Annual Surveillance Report
January 2017 through December 2017
Syphon Canyon Dam

DSOD Dam No. 1029-004
Irvine, CA
December 19, 2018

Prepared By:

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Prepared For:

Irvine Ranch Water District
Field Operations Department
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Irvine Ranch WATER DISTRICT

GENTERRA
CONSULTANTS, INC.
ENGINEERING & GEOTECHNICAL SERVICES

ANNUAL SURVEILLANCE REPORT
JANUARY 2017 THROUGH DECEMBER 2017
FOR
SYPHON CANYON DAM
DSOD DAM NO. 1029-004
IRVINE, CALIFORNIA

Submitted To:

Irvine Water District
Field Operations Department
P. O. Box 57000
Irvine, CA 92619-7000

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Project No. 397D-IRW

December 19, 2018

GENTERRA
CONSULTANTS, INC.
ENGINEERING & GEOTECHNICAL SERVICES

December 19, 2018 Project No. 397D-IRW

Irvine Ranch Water District
P. O. Box 57000
Irvine, CA 92619-7000

Attention: Mr. Jeff Smyth

Subject: Syphon Canyon Dam, DSOD Dam No. 1029-004,
Annual Surveillance Report from January 2017 through December 2017

Dear Mr. Smyth:

GENTERRA Consultants, Inc. (GENTERRA) is pleased to submit this Annual Surveillance Report for Syphon Canyon Dam covering the period from January 2017 through December 2017. This report is part of the scope of work described in our proposal dated October 14, 2015, and as authorized by the Irvine Ranch Water District (District) in Purchase Order No. 527854 dated December 22, 2015.

We appreciate this opportunity to provide the District with our services during this annual surveillance program. Please contact either of the undersigned with any questions.

Sincerely,
GENTERRA CONSULTANTS, INC.

Douglas A. Harriman, P.E.
Principal Engineer
P.E. 55620

Joseph J. Kulikowski, P.E., G.E.
President and Senior Principal Engineer
P.E. 17478, G.E. 491

Enclosure

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SECTION 1: INTRODUCTION AND BACKGROUND

1.1 GENERAL

This report presents the results of the dam safety monitoring and surveillance program for Syphon Canyon Dam and Reservoir conducted by the Irvine Ranch Water District (District) and GENTERRA Consultants, Inc. (GENTERRA) for the 12-month period from January 2017 through December 2017. It includes a compilation of the field measurements, observations, and conclusions related to the general condition of the dam. In addition, recommendations are provided for continued operation, surveillance, and monitoring of the dam. This report is being submitted as part of the jurisdictional requirements of the State of California, Department of Water Resources, Division of Safety of Dams (DSOD).

This surveillance report includes two-year graphical summaries of the field measurements of water levels in the piezometers, flow from the subdrain, and reservoir water levels at Syphon Canyon Dam. Historical (10-year) graphical and tabular summaries of piezometer water levels, subdrain flow rate, and reservoir water surface elevations are also included. GENTERRA reviewed the historical data to evaluate the long-term performance of the dam and reservoir and to identify any adverse trends or significant deviations from normal conditions. Water levels in the piezometers and seepage flow rates are presented with corresponding reservoir water surface elevations for the 10-year period from January 2008 through December 2017.

1.2 DAM AND RESERVOIR

Syphon Canyon Dam is a homogeneous earthfill embankment dam built in 1949 located in Irvine, California. The District took over operation of the Syphon Canyon Dam and Reservoir on January 4, 2010 from The Irvine Company. The Irvine Company provided limited operational data to the District and, as a result, there are some gaps in the historical data.

The vertical datum used for the original dam design and construction, and which has continued to be used for the dam safety monitoring program is the National Geodetic Vertical Datum of 1929 (NGVD29).

According to DSOD (2000) as well as as-built plans, the dam crest is at Elevation 385.0 feet, with a crest width of 10 feet. The height of the dam is 59 feet with a crest length of 843 feet. The crest of the dam is surfaced with soil and gravel.

The original construction of the dam consisted of a 2.5H:1V (Horizontal:Vertical) slope ratio for the upstream slope from the dam crest to Elevation 345.0 feet, and then a flatter 6H:1V slope ratio down to the upstream toe (AECOM, 2016). The downstream face of the dam consisted of a uniform 2.5H:1V slope ratio. No benches were originally constructed on either face of the dam.

