Slot Size (504' to 900')	504
Static Water Level Apr-2014 (592' brp)	592
	665
Well Screen (Liner) Ful-Flo Louvered 12" Diameter x Unknown Wall Mild Steel w/0.060 Slot Size (665' to 865')	
Top of Fill Material 14-Mar-2012 Video Survey (861' brp)	861
Well Sump (Liner) 12" Diameter x 3/8" Wall Mild Steel Blank w/SE Head (865' to 875')	865 875
Total Well Depth (900')	900
Pilot Borehole 10.625" Diameter Borehole (900' to 1,275')	
Total Borehole Depth (1,275')	1,275

AS-BUILT PROFILE: WELL 11A

PALMDALE WATER DISTRICT
WELL 11A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.125 in (original); Louvered / 0.060 in (liner)
SCREEN INTERVALS (ft bgs): 504-900 (original); 665-865 (liner)
CONSTRUCTION YEAR: 1963 (original), 2012 (liner)
STATE WELL NUMBER: Unknown

Notes:
Well details based on 14-Mar-2012 video survey and Well Drillers Report.

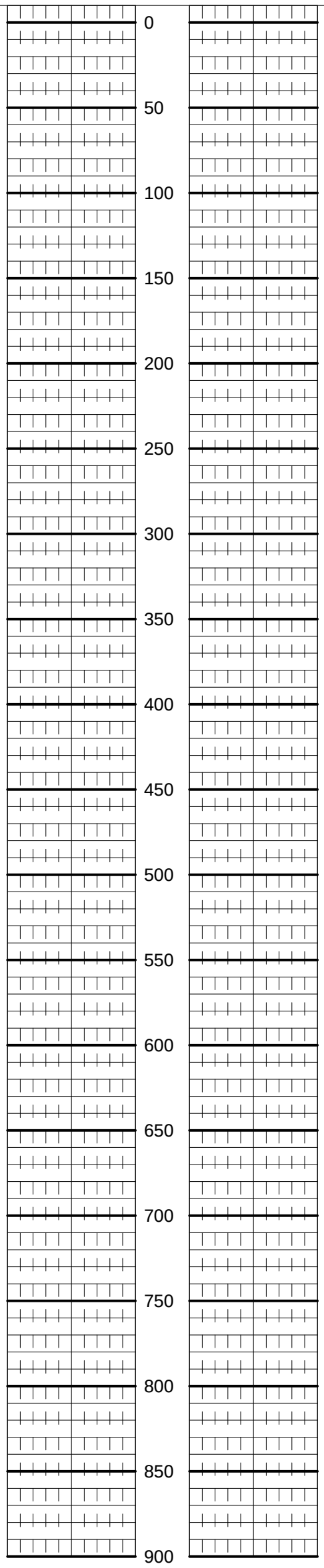
DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

KYLE Groundwater

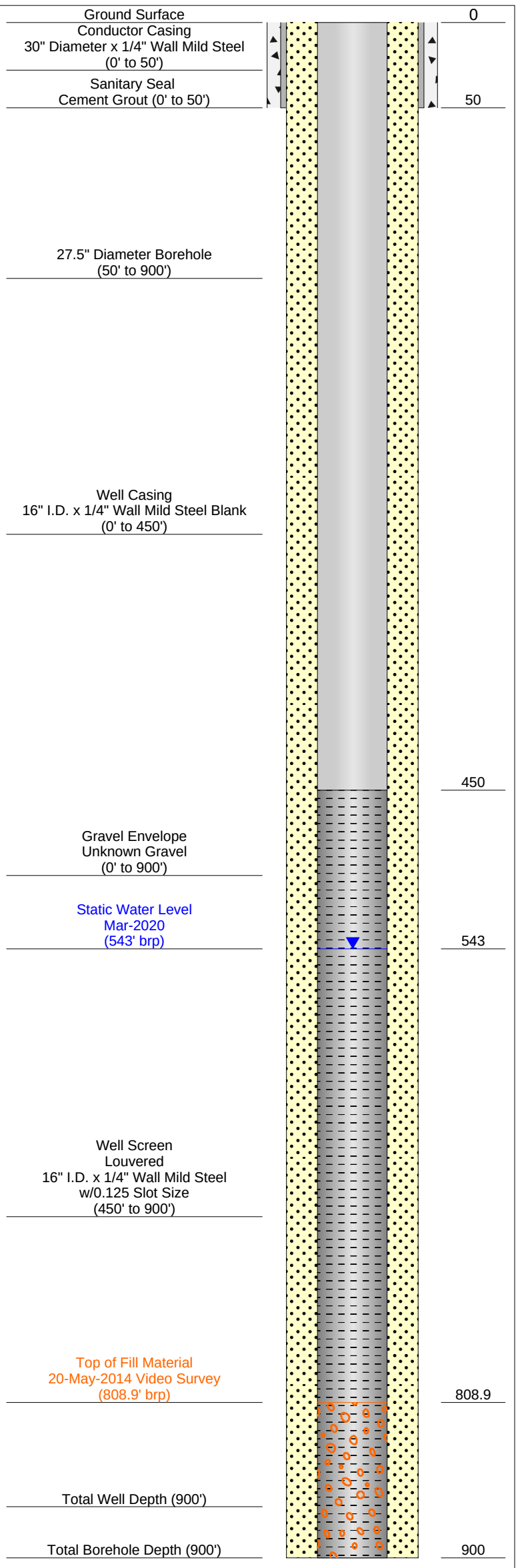
PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/GRAVEL: coarse sand, gravel	SP
GRAVEL: gravel with some brown clay	GP
SAND: fine to medium sand with clay streaks	SP
SAND: fine sand	SP
SAND W/CLAY: fine to medium sand, brown clay streaks	SP-SC
SAND W/CLAY: hard fine to medium sand, brown clay streaks	SP-SC
CLAY: brown clay some sand	CL
SAND W/CLAY: hard fine to medium sand, brown clay streaks	SP-SC
CLAY: brown clay some sand	CL
CLAY: hard brown clay, cemented sand	CL
SAND W/CLAY: fine sand, brown clay streaks	SP-SC
CLAY: brown clay some sand	CL
SAND W/CLAY: medium to coarse sand, brown clay streaks	SP-SC
SAND W/CLAY: fine to medium sand, brown clay streaks	SP-SC
CLAY: sandy gray clay with streaks of sand	CL



As-Built Profile



AS-BUILT PROFILE: WELL 14A

PALMDALE WATER DISTRICT
WELL 14A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.125 in
SCREEN INTERVALS (ft bgs): 450-900
CONSTRUCTION YEAR: 1965
STATE WELL NUMBER: 06N12W24A

Notes:

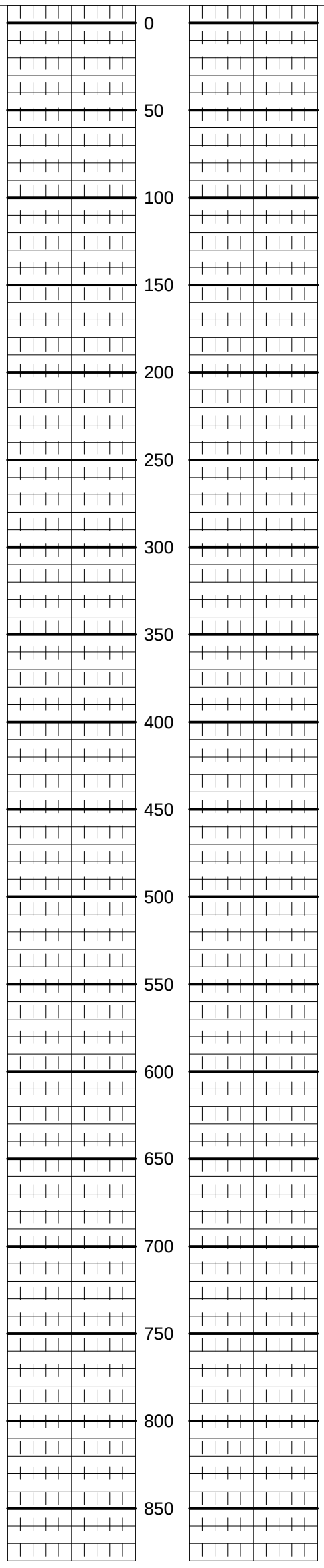
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

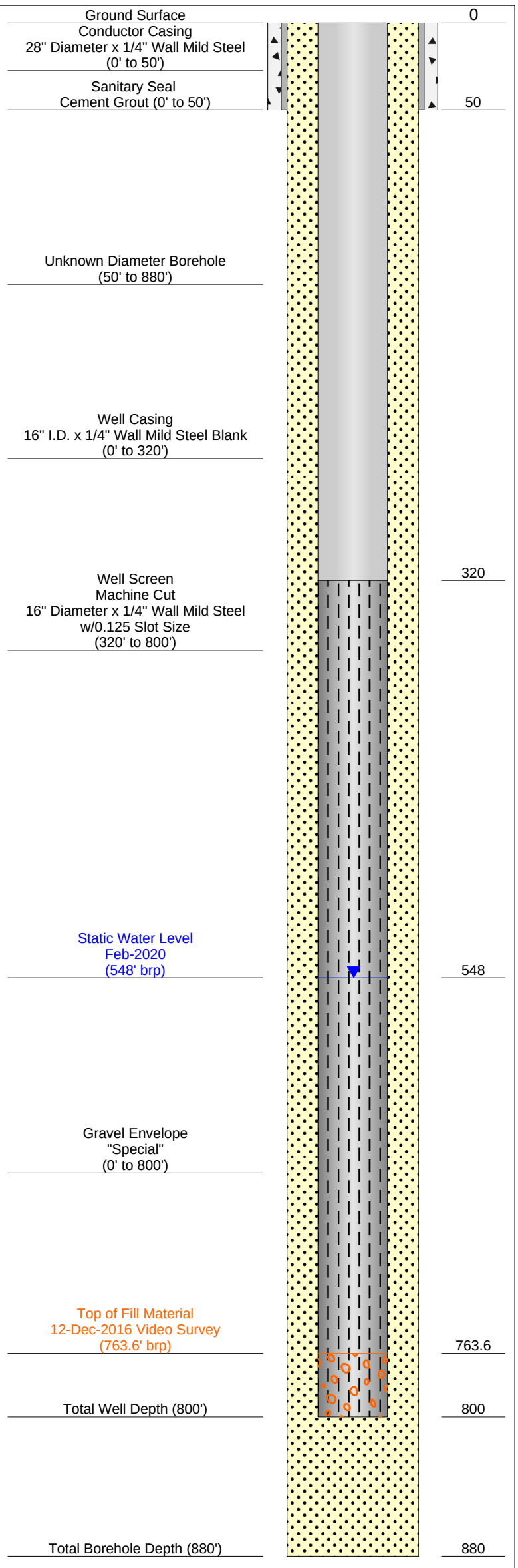
PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: surface soil	SP
GRAVEL: gravel	GP
CLAY: clay with gravel	CL
SAND: sand, clay streaks	SP
SAND W/CLAY: sand, clay and coarse gravel	SP-SC
SAND: sand, clay streaks	SP
SAND: fine sand	SP
SAND: sand, gravel	SP
SAND: sand, clay streaks	SP
GRAVEL: gravel	GP
SAND: hard packed sand	SP
SAND: coarse sand	SP
SAND: hard packed sand	SP
SAND: sand, clay streaks	SP
SAND: hard packed sand	SP
CLAY: clay and sand	CL
SAND: hard packed sand	SP
SAND: sand, clay streaks	SP
SAND: hard sand	SP
SAND: hard fine sand	SP
SAND: fine sand and clay	SP
SAND: hard sand, cemented	SP



As-Built Profile
(Based on 12-Dec-2016 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 15

PALMDALE WATER DISTRICT
WELL 15
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Machine Cut / 0.125 in
SCREEN INTERVALS (ft bgs): 320-800
CONSTRUCTION YEAR: 1960
STATE WELL NUMBER: 06N12W13N01

Notes:
Well details based on 12-Dec-2016 video survey and Well Drillers Report.