At some unknown time, modifications to both faces of the dam occurred. The current configuration of the dam consists of the following:

- Upstream Face of the Dam: The upstream face of the dam is covered with vegetation from the crest of the dam to a bench at approximate Elevation 378.0 feet, and has a slope ratio of 1.2H:1V. Between the bench to approximate Elevation 370.0 feet, the slope ratio is 1.4H:1V and has a layer of riprap for slope protection. Below Elevation 370.0 feet, the slope flattens to 6H:1V and is covered with some vegetation.

- Downstream Face of the Dam: The downstream face of the dam is covered with vegetation and has a slope ratio of 2.5H:1V. There is a bench at approximate Elevation 340.0 feet.

The reservoir has a storage capacity of 500 acre-feet per the document titled "*Dams within the Jurisdiction of the State of California*" (DSOD, July 2000). However, area-capacity curves shown on the as-built plans as well as in the updated document "*Dams within Jurisdiction of the State of California*" (DSOD, September 2017) report the capacity of the reservoir at the spillway crest elevation to be 578 acre-feet.

1.3 SPILLWAY

The spillway consists of an approach, channel, and downstream exit located on the left abutment. The spillway is a 12.5-foot-wide, open trapezoidal channel, with a broad-crested weir. Original construction of the weir control section and sides of the spillway channel were lined with gunite, but since then shotcrete was added (AECOM, 2016). In 2017, a portion of the left spillway wall was patched with shotcrete. The spillway crest is at Elevation 378.0 feet, which provides 7 feet of freeboard.

1.4 OUTLET WORKS

The outlet works, located near the right abutment, currently consist of a 15-inch-diameter reinforced concrete pipe (RCP) with both upstream and downstream valves. In 2015, the 15-inch slide gate at the inlet was replaced with a 12-inch-diameter valve. The invert of the inlet is at approximate Elevation 336.0 feet.

On the downstream side of the dam, the 15-inch-diameter RCP transitions to an older 16-inch-diameter metallic pipe. A 16-inch butterfly valve is on the metallic pipe. The 16-inch metallic pipe joins a 16-inch-diameter, cement-mortar-lined and -coated (CML&C) steel pipe that connects to the Interim Facility, which serves as a reservoir drain line. The outlet pipe that serves as an emergency blowoff discharges into the underground storm water system.

SECTION 2: FIELD MEASUREMENTS

2.1 GENERAL

The District has been taking field measurements at Syphon Canyon Dam on a regular basis since January 4, 2010. These measurements include seepage flows at a flow point and the water levels in 12 piezometers. District personnel measure the water levels in the reservoir, piezometers and the seepage flow point monthly. Precipitation is measured by an onsite rain gage.

Figure 1 is a Site and Instrumentation Plan showing the layout of the dam and appurtenances, as well as the locations of the piezometers and the seepage collection subdrain. Figure 2 shows Section A-A', which is located at the maximum section of the dam. As used in this report, the left and right designations are as viewed looking downstream.

A slope failure (sloughing just above the previous downstream slope bench) occurred in January 2011 just above the previous bench on the downstream face of the dam. Based on the results of a limited geotechnical investigation performed by GENTERRA, slope repair was recommended (GENTERRA, March 9, 2011). Repair plans (GENTERRA, June 2011) were approved by the DSOD in July 2011.

Rock Structures Construction Company (Lic. No. 596470A) performed the slope repair work under contract to the District. Construction began on August 15, 2011. Backfill and compaction was completed on August 25, 2011.

2.2 PIEZOMETERS

Water levels in the piezometers are measured monthly by District personnel. The reservoir water surface elevation is also noted at the time of the field measurements.

During the current reporting period, the reservoir water surface elevation varied between Elevations 357.3 feet and 375.9 feet. The spillway crest is at Elevation 378.0 feet. The crest of the dam is at Elevation 385.0 feet.