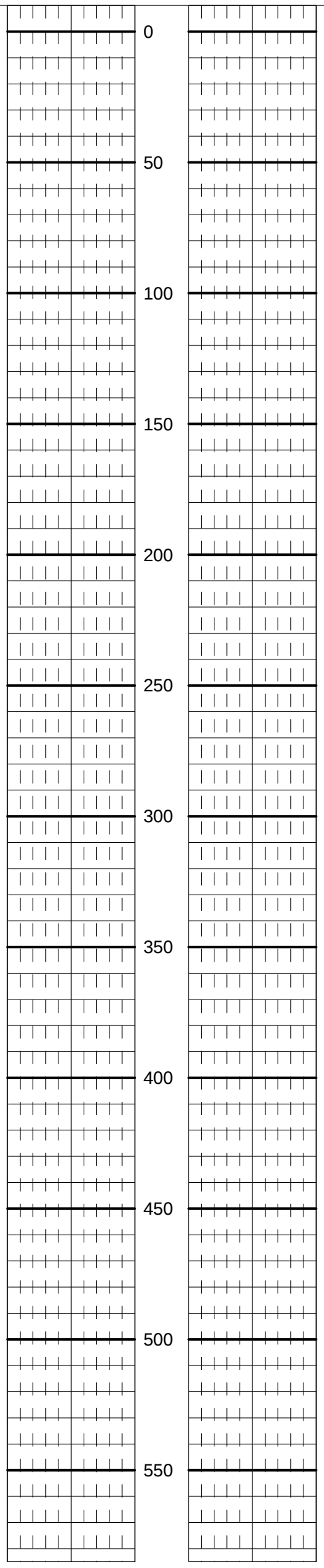
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

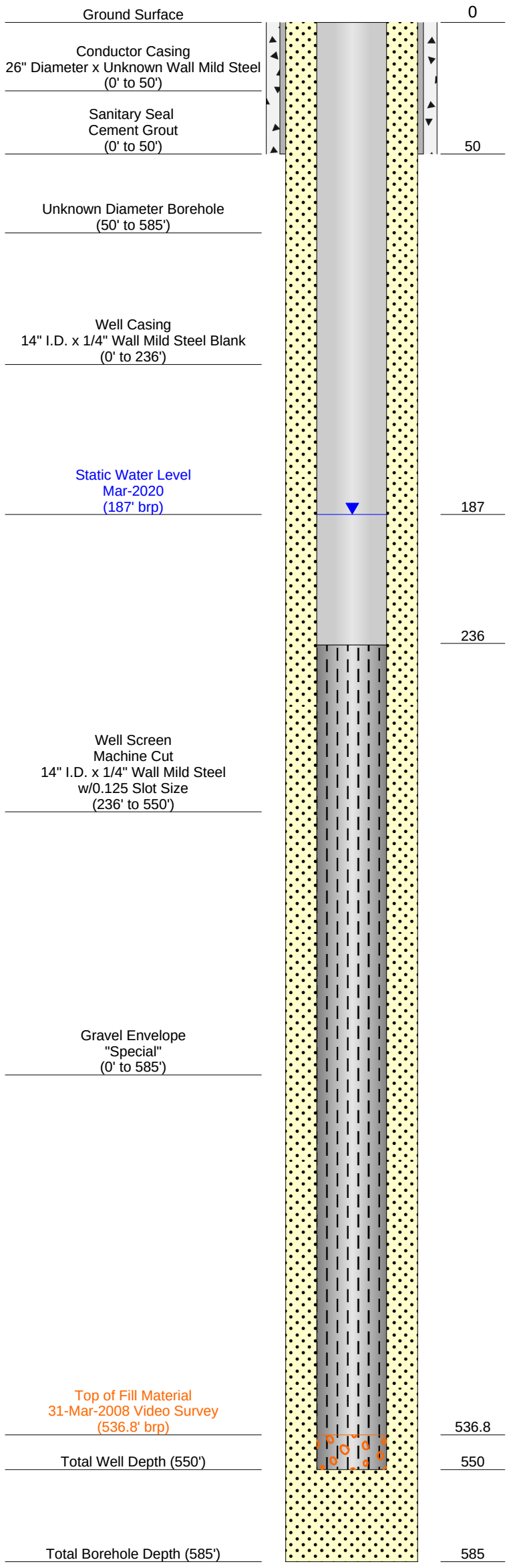
PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: sand	SP
SAND: coarse sand	SP
SAND: coarse sand and boulders	SP
SAND: hard packed sand	SP
SAND: sand	SP
SAND: coarse sand	SP
CLAY: clay and sand	CL
SAND: sand and boulders	SP
SAND: coarse sand	SP
CLAY: clay and sand	CL
SAND: coarse sand and clay	SP
SAND: coarse sand	SP
SAND: coarse sand and boulders	SP
SAND: coarse sand	SP
SAND: sand and boulders	SP
GRAVEL: boulders	GW
SAND: packed sand and boulders	SP
Bedrock	Bedrock



As-Built Profile
(Based on 31-Mar-2008 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 16

PALMDALE WATER DISTRICT
WELL 16
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Machine Cut / 0.125 in
SCREEN INTERVALS (ft bgs): 236-550
CONSTRUCTION YEAR: 1960
STATE WELL NUMBER: 05N11W05C

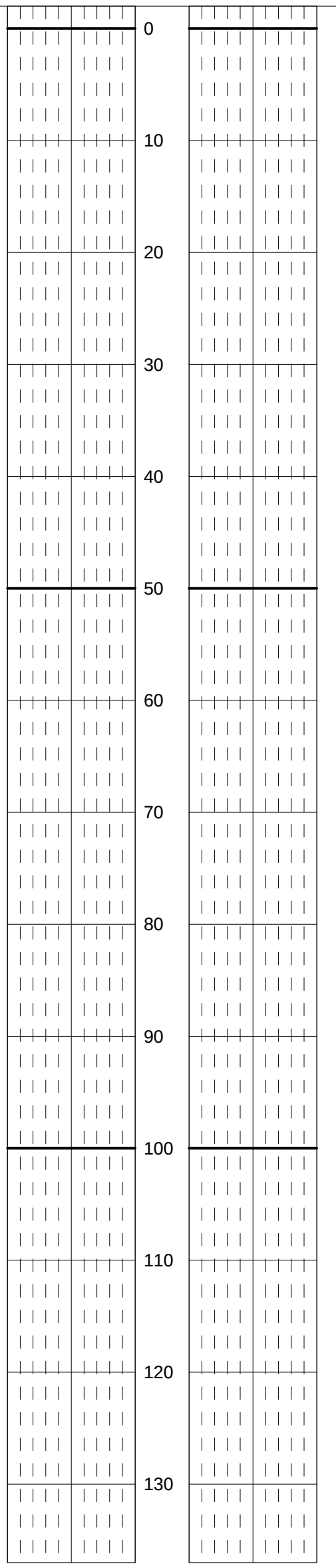
Notes:
Well details based on 31-Mar-2008 video survey and Well Drillers Report.

DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

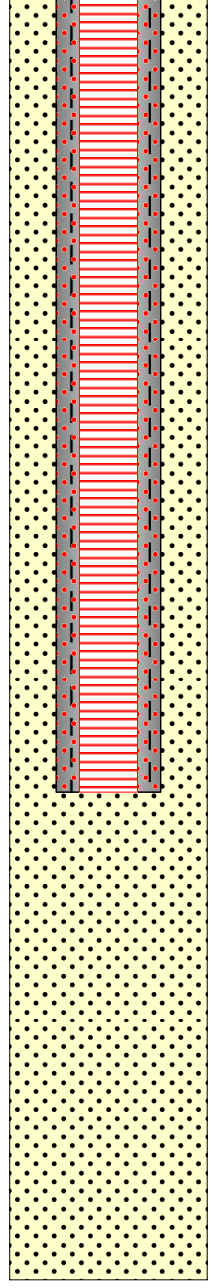
KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: sand	SP
SAND W/SILT: sandy silt with clay	SP-SM
CLAY: clay	CL
CLAY: clay and boulders	CL
GRAVEL: gravel	GP
BOULDERS: boulders	Boulders



As-Built Profile	
Ground Surface	0
13" Diameter Borehole (0' to 137')	
Well Casing (Original) 8" Diameter x 8 gauge Wall Mild Steel Blank (0' to 20')	
Well Casing (Liner) 6" Diameter SDR21 ASTM F-480 Blank PVC (assumed 0' to 48')	
Well Screen (Original) Machine Cut 8" Diameter x 8 gauge Wall Mild Steel w/Unknown Slot Size (20' to 108')	20
Static Water Level Mar-2020 (41' brp)	41
Well Screen (Liner) 6" Diameter SDR21 ASTM F-480 Mill Slot PVC w/Unknown Slot Size (assumed 48' to 108')	48
Gravel Envelope (Original) Unknown Gravel (0' to 137')	
Gravel Envelope (Liner) Unknown Gravel (assumed 0' to 108')	
Total Well Depth (108')	108
Total Borehole Depth (137')	137



AS-BUILT PROFILE: WELL 18

PALMDALE WATER DISTRICT
WELL 18
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Machine Cut / Unknown
SCREEN INTERVALS (ft bgs): 20-108
CONSTRUCTION YEAR: 1954
STATE WELL NUMBER: 05N11W17H

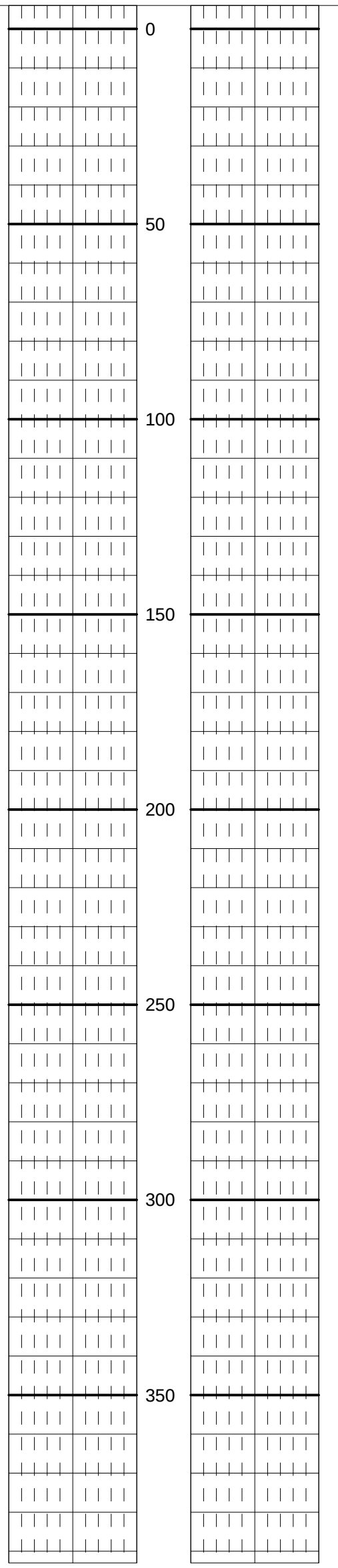
Notes:
1) Conductor casing / annular seal unknown.
2) Top of Fill was 92.8 ft brp on 8-Dec-2016 video survey (prior to liner installation).

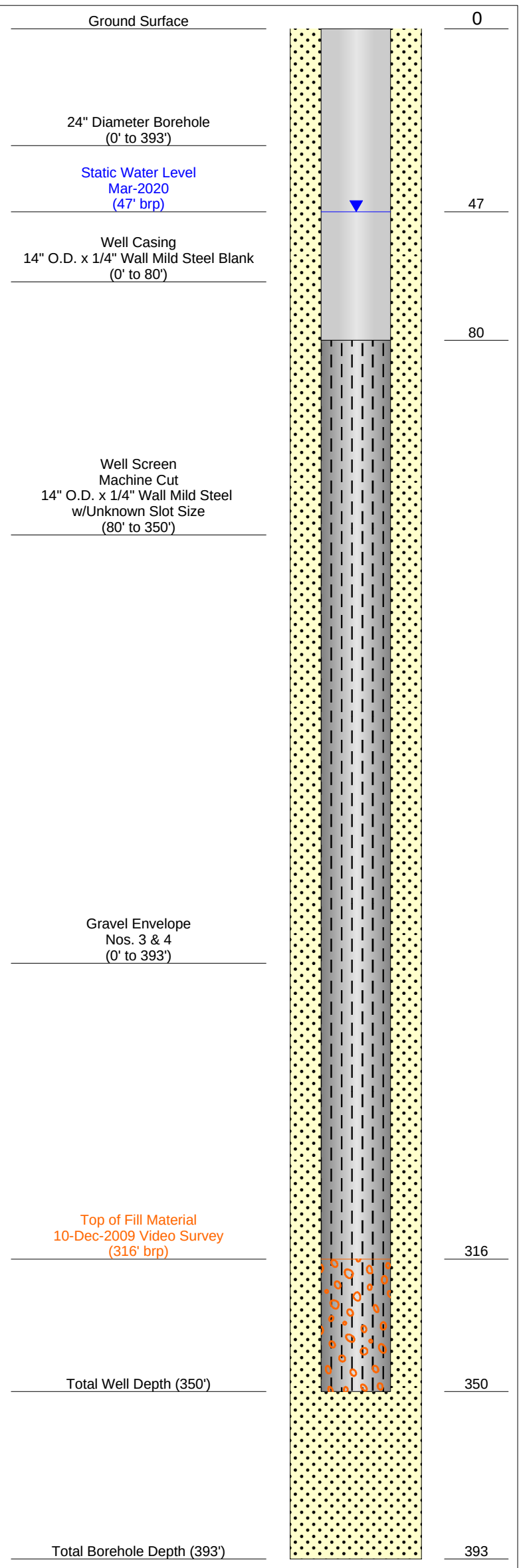
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: sand	SP
SAND: sand and rocks	SP
SAND: sand with gravel	SP
SAND: sand	SP
SAND: sand, clay streaks	SP
SAND: coarse sand, gravel, small clay streaks	SP
SAND: hard packed sand	SP
SAND W/GRAVEL: coarse sand, gravel	SP
SAND W/CLAY: coarse sand, clay	SP-SC
SAND: sand, clay streaks	SP
SAND: coarse sand	SP
SAND: hard packed sand	SP





AS-BUILT PROFILE: WELL 19

PALMDALE WATER DISTRICT
WELL 19
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Machine Cut / Unknown
SCREEN INTERVALS (ft bgs): 80-350
CONSTRUCTION YEAR: 1961
STATE WELL NUMBER: 05N11W17H

Notes:

DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

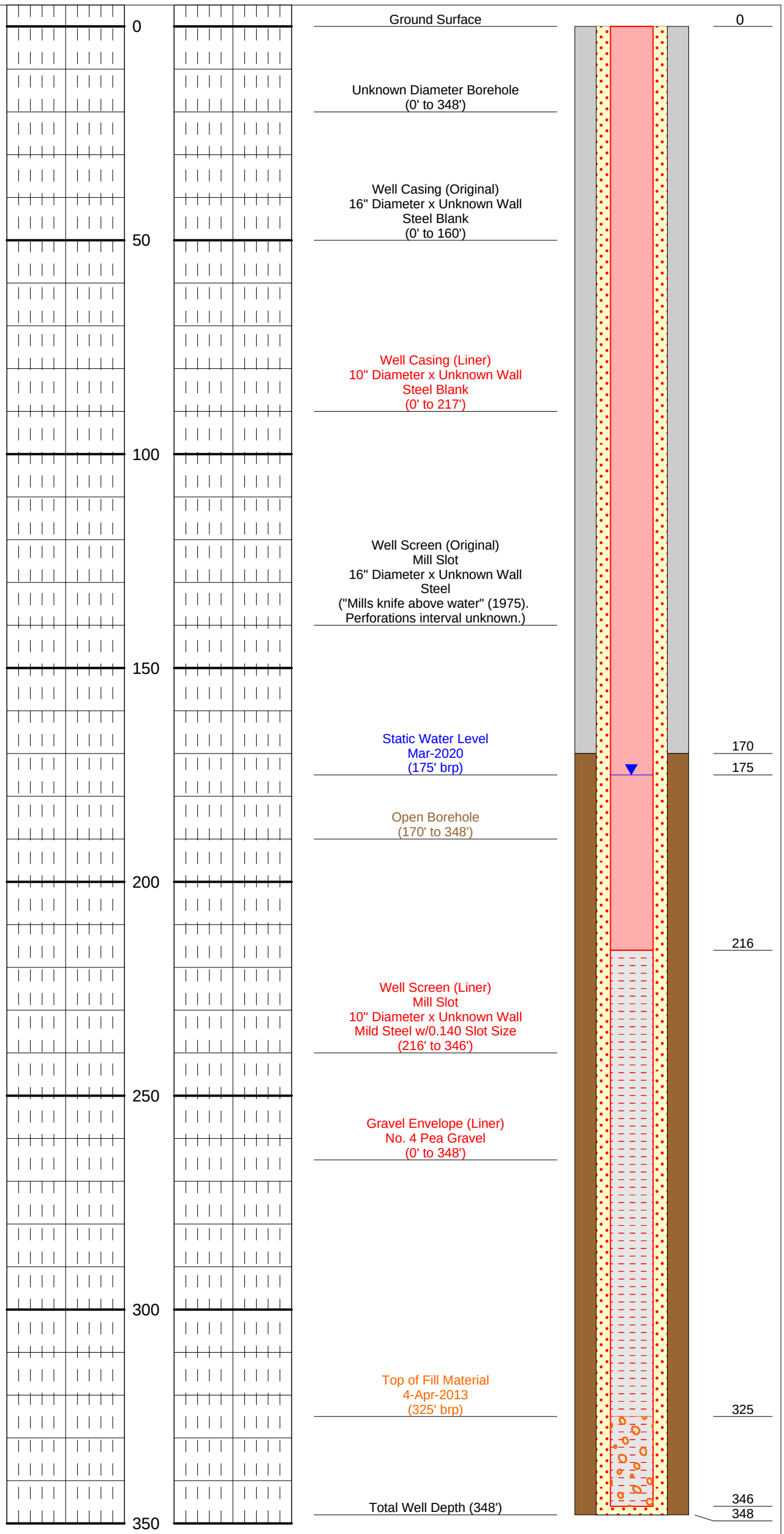
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification	Spontaneous Potential (mV) 0 50 100	Resistivity RSN / RLN (Ohm-m) 0 50 100	As-Built Profile (Based on 4-Apr-2013 Video Survey and Well Drillers Report)

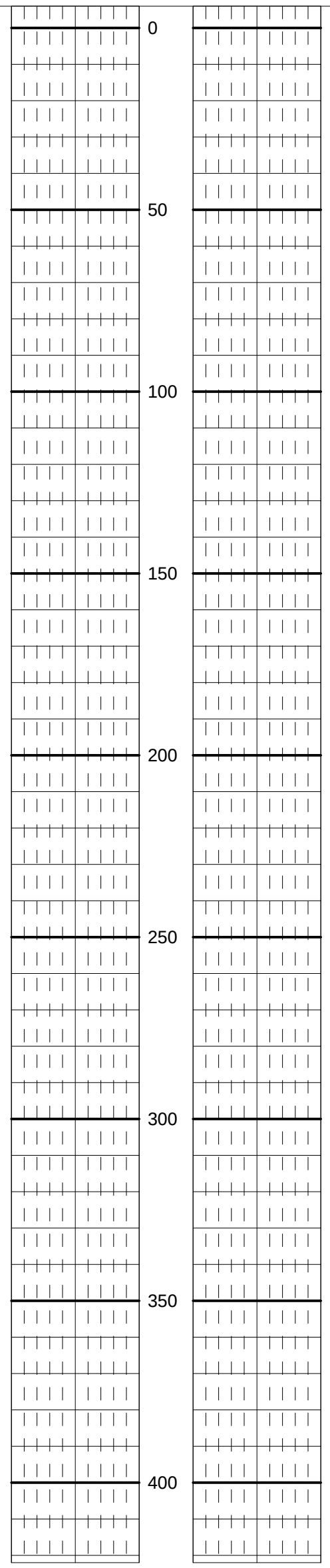
No Well Drillers Report. No lithology recorded.

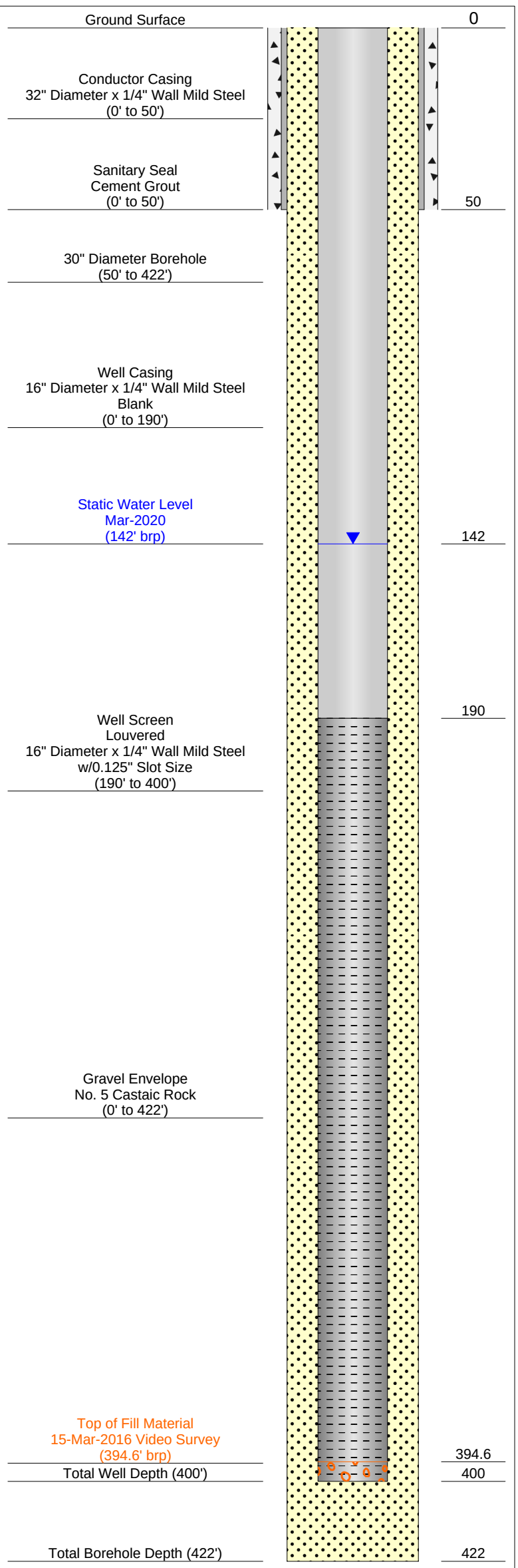


AS-BUILT PROFILE: WELL 21

PALMDALE WATER DISTRICT WELL 21 PALMDALE, CALIFORNIA DECEMBER 2020	STEEL TYPE: Steel PERFORATION TYPE/SIZE: Mill Slot / Unknown size (original); Mill Slot / 0.140 in. (liner) SCREEN INTERVALS (ft bgs): Unknown (original); 216-346 (liner) CONSTRUCTION YEAR: Unknown (original), 1979 (liner) STATE WELL NUMBER: Unknown	Notes: Well details based on 4-Apr-2013 video survey and Well Drillers Report. DRAWN BY: K.MAKAR APPROVED BY: R.KYLE	KYLE Groundwater	**PROJECT NO.** 3020.001 **APPENDIX** F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/GRAVEL: medium to coarse sand, gravel	SP
SAND W/GRAVEL: coarse sand and gravel, some small to medum boulders	SP
SAND W/GRAVEL: coarse sand and fine gravel	SP
SAND: medium sand, small clay streaks	SP
SAND: coarse sand	SP
SAND: medium to coarse sand, small clay streaks	SP
CLAY: clay with medium sand	CL
SAND: hard packed sand	SP
GRANITE: granite	Granite





AS-BUILT PROFILE: WELL 22

PALMDALE WATER DISTRICT
WELL 22
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.125 in.
SCREEN INTERVALS (ft bgs): 190-400
CONSTRUCTION YEAR: 1974
STATE WELL NUMBER: 06N11W34P

Notes:

DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
CLAY: clay with gravel	CL
SAND W/CLAY: sand with clay	SP-SC
GRAVEL: gravel with clay	GP
GRAVEL: gravel with rock	GP
CLAY: clay with gravel	CL
GRAVEL: gravel with clay	GP
CLAY: clay with gravel	CL
GRAVEL: gravel with clay	GP
CLAY: clay with gravel	CL
GRAVEL: gravel with clay	GP
GRAVEL: gravel	GP
GRAVEL: gravel with clay	GP
CLAY: clay with gravel	CL
GRAVEL: gravel	GP
CLAY: clay with gravel	CL
GRAVEL: gravel with clay	GP
GRAVEL: gravel with rock	GP
CLAY: clay with gravel	CL
GRAVEL: gravel with clay	GP
GRAVEL: gravel	GP
CLAY: clay	CL
GRAVEL: gravel with clay	GP
CLAY: clay	CL
GRAVEL: gravel with clay	GP
CLAY: clay	CL
GRAVEL: gravel with clay	GP
GRAVEL: gravel with granite	GP
GRANITE: granite	Granite

Spontaneous Potential (mV): 0, 50, 100

Resistivity RSN / RLN (Ohm-m): 0, 50, 100

0, 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850

As-Built Profile

Ground Surface	0
Sanitary Seal Cement Grout (0' to 80')	
Annular Seal 9 Sack Slurry (0' to 50')	50
Conductor Casing 30" Diameter 5/16" Wall Mild Steel (0' to 80')	80
Gravel Fill Tube Unknown Diameter Mild Steel (0' to 85')	85
28" Diameter Borehole (80' to 900')	
Well Casing 16" I.D. x 5/16" Wall Mild Steel Blank (0' to 600')	
Gravel Envelope 1/4" Birdseye (50' to 900')	
Static Water Level Mar-2020 (558' brp)	558
	600
Well Screen Louvered 16" I.D. x 5/16" Wall Mild Steel w/0.030" Slot Size (600' to 840')	
Top of Fill Material (Debris) 25-Apr-2012 Video Survey (740' brp)	740
Total Well Depth (840')	840
Total Borehole Depth (900')	900

AS-BUILT PROFILE: WELL 23A

PALMDALE WATER DISTRICT
WELL 23A
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.030 in.
SCREEN INTERVALS (ft bgs): 600-840
CONSTRUCTION YEAR: 1991
STATE WELL NUMBER: 06N11W19L