A piezometer is a small-diameter well used mainly to measure water levels. It is typically installed as a casing in a vertical borehole and has a discrete perforated zone near its bottom to enable monitoring of changes in water levels within that zone. More than one piezometer can be installed within a single, larger-diameter outer well casing. These groups of piezometers are often referred to as multi-stage or nested piezometers. The tip of each piezometer is generally placed at its own discrete depth range within the outer well casing. The outer well casing is perforated along the vertical zones corresponding to the depths of the piezometer tips. At this facility, Piezometers P-1, P-2, and P-3 each have two piezometers in them, designated as A and B. Table 1 presents some detailed information about the piezometers, including the material in which the tips are founded.

In December 2015, the District converted Piezometers P-2A, P-2B, P-4, P-5, P-6, P-7, P-8, and P-9 to vibrating wire piezometers. A vibrating wire piezometer contains a high tensile steel wire attached at one end to a diaphragm. The wire is electronically plucked to make it vibrate, and its resonant frequency is proportional to the tension in the wire. The frequency of vibration in the wire induces an alternating electrical current in a coil. The magnitude of the current is detected, and the frequency reading is then converted to a pressure. The pressure fluctuates with changes in water levels in the immediate vicinity of the piezometer tip.

The location of each piezometer is shown in Figure 1. Figure 2 illustrates selected piezometers along a representative cross-section through the dam (Section A-A'), along with the elevations of piezometric levels corresponding to the maximum historical water levels recorded. The maximum and minimum piezometric levels during the current reporting period are also shown. Please note that the piezometric levels within the dam, at the locations of the piezometers, were assumed to be the same as the water levels in the piezometers. In general, the piezometric surface within the dam is higher than the water levels in the piezometers.

Table 2 lists piezometer water levels for the 10-year period from January 2008 through December 2017. Figures 3A through 3D are graphical plots of piezometer water levels and reservoir water surface elevations during the two-year period from January 2016 through December 2017. Figures 4A through 4D are graphical plots of piezometer water levels and reservoir water surface elevations during the 10-year period from January 2008 through December 2017.

Discussed below for each piezometer is a summary of the water level measurements during the 12-month review period as well as historical trends.

Nested Piezometers P-1, P-2 and P-3 are located on the crest of the dam, P-2 is located near the maximum section of the dam, P-1 is located on the right side of the crest, and P-3 is located on the left side of the crest. Piezometer P-1A is nested in the same well as Piezometer P-1B located on the right most portion of the crest of the dam. The tip of P-1A is located within the dam embankment at Elevation 365.7 feet, while P-1B has a tip within the dam foundation at Elevation 345.7 feet. Piezometer P-1A remained nearly dry. The water levels in P-1B generally responded to reservoir water surface fluctuations and were within historical water levels during the review period (Figures 3A and 4A).

Piezometer P-2A is nested in the same well as Piezometer P-2B on the crest of the dam, near the maximum section of the dam. The tip of P-2A is located within the dam embankment at Elevation 342.2 feet, while P-2B has a tip within the dam foundation at Elevation 309.4 feet. Piezometer P-2A had showed little response to the fluctuations in the reservoir, prior to emptying the reservoir and after refilling the reservoir (Figure 4B). In July 2015, the District performed a maintenance cleaning of P-2A. Since the reservoir was refilled, the water level reading in P-2A have been gradually increasing, within the historical range. During the review period, water levels in P-2A showed some response to the reservoir water level fluctuations (Figure 3B).

The water level readings in Piezometer P-2B have been unreliable (erroneous) since the vibrating wire instrument was installed in December 2015. In 2016, GENTERRA notified the District of the erroneous readings. The District determined that the vibrating wire instrument was providing faulty data, which resulted in the higher than normal readings. A repair was performed on the instrument. On February 16, 2017, the District performed a maintenance cleaning of P-2B which resulted in a new reported bottom of Elevation 304.0 feet, which is five feet deeper than prior to the cleaning. GENTERRA has updated the tip elevation shown in Tables 1 and 2.

The District took two manual readings in P-2B during this review period (taken on February 28, 2017 and April 26, 2017) which indicated a new historical high-water level at Elevation 351.0 feet (Figures 3B and 4B). The vibrating wire instrument was providing higher readings than what was measured manually, and the District should attempt to recalibrate and see its performance. If needed, the District will need to replace the vibrating wire instrument in P-2B.