Notes:

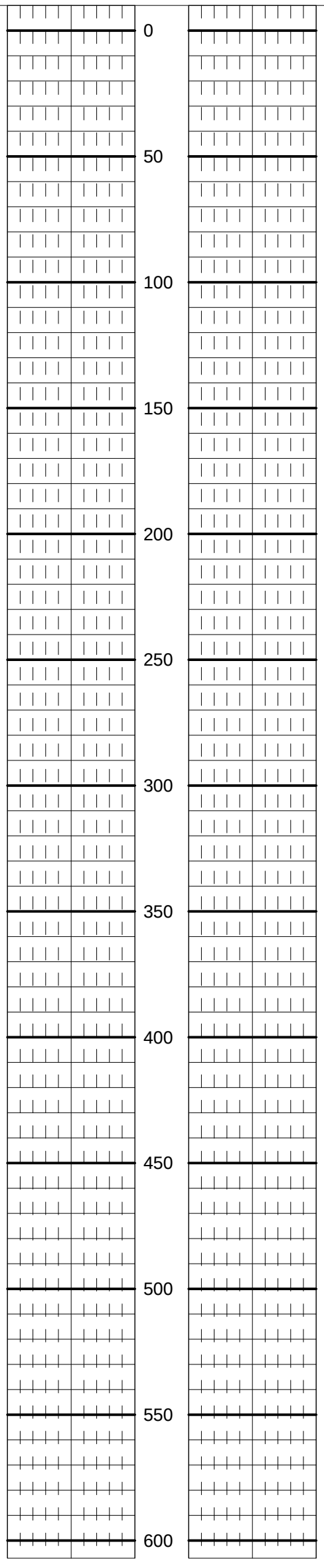
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

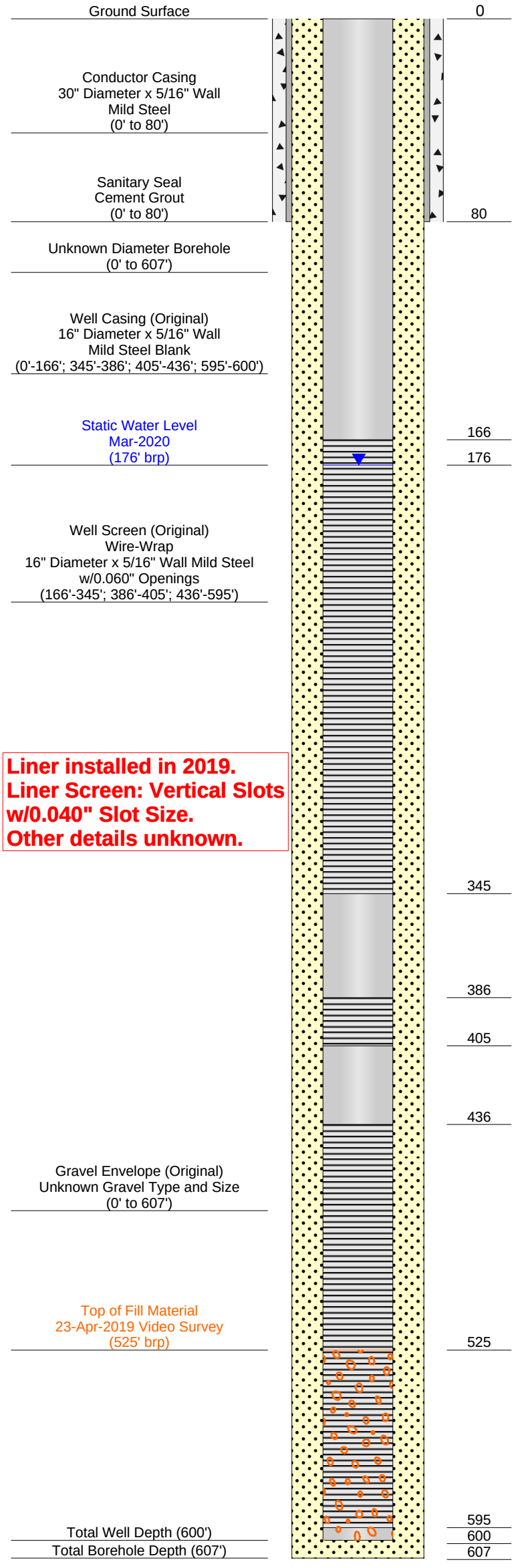
PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
CONDUCTOR: No lithology provided.	N/A
SAND: fine sand and cobbles	SP
SAND: fine sand with clay streaks	SP
CLAY: clay with sand	CL
SAND W/GRAVEL: rocks, medium to coarse sand, gravel	SP
CLAY: tan clay	CL
SAND: fine sand, small gravel, trace clay	SP
CLAY: clay	CL
SAND W/CLAY: brown sand with clay	SP-SC
GRAVEL: gravel with clay	GP
CLAY W/SAND: brown clay with sand, trace gravel	CL
SAND: fine sand, small gravel, trace clay	SP
CLAY W/SAND: clay with sand, trace gravel	CL
SAND: fine sand, small gravel, trace clay - tight	SP
SAND: fine sand, small gravel, trace clay- firm	SP
D. C. GRANITE: decomposed granite with clay	Granite
GRANITE: granite firm	Granite
GRANITE: granite, decomposed granite, fine sand	Granite



As-Built Profile
(Based on 23-Apr-2019 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 25

PALMDALE WATER DISTRICT
WELL 25
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire-Wrap / 0.060 in.
SCREEN INTERVALS (ft bgs): 166-345; 386-405; 436-595 (orig.) (video)
CONSTRUCTION YEAR: 1989 (original), 2019 (liner)
STATE WELL NUMBER: 06N11W35J01

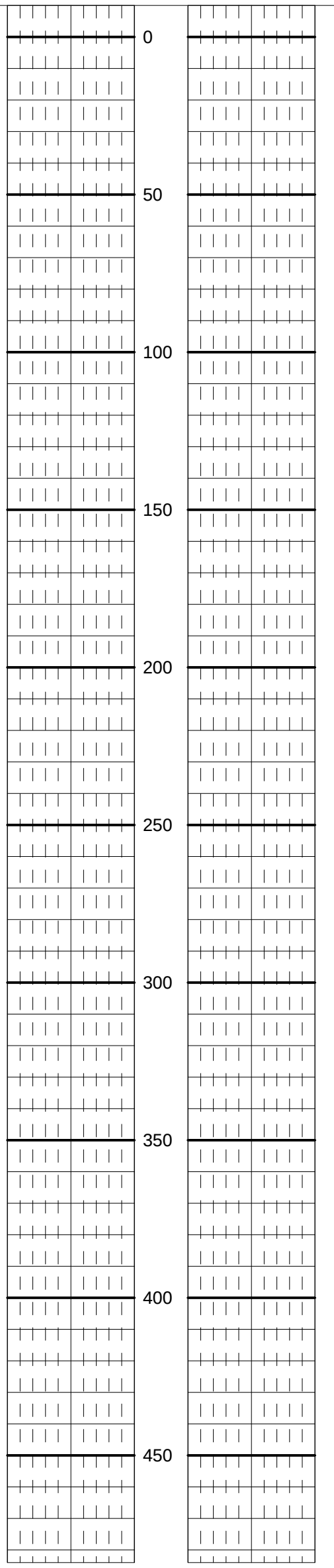
Notes:
Well details based on 13-Nov-2003 video survey and Well Drillers Report.
Liner installed in 2019.
Details unknown.

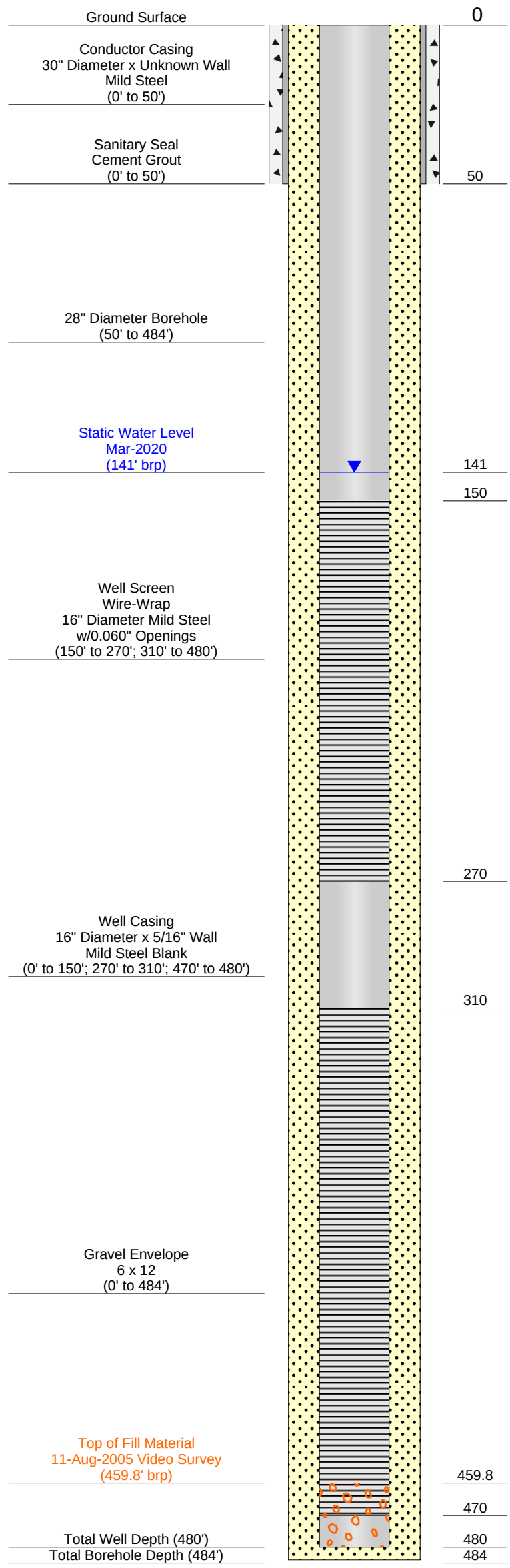
DRAWN BY: K.MAKAR
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
CONDUCTOR: conductor (no lithology provided)	Conductor
SAND: fine sand, fine gravel, some clay	SP
GRAVEL: gravel with sand	GP
GRAVEL: gravel with rocks	GP
CLAY: clay	CL
GRAVEL: gravel with rocks and sand	GP
CLAY: clay	CL
SAND: fine sand, clay, fine gravel	SP
GRAVEL: gravel with clay	GP
CLAY: sandy clay with fine gravel	CL
CLAY: clay with gravel streaks	CL
GRAVEL: gravel, small rocks, sand	GP
GRAVEL: gravel with clay	GP
CLAY: clay	CL
GRAVEL: gravel with snady clay	GP
CLAY: clay	CL
GRAVEL: fine to medium gravel, some clay	GP
GRAVEL: decomposed granite gravel, some clay	GP
CLAY: gray clay, trace gravel	CL
GRAVEL: decomposed granite gravel, some clay	GP
GRAVEL: decomposed granite (firm)	Granite
GRANITE: granite gravel and clay	Granite
GRANITE: granite (hard), with spots of clay	Granite
GRANITE: granite (hard)	Granite





AS-BUILT PROFILE: WELL 26

PALMDALE WATER DISTRICT
WELL 26
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire-Wrap / 0.060 in.
SCREEN INTERVALS (ft bgs): 150-270; 310-470
CONSTRUCTION YEAR: 1989
STATE WELL NUMBER: 06N11W33J02

Notes:

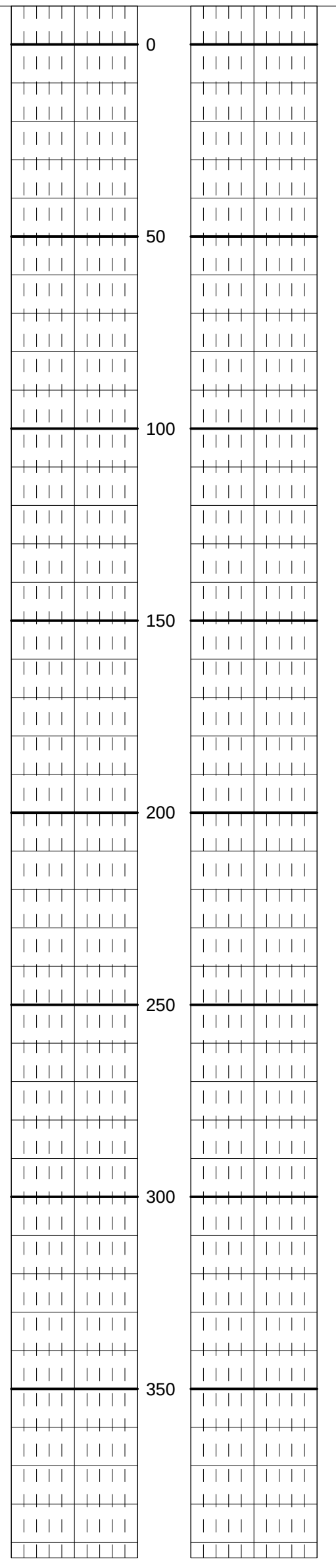
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