Piezometer P-3A is nested in the same well as Piezometer P-3B located on the far left portion of the crest of the dam. The tips of both P-3A and P-3B are located within the dam embankment at Elevations 362.3 and 340.3 feet, respectively. Water levels in P-3A remained nearly dry throughout the review period, while P-3B showed water levels that generally responded to reservoir water surface fluctuations (Figures 3C and 4C). A reading taken on June 22, 2017 in P-3B showed a sudden increase in the water level that was higher than historical levels. Following the high reading the water levels returned below Elevation 350 feet. This single measurement is likely erroneous but this piezometer should be closely observed in the future.

Piezometer P-4 is located on the downstream face, near the maximum section of the dam. P-5 is located at the downstream toe, also near the maximum section of the dam. The tips of both P-4 and P-5 are located within the dam foundation at Elevations 314.7 and 314.0 feet, respectively. Water levels in P-4 and P-5 showed general responses to reservoir water surface fluctuations and responded to the reservoir being refilled in early 2016. During the months of June, July and August 2012, Mr. Ken Pfister of the District indicated that Piezometer P-4 was missing its top cap. As a result, water and other debris could have entered the piezometer and caused the abnormal high readings during those months. The cap was replaced in August 2012, and the readings returned to the previously recorded range (Figures 3D and 4D). The top of casings for P-4 and P-5 were raised on June 23, 2015 and August 25, 2015, respectively (Table 2). During the review period, both P-4 and P-5 reported new historical high-water levels of Elevations 331.9 and 332.6 feet, respectively. Since the vibrating wire instruments were installed in December 2015 for P-4 and P-5, water level readings have continued to rise to new historical levels.

Piezometers P-6, P-7 and P-8 are located on the downstream face of the dam, near the maximum section of the dam. The tips of all three piezometers are located within the dam embankment at Elevations 360.6, 338.1 and 336.8 feet, respectively. On June 23, 2015, the tops of casings for all three piezometers were raised from 1.2 feet to as high as 3.0 feet (Table 2). Water levels in all three piezometers showed no apparent responses to reservoir water surface fluctuations (Figures 4B and 4D). In July 2015, the District performed a maintenance cleaning of P-7. Since the vibrating wire

instruments were installed in December 2015 for P-6, P-7 and P-8, water level readings have not fluctuated at all. P-6 should be investigated because water level in P-6 cannot be higher than crest piezometers.

Piezometer P-9 is located on the downstream face of the dam, on the right side of the dam. The tip of P-9 is located within the dam foundation at Elevation 335.4 feet. On June 23, 2015, the top of casing for P-9 was raised 3.5 feet (Table 2). Water levels in P-9 showed no apparent response to reservoir water surface fluctuations (Figure 4A). Since the vibrating wire instrument was installed in December 2015 for P-9, water level readings have not fluctuated.

Based on GENTERRA's review of the piezometer data, there are no indications of any adverse conditions in the dam embankment, abutments, or foundation. The piezometers with vibrating wire instruments should be checked and calibrated or replaced as needed. In addition, manual readings should be taken for comparison until the readings are reasonably in agreement, as close as possible but no more than 0.5-foot difference from each other. The District should have the elevations of the tops of casings surveyed and should measure the depth to the bottom of each piezometer periodically to verify that the casings are not blocked to their entire as-built depth.

2.3 SEEPAGE FLOW

Seepage through the dam and/or foundation is collected in the seepage collection vault, which is located beyond the downstream toe of the dam (Figure 1). The seepage collection vault has one seepage subdrain outlet. Seepage flow is measured monthly by District personnel at that one point.

Seepage flow rates for the past 10 years measured at the seepage flow point are presented in Table 2. The graph in Figure 5 displays the seepage flow rates versus the reservoir water surface elevations for the period from January 2016 through December 2017. The graph in Figure 6 covers a 10-year historical period from January 2008 through December 2017.

Seepage flow rates have decreased to little or no flow when the reservoir water surface is below approximate Elevation 355 feet. During the 12-month review period, the seepage flow rate ranged from a low of 0.7 gallons per minute on October 26, 2017 to a high of 9.5 gallons per minute on August 30, 2017 (Figure 5).