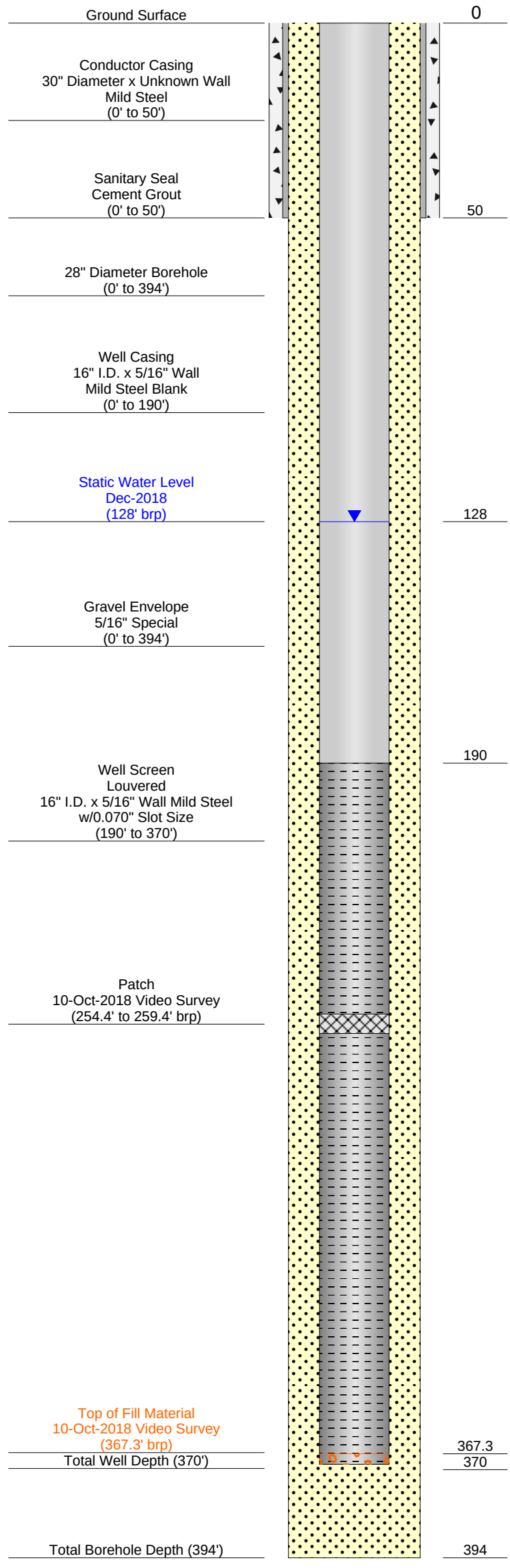
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/GRAVEL: rocks, medium to coarse sand, gravel	SP
SAND: fine sand, spots of clay, trace gravel	SP
SAND W/GRAVEL: sand, gravel and some clay	SP
SAND W/GRAVEL: sand, gravel	SP
SAND W/GRAVEL: sand, gravel, some rocks	SP
CLAY: sandy clay	CL
SAND W/GRAVEL: sand, gravel, some rocks	SP
SAND: sand and clay	SP
SAND W/GRAVEL: sand, gravel and some clay	SP
CLAY: sandy clay	CL
SAND W/GRAVEL: sand, gravel and some clay	SP
SAND W/GRAVEL: sand, gravel	SP
SAND W/GRAVEL: sand, gravel and some clay	SP
GRANITE: granite	Granite
GRANITE: granite with gray clay, some gravel	Granite





AS-BUILT PROFILE: WELL 29

PALMDALE WATER DISTRICT
WELL 29
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.070 in.
SCREEN INTERVALS (ft bgs): 190-370
CONSTRUCTION YEAR: 1989
STATE WELL NUMBER: 06N11W35G01

Notes:

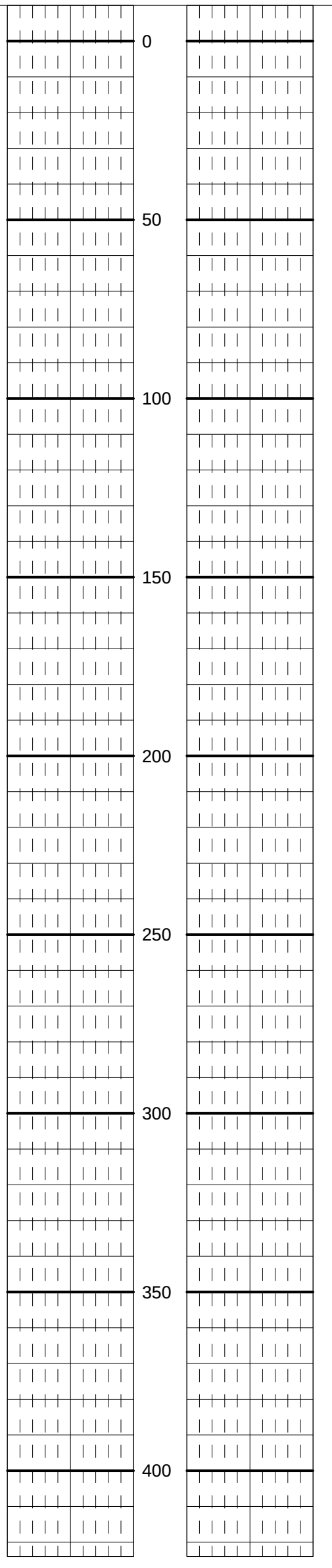
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

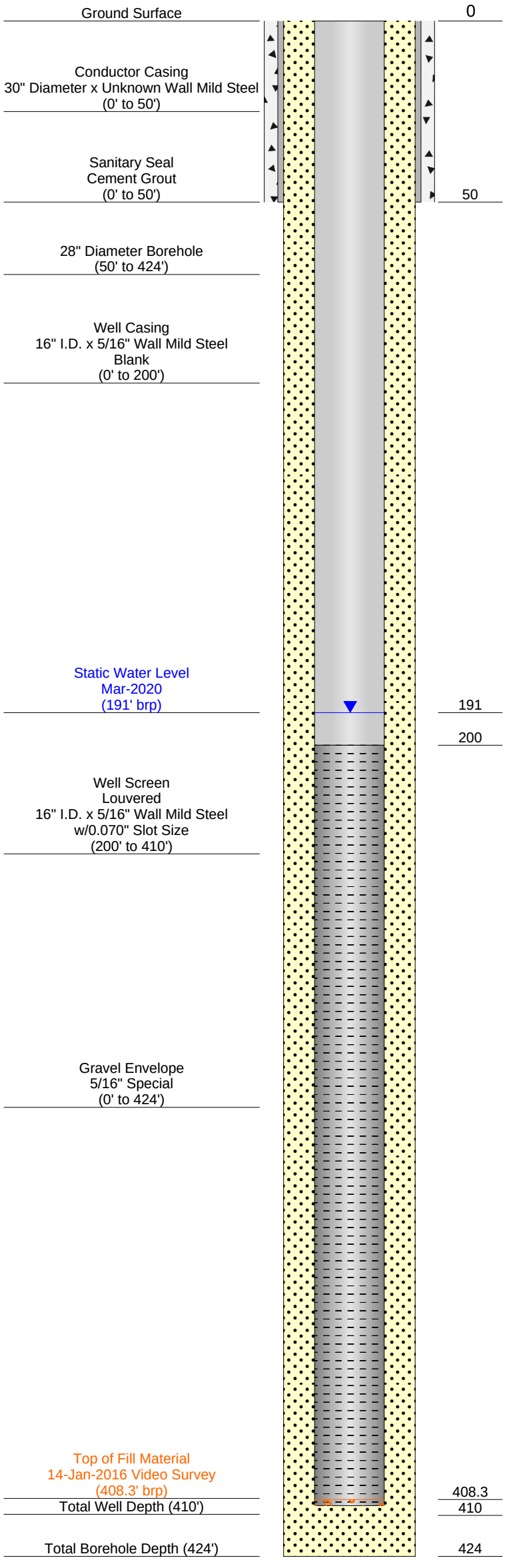
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
CONDUCTOR: conductor (no lithology provided)	N/A
SAND W/GRAVEL: sand, gravel, and rock	SP
SAND: fine sand some clay and rocks	SP
SAND: fine sand, sandy clay	SP
SAND: fine sand some clay and gravel	SP
CLAY W/SAND: sandy clay, gravel	CL
CLAY: clay	CL
SAND W/GRAVEL: sand, fine to medium gravel	SP
CLAY: clay	CL
CLAY: clay, some sand and gravel	CL
SAND W/GRAVEL: sand, gravel, and spots of clay	SP
SAND: fine sand, gravel, decomposing granite	SP
GRANITE: granite	Granite





AS-BUILT PROFILE: WELL 30

PALMDALE WATER DISTRICT
WELL 30
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.070 in.
SCREEN INTERVALS (ft bgs): 200-410
CONSTRUCTION YEAR: 1989
STATE WELL NUMBER: 06N11E36C

Notes:

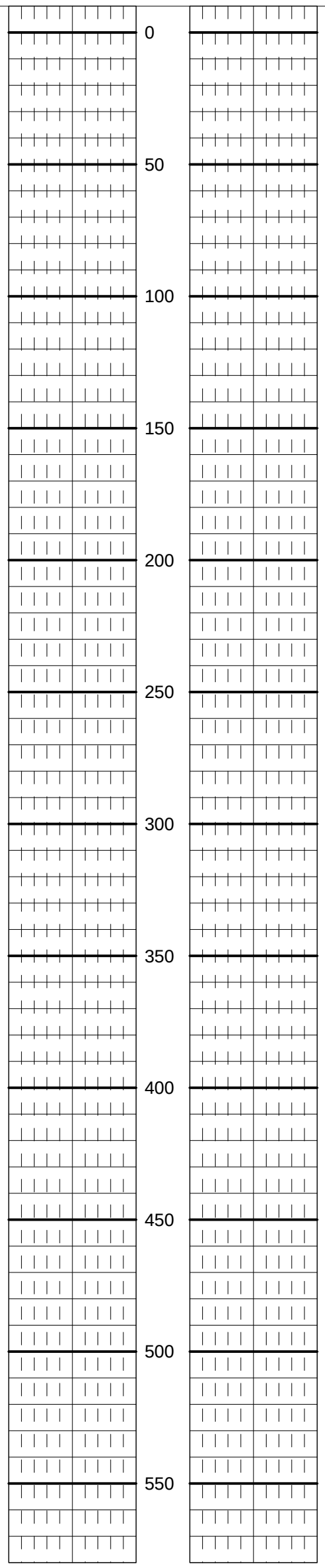
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

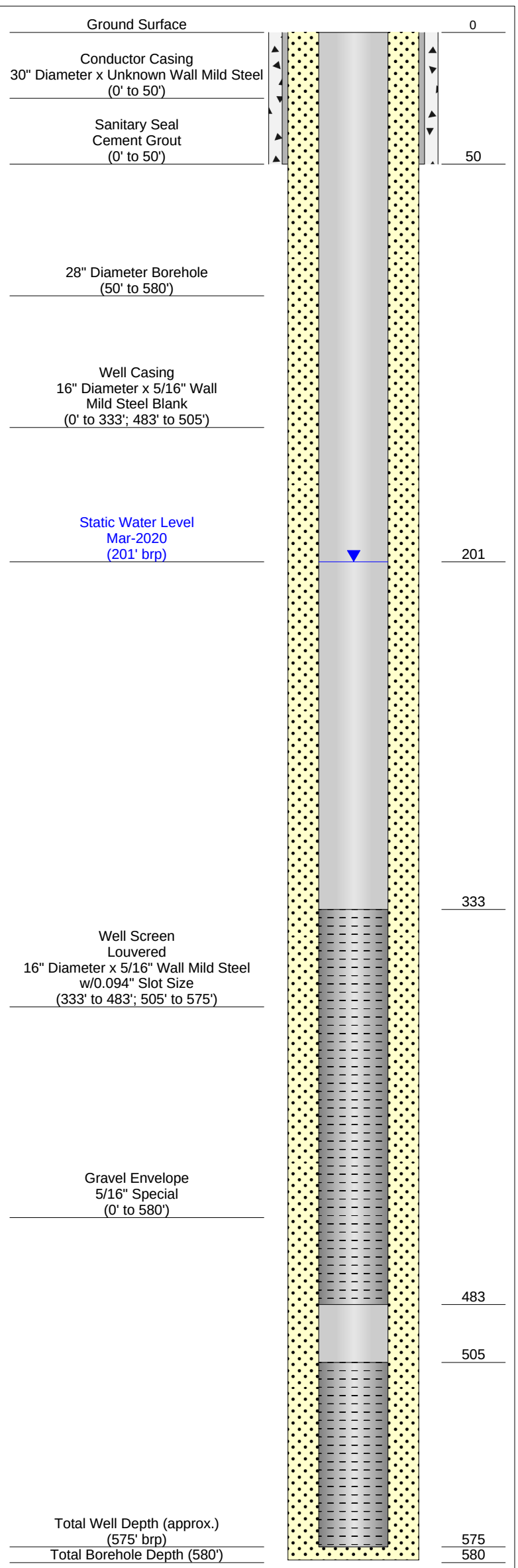
KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/GRAVEL: sand, gravel, and clay	SP
SAND W/GRAVEL: sand, gravel, some rocks	SP
GRAVEL: fine gravel	GP
SAND W/GRAVEL: sand, gravel	SP
SAND: fine sand	SP
SAND: sand	SP
CLAY: sandy clay	CL
SAND: fine sand	SP
SAND W/CLAY: medium sand, coarse sand with clay	SP-SC
SAND: rocks, fine to coarse sand	SP
SAND: rocks, fine to coarse sandy clay	SP
SAND: fine sand some clay	SP
CLAY: sandy clay	CL
SAND: fine sand	SP
CLAY: sandy clay	CL
SAND: fine sand	SP
SAND: fine sand some clay	SP
SAND: sand	SP
SAND W/CLAY: sand and clay	SP
SAND: fine sand some clay	SP
SAND W/CLAY: sand and clay	SP
CLAY: sandy clay	CL
SAND W/GRAVEL: dark sand, gravel	SP
GRANITE: hard granite	Granite





AS-BUILT PROFILE: WELL 32

PALMDALE WATER DISTRICT
WELL 32
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Louvered / 0.094 in.
SCREEN INTERVALS (ft bgs): 333-483; 505-573
CONSTRUCTION YEAR: 1989
STATE WELL NUMBER: 06N11W32P

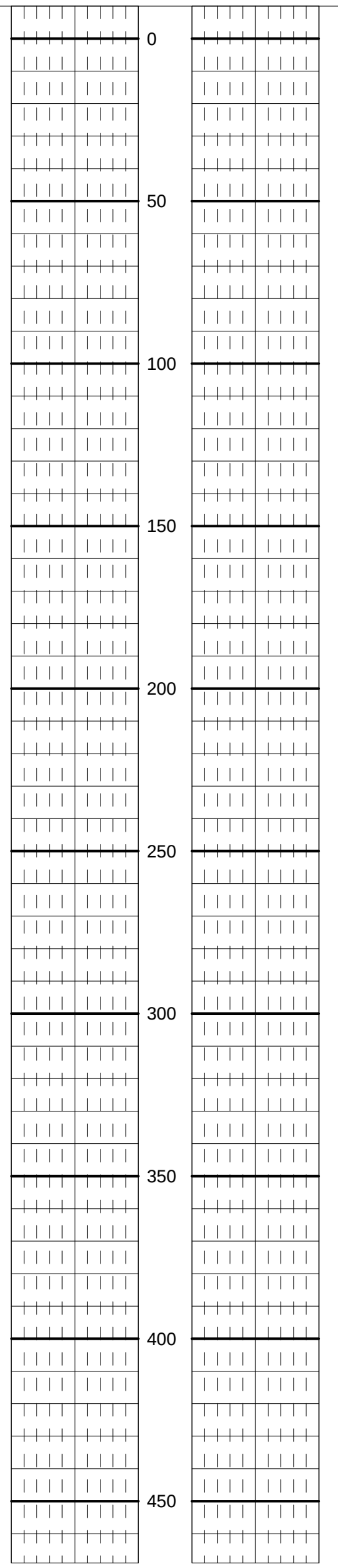
Notes:
Well details based on8-Dec-2013 video survey and Well Drillers Report.

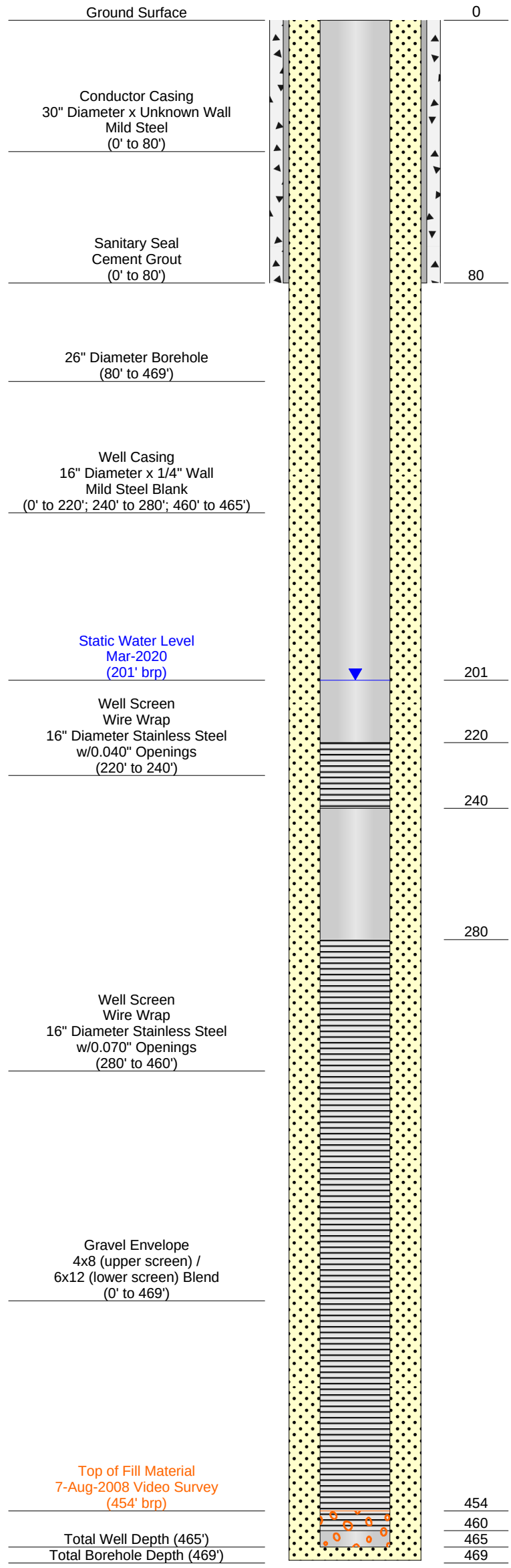
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO.	APPENDIX
3020.001	F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND: sand	SP
SAND: sand	SP
SAND: sand with gravel	SP
GRAVEL: gravel with clay	GP
GRAVEL: gravel with sand	GP
CLAY: clay with sand	CL
GRAVEL: gravel with sand	GP
GRAVEL: sandy gravel	GP
SAND W/CLAY: medium sand, coarse sand with clay	SP-SC
GRAVEL: gravel with sand	GP
GRANITE: decomposed granite	Granite





AS-BUILT PROFILE: WELL 33

PALMDALE WATER DISTRICT
WELL 33
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire Wrap / 0.040 in; 0.070 in
SCREEN INTERVALS (ft bgs): 220-240; 280-460
CONSTRUCTION YEAR: 1991
STATE WELL NUMBER: 06N11E36D

Notes:

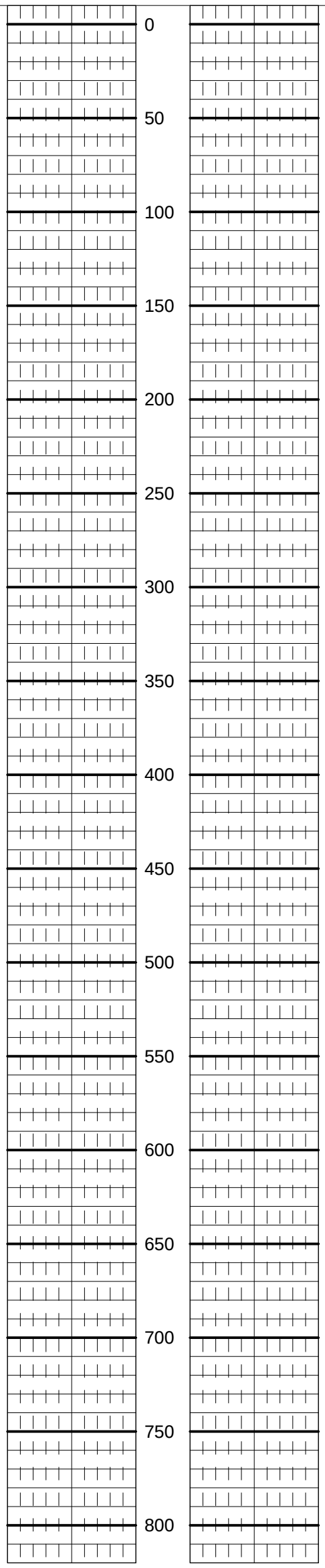
DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

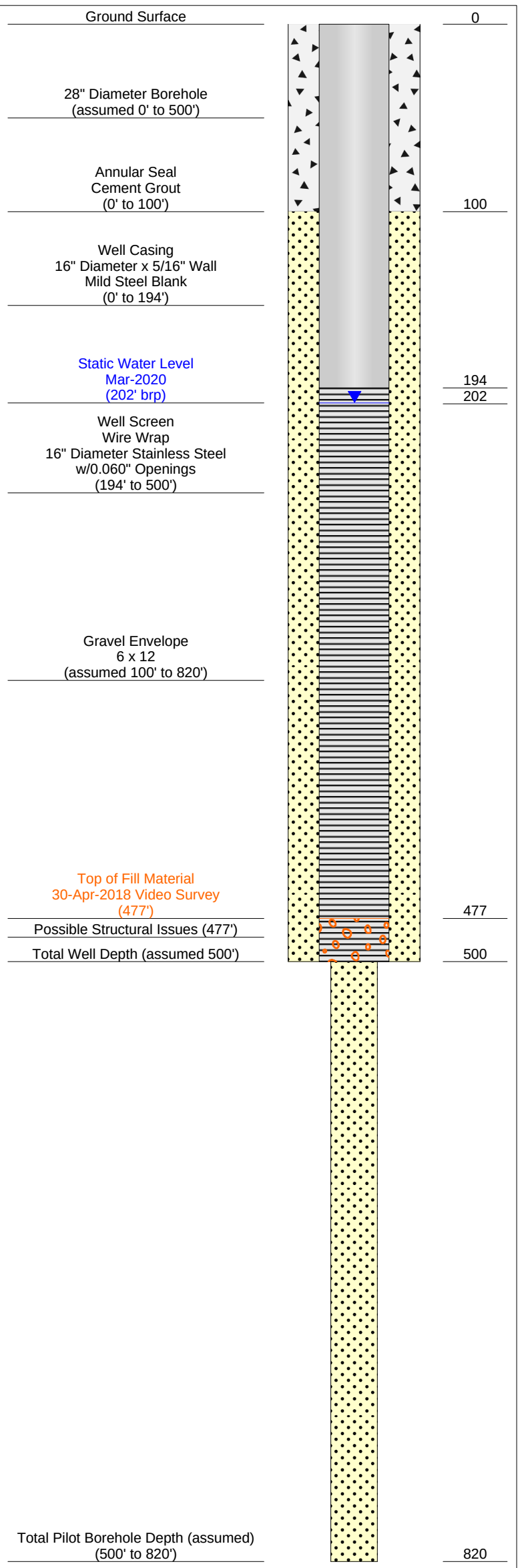
PROJECT NO. 3020.001

APPENDIX F

Lithology (Well Drillers Report)	Interpreted USCS Field Classification
SAND W/GRAVEL: sand, gravel, cobbles	SP
SAND W/GRAVEL: sand, gravel, clay	SP
SAND W/CLAY: sand and clay	SP-SC
SAND W/GRAVEL: sand, gravel, clay	SP
CLAY W/SAND: clay, sand, gravel	CL
CLAY W/GRAVEL: clay and gravel	CL
CLAY: clay	CL
CLAY W/SAND: clay, sand, gravel	CL
CLAY: clay hard packed	CL
GRANITE: granite	Granite



As-Built Profile
(Based on 30-Apr-2018 Video Survey and Well Drillers Report)



AS-BUILT PROFILE: WELL 35

PALMDALE WATER DISTRICT
WELL 35
PALMDALE, CALIFORNIA
DECEMBER 2020

STEEL TYPE: Mild Steel
PERFORATION TYPE/SIZE: Wire Wrap / 0.060 in.
SCREEN INTERVALS (ft bgs): 194-Unknown
CONSTRUCTION YEAR: 1991
STATE WELL NUMBER: 05N11W03W01

Notes:
Well details based on 30-Apr-2018 video survey and Well Drillers Report.