SECTION 3: FIELD EVALUATIONS

3.1 FIELD EVALUATION OF APRIL 5, 2017

A field evaluation of Syphon Canyon Dam on April 5, 2017 was performed by Nicholas Josten, P.E. and J. Will Kulikowski of GENTERRA; Jeff Smyth, Bill Wesson and Mike Chandler of the District; and Brandon Cruz, P.E. of DSOD. The reservoir water surface was at an elevation of 375.5 feet at the time of the field visit. Photographs were taken and are in the project files at GENTERRA for comparison with previous and future field evaluations.

3.1.1 DAM

The crest of the dam is surfaced with soil and gravel. It was in satisfactory condition with no signs of settlement or instability. The small crack observed during a previous field evaluation was no longer present. That crack was approximately four feet in length and one quarter inch in width and was located on the upstream edge of the crest of the dam, running parallel to the crest of the dam, on the left side of the dam. The District should monitor this area for the appearance of additional cracks and the reappearance of the crack mentioned above. There was no rodent activity observed on the crest of the dam.

The upper portion of the upstream face of the dam was surfaced with vegetation to a bench at approximate Elevation 378.0 feet. Between the bench and approximate Elevation 370.0 feet, there was a layer of riprap for slope protection. The area submerged below the water surface could not be examined. There were no signs of settlement or instability on the upstream slope. There was no rodent activity observed on the upstream face of the dam.

The downstream face of the dam is covered with vegetation. The vegetation was maintained at a good height at the time of this field evaluation. The downstream slope was in satisfactory condition, with no signs of settlement or instability. There was no rodent activity observed on the downstream face of the dam.

3.1.2 RESERVOIR

A visual observation of the reservoir area was performed during this field evaluation. No odors or other unusual conditions were observed. The aeration lines previously installed at the reservoir are still present and operating. These aeration lines are powered by an air compressor located in a structure at the downstream toe of the dam.

3.1.3 SPILLWAY

The shotcrete-lined portion of the spillway channel showed signs of deterioration and cracking that were noticeably worse than the previous field evaluation on November 23, 2016. A vertical crack located on the left shotcrete lining of the spillway channel, approximately nine feet from the upstream edge of the shotcrete lining, ran the entire height of the spillway wall and had a vertical offset in the upper portion of the lining as well as a horizontal offset of up to approximately four inches in the lower portion of the lining. The crack's offset increased by up to three inches from

previous observations on November 23, 2016. Other significant vertical and horizontal cracks varying in length, width and offset were observed in the shotcrete-lined portion of the spillway channel. The distress to the shotcrete lining could have been caused by the following factors:

- Heavy rainfall infiltrating into the soil behind the shotcrete lining through the existing cracks;
- Natural infiltration through the ground surface above the shotcrete lining;
- Improperly designed and constructed weep holes;
- Clogged of the weep holes due to sediment buildup and/or vegetation growth;
- Lack of a V-ditch along the top edge of the existing shotcrete lining;
- Lack of maintenance to the existing weep holes; and,
- Lack of reinforcement/wire-mesh within the shotcrete.

Future rain events may cause significant damage to the existing lining if the required remedial repair of the shotcrete lining is not made in a timely manner. Significant damage can block the spillway channel, prevent the spillway flow and can create a dam safety issue due to potential for overtopping of the dam embankment. Therefore, GENTERRA recommends that the District continue to monitor and consider repairing the distressed portion of the shotcrete lining as soon as possible.

A small quantity of soil was observed in several areas in the shotcrete-lined spillway channel below some of the weep holes. The weep holes in the shotcrete-lined portion of the spillway channel were blocked and some vegetation was growing out of them. The spillway is a critical feature of a dam and any flow through the spillway channel should not undermine the spillway channel or the dam.

In addition to repairing the distressed portion of the shotcrete lining, GENTERRA recommends improving the entire existing spillway channel, including the spillway approach as well as the flow path downstream of the spillway so that they function properly when needed. Flow could affect the downstream slope of the dam since a channel was not included in the original design.

3.1.4 OUTLET WORKS

DSOD recommends that the outlet and the emergency blow-off valves be exercised and documented in a log at least once per year to confirm operability. DSOD requires the valves be exercised once every three years in the presence of a DSOD representative.

The three outlet valves (12-inch-diameter and 16-inch-diameter outlet valves as well as the 16-inch-diameter blowoff valve) were last exercised on July 14, 2016 but not in the presence of a DSOD representative. All three outlet valves were exercised in the presence of a DSOD representative on January 12, 2011, and on May 26, 2016 for the 12-inch-diameter and 16-inch-diameter outlet valves only. No exercising on any of the three valves was performed during this field evaluation on April 5, 2017.

3.1.5 SEEPAGE

Seepage flow rates are measured monthly by District personnel in the seepage collection vault located downstream of the dam. No measurements were taken during this field evaluation. The seepage flow rate measured by the District prior to this field evaluation (March 28, 2017) was consistent with historical trends.

The District observes the ground surface for seepage on a regular basis when visiting the dam. There were two wet areas observed downstream of the dam during the previous field evaluation performed on November 23, 2016. One wet area was located near the entrance to the seepage collection vault, and the other was located just upstream of the softball field. These two areas are low points downstream of the dam and the wet conditions were likely the result of recent rains at the site two days prior to the previous field evaluation on November 23, 2016. These two areas were evaluated and was determined to not be due to any seepage from the dam. These two wet areas were no longer present during the field evaluation on April 5, 2017. No other signs of possible seepage were observed on the ground surface in the area downstream of the dam.

3.2 FIELD EVALUATION OF DECEMBER 21, 2017

A field evaluation of Syphon Canyon Dam on December 21, 2017 was performed by Douglas A. Harriman, P.E. and J. Will Kulikowski of GENTERRA; and Mike Chandler of the District. The reservoir water surface was at an elevation of 357.5 feet at the time of the field visit. Photographs were taken and are in the project files at GENTERRA for comparison with previous and future field evaluations.

3.2.1 DAM

The crest of the dam is surfaced with soil and gravel. It was in satisfactory condition with no signs of settlement or instability. The small crack observed on the upstream edge of the crest of the dam during previous field evaluations was no longer present. Some minor tire ruts are beginning to form on the crest of the dam near the left abutment. GENTERRA recommends that the District monitor the condition of the ruts. There was no rodent activity observed on the crest of the dam.

The upper portion of the upstream face of the dam was surfaced with vegetation to a bench at approximate Elevation 378.0 feet. Between the bench and approximate Elevation 370.0 feet, there was a layer of riprap for slope protection. Below approximate Elevation 370.0 feet, the slope was surfaced with soil and vegetation. The area submerged below the water surface could not be examined. The upstream face of the dam was in satisfactory condition, with no signs of settlement or instability. There was no rodent activity observed on the upstream face of the dam.

The downstream face of the dam is covered with vegetation. Little to no vegetation growth was observed on the downstream slope. Minor rodent activity was present on the downstream face of the dam. GENTERRA recommend the District continue to implement their effective rodent abatement program. The downstream slope was in satisfactory condition, with no signs of settlement or instability.

3.2.2 RESERVOIR

A visual observation of the reservoir area was performed during this field evaluation. No odors or other unusual conditions were observed. The aeration lines previously installed at the reservoir are still present and operating. These aeration lines are powered by an air compressor located in a structure at the downstream toe of the dam.

3.2.3 SPILLWAY

In 2017, a portion of the left spillway wall was patched with shotcrete. No other change has occurred since the previous field evaluation on April 5, 2017.

3.2.4 OUTLET WORKS

Since the previous field evaluation on April 5, 2017, the three outlet valves (12-inch-diameter and 16-inch-diameter outlet valves as well as the 16-inch-diameter blowoff valve) were exercised on April 18, 2017 but not in the presence of a DSOD representative. All three outlet valves were exercised in the presence of a DSOD representative on January 12, 2011, and on May 26, 2016 for the 12-inch and 16-inch outlet valves only.

3.2.5 SEEPAGE

Seepage flow rates are measured monthly by District personnel in the seepage collection vault located downstream of the dam. No measurements were taken during this field evaluation. The seepage flow rate measured by the District prior to this field evaluation (November 29, 2017) was following the historical trends and was responding to reservoir level fluctuations.

The District observes the ground surface for seepage on a regular basis when visiting the dam. No signs of possible seepage were observed on the ground surface in the area downstream of the dam during this field evaluation.