DRAWN BY: M.DYKSTRA
APPROVED BY: R.KYLE

KYLE Groundwater

PROJECT NO. 3020.001

APPENDIX F

APPENDIX G

May 29, 2020 CITM Survey – Well No. 7A

KYLE Groundwater

PACIFIC SURVEYS

CASING INSPECTION LOG

Job No. 26707

Company BWP 20-526

Well PALMDALE WATER DISTRICT WELL #7

Field PALMDALE

County LOS ANGELES State CA

Location:

27 MILES SOUTH OF E AVENUE P ON WEST SIDE OF 25th STREET E
GPS: 34.598356 -118.085688

Other Services:

NONE

Sec. Twp. Rge.

Permanent Datum T.O.C. Elevation
Log Measured From T.O.C. 0' above perm. datum
Drilling Measured From N/A

Elevation
K.B.
D.F.
G.L.

Date	5/29/2020
Run Number	ONE
Depth Driller	920'
Depth Logger	824'
Bottom Logged Interval	820'
Top Log Interval	0'
Static Water Level	530'
Depth Of Pump Bowls	N/A
Density / Viscosity	N/A
Max. Recorded Temp.	82.0 F
Pump Rate (GPM)	STATIC
Time Well Ready	10:00 AM
Time Logger on Bottom	10:45 AM
Equipment Number	PS-12
Location	L.A.
Recorded By	ABREAU
Witnessed By	---

Borehole Record

Run Number	Bit	From	To

Tubing Record

Size	Wgt/Ft	Top	Bottom

	Size	Wgt/Ft	Top	Bottom
Casing Record				
Surface String	N/A	N/A	0'	80'
Prot. String				
Production String	15.5" ID	0.250" WALL	0'	920'
Liner				

<<< Fold Here >>>

Comments

MILD STEEL WIRE-WRAP SCREEN FROM 573.8' TO 900'
USED Cu BEARING CALIBRATIONS FOR CITM_CIT
PATTERN STRIP FOR CALIPER IS 15.5"= BLUE =>16.5"=RED

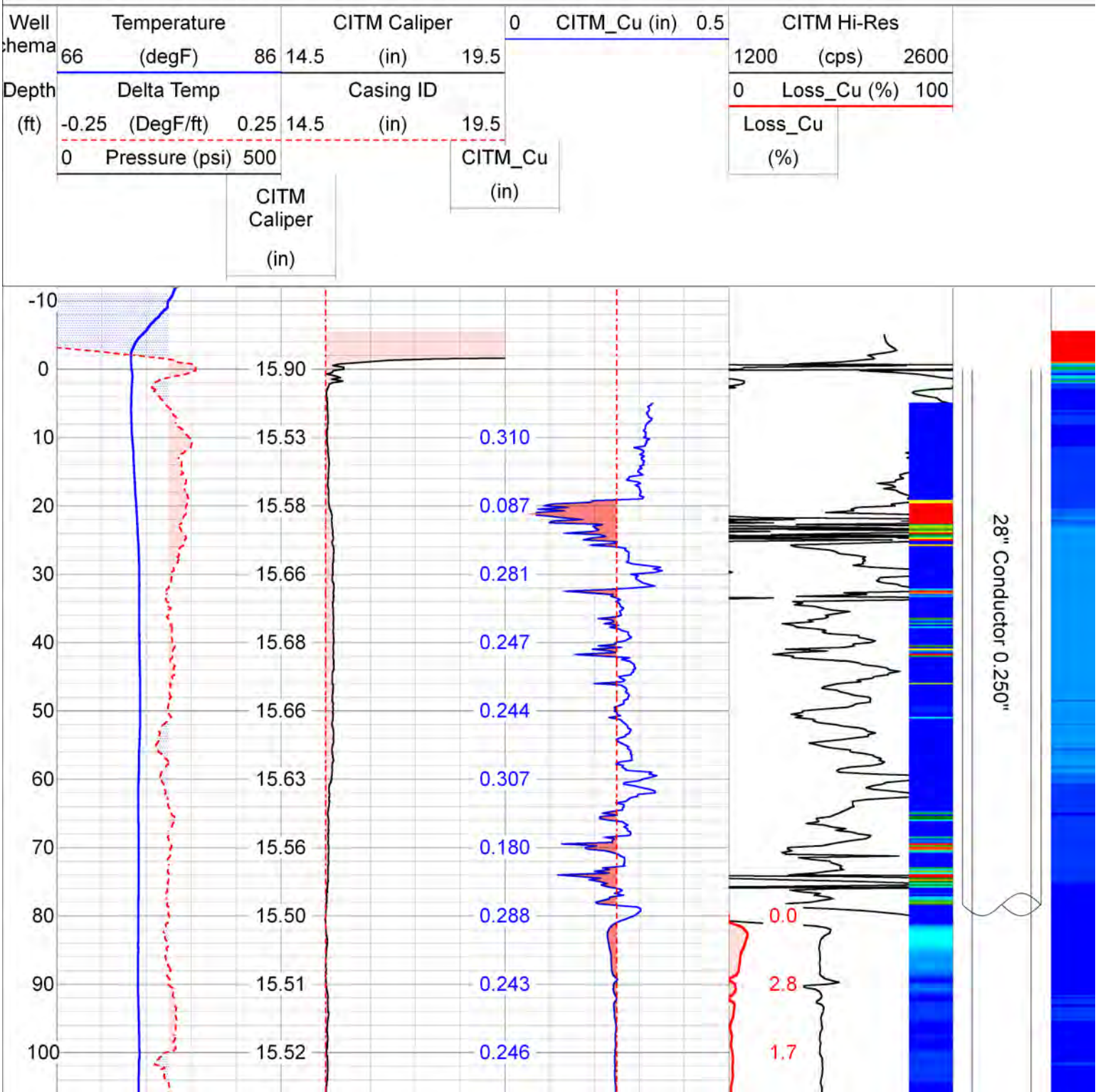
Calibration Report

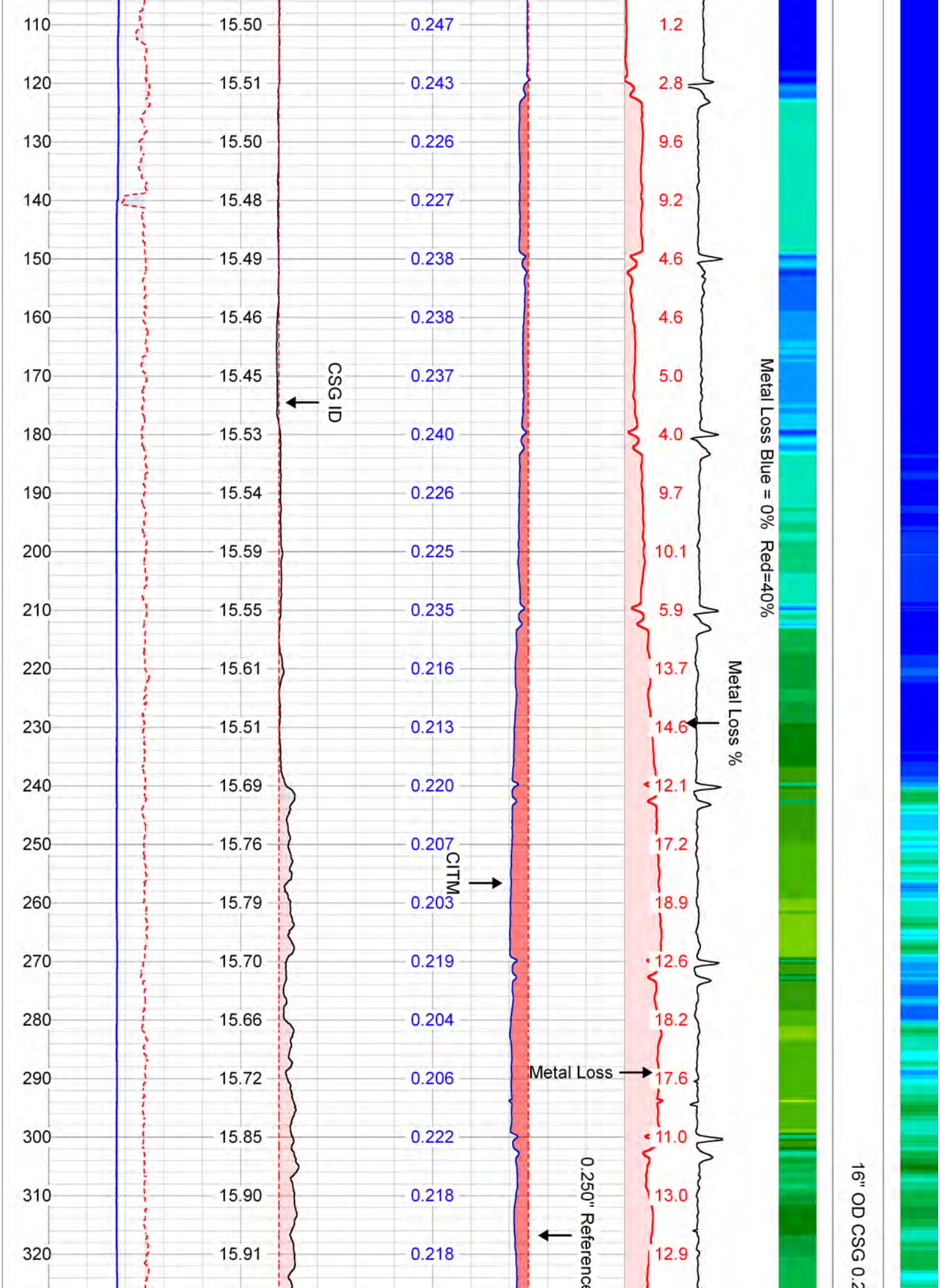
Database File	C:\Users\Rose1\Dropbox (Pacific)\Databases\26700-26799\26707.db
Dataset Pathname	CITM_FINAL
Dataset Creation	Fri May 29 11:23:57 2020

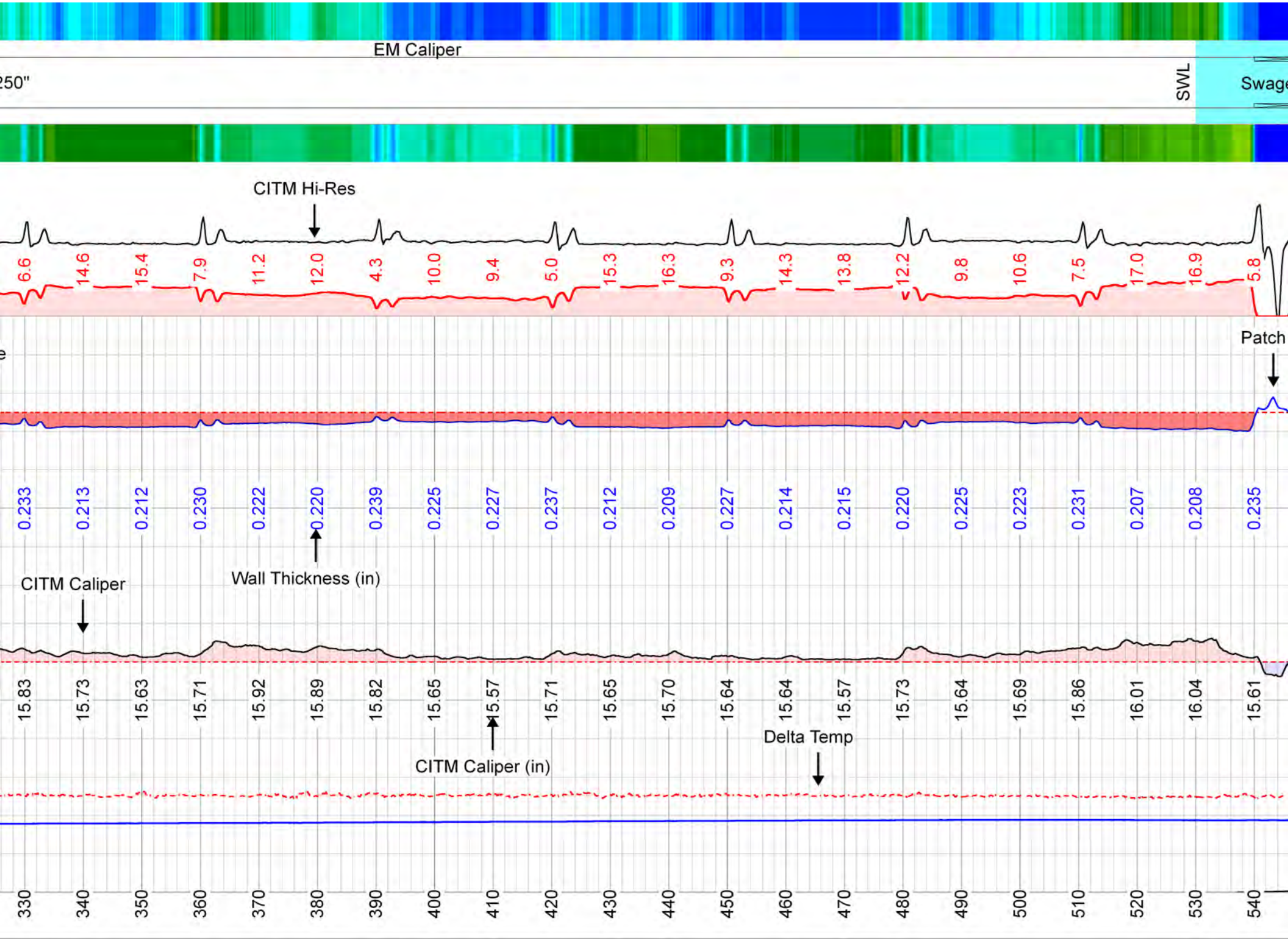
Casing Inspection/Caliper (RAMP QUICKLY TO 162VDC @ 115mA) Calibration Report