SECTION 4: CONCLUSIONS AND RECOMMENDATIONS

4.1 CONCLUSIONS

4.1.1 Based on the available data, the dam appears to be performing satisfactorily.

4.1.2 Piezometers P-2B, P-4, and P-5 had readings in the 12-month review period indicating new historical high-water levels. Also, piezometers with vibrating wire instruments (Piezometers P-2A, P-2B, P-4, P-5, P-6, P-7, P-8, and P-9) should be checked and recalibrated as needed.

4.1.3 The minor tire ruts are beginning to form on the crest near the left side of the dam.

4.1.4 Minor rodent activity was observed on the downstream face of the dam.

4.1.5 The deterioration and cracking in the shotcrete-lined portion of the spillway channel had worsened since the field evaluation on November 23, 2016. In 2017, a portion of the left spillway wall was patched with shotcrete.

4.1.6 The three outlet valves were all exercised on April 18, 2017, however not in the presence of a DSOD representative.

4.2 RECOMMENDATIONS

4.2.1 The District should check and calibrate as-needed to restore the functionality of the vibrating wire instruments in the piezometers. In addition, manual readings should be taken for comparison until the readings are reasonably in agreement, as close as possible but no more than 0.5-foot difference from each other. The District should have the elevations of the top of casings surveyed and should measure the depth to the bottom of each piezometer periodically to verify that the casings are not blocked to their entire as-built depth. Performance of Piezometers P-2B, P-5 and P-6 should be investigated as soon as possible. GENTERRA recommends the District to bail out Piezometer P-5 and to take manual readings to check whether or not the water level is bouncing back.

4.2.2 The District should monitor the condition of the minor ruts on the crest of the dam. Timely repair of these minor ruts will prevent costly repair later, and will also enhance the dam safety.

4.2.3 The District should continue to implement their effective rodent abatement program to prevent damage on the crest and slopes of the dam.

4.2.4 The shotcrete-lined portion of the spillway channel should continue to be monitored, and the District should consider improving the entire existing spillway channel

including the flow path downstream. Flow could affect the downstream slope of the dam since a channel was not included in the original design.

4.2.5 District personnel should observe the condition of the dam and appurtenances, looking for signs of distress or movement, increased seepage, or other unusual conditions, and verifying that the critical facilities are functional. Any unusual observations should be reported immediately to a District supervisor and the District's Dam Safety Consultant at the time.

4.2.6 GENTERRA recommends conducting a special evaluation of the dam immediately after any earthquake with a Magnitude of 4.5 or greater within a 50-mile radius of the dam, and/or any seismic event that would cause heavy furniture overturning in areas near the dam and reservoir.

SECTION 5: LIMITATIONS

This report represents the results of our surveillance program for Syphon Canyon Dam, covering the period from January 2017 through December 2017. Professional services were provided to evaluate the performance of the existing dam based upon review of previous data, field inspections, instrumentation readings, and surveys.

The conclusions and professional opinions presented herein were developed by GENTERRA Consultants, Inc. for the Irvine Ranch Water District in accordance with generally accepted engineering principles and practices. We make no other warranty, either express or implied.

SECTION 6: REFERENCES

1. AECOM, 2016, *2015 Annual Surveillance Report for Syphon Canyon Dam, DSOD Dam No. 1029-004, Orange County, California;* by AECOM; dated April 21, 2016.

2. AECOM, 2015, *2014 Annual Surveillance Report for Syphon Canyon Dam, DSOD Dam No. 1029-004, Orange County, California;* by AECOM; dated May 18, 2015.

3. Browning, C.R., 1949, Syphon Canyon Dam As-Constructed Drawings, 2 Sheets Titled: *Topography, Profile & Geology; Plans, Profiles, Sections and Detail of Dam and Appurtenances As Constructed;* by Browning, C.R., dated 1949.

4. California Department of Water Resources, Division of Safety of Dams (DSOD), 2017, *Dams Within Jurisdiction of the State of California;* by DSOD; dated September 2017.

5. California Department of Water Resources, Division of Safety of Dams (DSOD), 2016, *Inspection of Dam and Reservoir in Certified Status;* by DSOD; dated June 20, 2016.

6. California Department of Water Resources, Division of Safety of Dams (DSOD), 2000, *Dams Within Jurisdiction of the State of California, Bulletin 17-00;* by DSOD; dated July 2000.