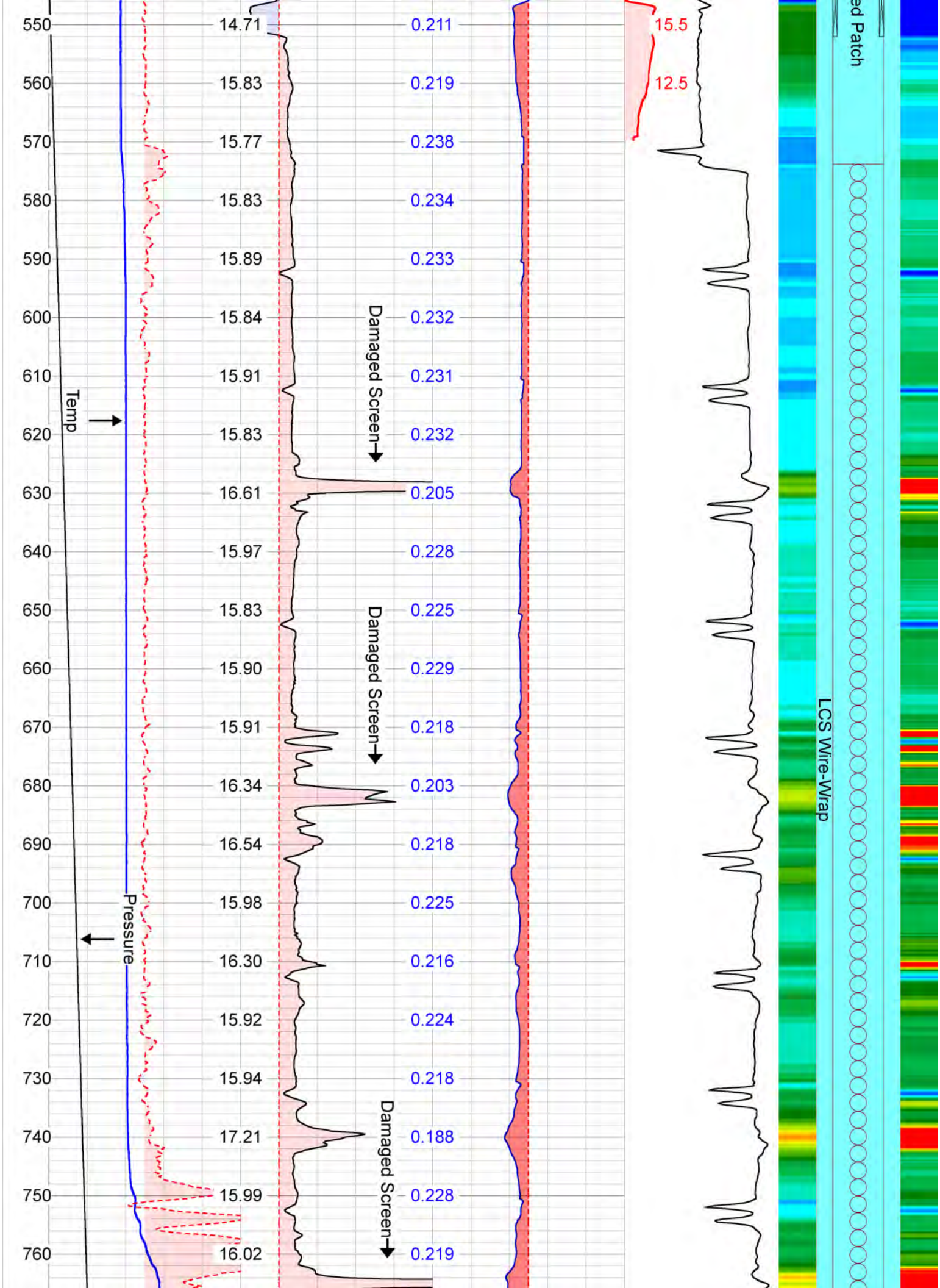
	Serial Number:	100
	Tool Model:	A
	Performed:	Mon Apr 27 08:32:08 2020
	Reference (cps)	Reading (cps)
Low:	0.000	0.000
High:	1.000	1.000
	Gain = 1.000	Offset = 0.000

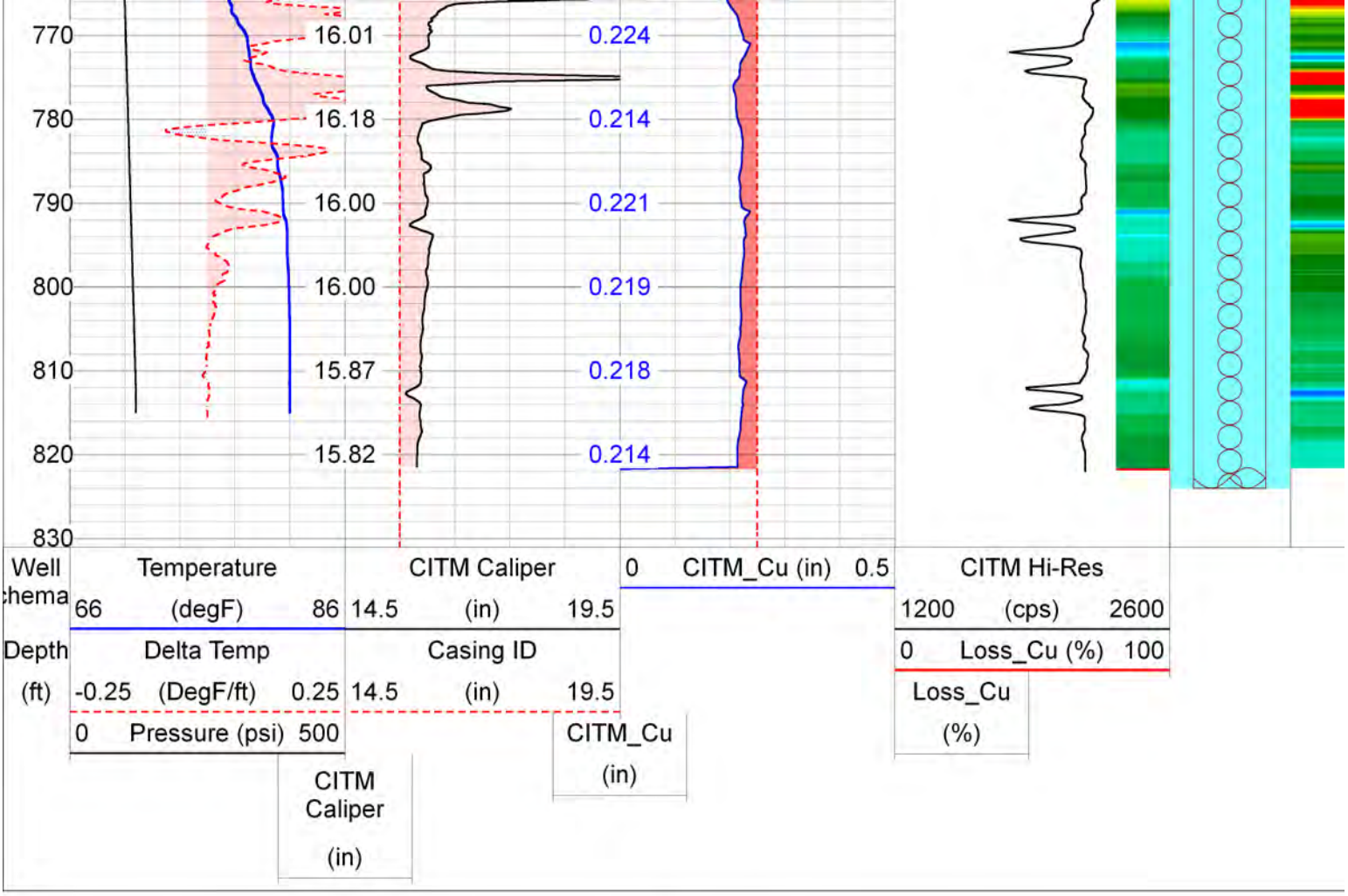
Database File	c:\users\rose1\dropbox (pacific)\databases\26700-26799\26707.db
Dataset Pathname	CITM_FINAL
Presentation Format	citm_final_mr
Dataset Creation	Fri May 29 11:23:57 2020
Charted by	Depth in Feet scaled 1:240




110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
15.50
15.51
15.50
15.48
15.49
15.46
15.45
15.53
15.54
15.59
15.55
15.61
15.51
15.69
15.76
15.79
15.70
15.66
15.72
15.85
15.90
15.91
0.247
0.243
0.226
0.227
0.238
0.238
0.237
0.240
0.226
0.225
0.235
0.216
0.213
0.220
0.207
0.203
0.219
0.204
0.206
0.222
0.218
0.218
1.2
2.8
9.6
9.2
4.6
4.6
5.0
4.0
9.7
10.1
5.9
13.7
14.6
12.1
17.2
18.9
12.6
18.2
17.6
11.0
13.0
12.9
CSG ID
CITM
Metal Loss
0.250" Reference
Metal Loss %
Metal Loss Blue = 0% Red=40%
16" OD CSG 0.2


EM Caliper
250"
SWL
Swage
CITM Hi-Res
6.6 14.6 15.4 7.9 11.2 12.0 4.3 10.0 9.4 5.0 15.3 16.3 9.3 14.3 13.8 12.2 9.8 10.6 7.5 17.0 16.9 5.8
Patch
0.233 0.213 0.212 0.230 0.222 0.220 0.239 0.225 0.227 0.237 0.212 0.209 0.227 0.214 0.215 0.220 0.225 0.223 0.231 0.207 0.208 0.235
CITM Caliper
Wall Thickness (in)
15.83 15.73 15.63 15.71 15.92 15.89 15.82 15.65 15.57 15.71 15.65 15.70 15.64 15.64 15.57 15.73 15.64 15.69 15.86 16.01 16.04 15.61
CITM Caliper (in)
Delta Temp
330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540


550
560
570
580
590
600
610
620
630
640
650
660
670
680
690
700
710
720
730
740
750
760
14.71
15.83
15.77
15.83
15.89
15.84
15.91
15.83
16.61
15.97
15.83
15.90
15.91
16.34
16.54
15.98
16.30
15.92
15.94
17.21
15.99
16.02
0.211
0.219
0.238
0.234
0.233
0.232
0.231
0.232
0.205
0.228
0.225
0.229
0.218
0.203
0.218
0.225
0.216
0.224
0.218
0.188
0.228
0.219
15.5
12.5
Damaged Screen
Damaged Screen
Damaged Screen
Temp
Pressure
LCS Wire-Wrap
ed Patch



Filter Report

Database File C:\Users\Rose1\Dropbox (Pacific)\Databases\26700-26799\26707.db
Dataset Pathname CITM_FINAL
Dataset Creation Fri May 29 11:23:57 2020

Filter Name	Filter Type	Filter Length
		(ft)
LSPD	Gaussian	3.00
LTEN	Gaussian	6.00
LSPDRT	None	
CITM_ICL	None	
CITM_CIT	None	
CITM_DIA	None	
PTEMP	None	
TEMP	None	
PRES	None	
HEAD_V	None	
V10	None	

Log Variables

DatabaseC:\Users\Rose1\Dropbox (Pacific)\Databases\26700-26799\26707.db
Dataset field/well/run1/CITM_UP/_vars_

Top - 573.80 ft

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	PERFS	SRFTEMP
	in	degF	in	in		degF
TEMP	15.5	100	15.5	0.25	No	0

TDEPTH
ft
573.8

573.8

573.80 ft - Bottom

BHTEMP_Src	BOREID	BOTTEMP	CASEOD	CASETHCK	**PERFS**	**SRFTEMP**
	in	degF	in	in		**degF**
TEMP	15.5	100	15.5	0.25	**Yes**	**0.145**

TDEPTH
ft
824

Variable Description

BHTEMP_Src : BHTEMP Input Source Selector
BOREID : Borehole I.D.
BOTTEMP : Bottom Hole Temperature
CASEOD : Casing O.D.
CASETHCK : Casing Thickness
PERFS : Perforation Flag
SRFTEMP : Surface Temperature
TDEPTH : Total Depth