7. GENTERRA Consultants, Inc. (GETNERRA), 2017, *Annual Surveillance Report, January 2016 through December 2016 for Syphon Canyon Dam and Reservoir, No. 793-009, Irvine, California;* by GENTERRA; dated August 25, 2017.

8. GENTERRA, 2013, *Annual Surveillance Report, January 2012 through December 2012 for Syphon Canyon Dam and Reservoir, No. 793-009, Irvine, California;* by GENTERRA; dated April 23, 2013.

9. GENTERRA, 2011, *Observation and Testing During Downstream Slope Repair, Syphon Canyon Dam, No. 1029-04, Orange County, California;* by GENTERRA; dated September 9, 2011.

10. GENTERRA, 2011, *Report for Evaluation of Sloughing and Slope Instability, Syphon Canyon Dam, No. 1029-04, Orange County, California;* by GENTERRA; dated March 9, 2011.

11. The Irvine Company, 2009, *Letter from Peter J.* Changala to Greg Heiertz (Irvine Ranch Water District); by The Irvine Company; dated November 17, 2009.

12. URS Corporation, 2014, *2013 Annual Surveillance Report for Syphon Canyon Dam, DSOD Dam No. 1029-004, Orange County, California;* by URS; dated June 30, 2014.

TABLES

TABLE 1
SYPHON CANYON DAM
PIEZOMETER DETAILS

Piezometer ID	Location and Approximate Station	Original			Modified Unknown Date			2015 - Current			Material at Tip (if known)	Installation or First Reading
		Top Elev. (ft)	Tip Elev. (ft)	Depth (ft)	Top Elev. (ft)	Tip Elev. (ft)	Depth (ft)	Top Elev. (ft)	Tip Elev. (ft)	Depth (ft)		
P-1A	Dam Crest, Station 6+90	385.1	365.7	19.4	385.1	365.7	19.4	385.1	365.7	19.4	Dam Embankment	Before 2003
P-1B	Dam Crest, Station 6+90	385.1	345.7	39.4	385.1	345.7	39.4	385.1	345.7	39.4	Dam Foundation	Before 2003
P-2A	Dam Crest, Station 4+90	385.9	342.2	43.7	385.9	342.2	43.7	385.9	342.2	43.7	Dam Embankment	Before 2003
P-2B	Dam Crest, Station 4+90	385.0	309.4	75.6	385.0	309.4	75.6	385.0	304.0	81.0	Dam Foundation	Before 2003
P-3A	Dam Crest, Station 3+00	385.6	362.3	23.3	385.6	362.3	23.3	385.6	362.3	23.3	Dam Embankment	Before 2003
P-3B	Dam Crest, Station 3+00	385.6	340.3	45.3	385.6	340.3	45.3	385.6	340.3	45.3	Dam Embankment	Before 2003
P-4	Downstream Slope, Station 5+00	340.0	314.7	25.3	340.0	314.7	25.3	342.8	314.7	28.1	Dam Foundation	Before 2003
P-5	Downstream Toe, Station 4+60	330.7	314.0	16.7	330.7	314.0	16.7	333.7	314.0	19.7	Dam Foundation	Before 2003
P-6	Downstream Slope, Station 4+90	370.2	360.6	9.6	370.2	360.6	9.6	371.4	360.6	10.8	Dam Embankment	1/19/2011
P-7	Downstream Slope, Station 4+90	349.7	338.1	11.6	349.7	338.1	11.6	351.3	338.1	13.2	Dam Embankment	1/19/2011
P-8	Downstream Slope, Station 4+90	343.4	336.8	6.6	345.3	336.8	8.5	346.4	336.8	9.6	Dam Embankment	1/19/2011
P-9	Downstream Slope, Station 6+70	342.9	335.4	7.5	344.9	335.4	9.5	346.4	335.4	11.0	Dam Foundation	1/19/2011

Notes:

1) Top "Reference" Elevation and Depth for Piezometers P-1A to P-5 are based on The Irvine Company (2009), and for Piezometers P-6 to P-9 on GENTERRA (2013).
2) Information concerning changes to the Top "Reference" Elevation due to the standpipe modifications was provided by the District.
3) The District extended the standpipe for Piezometers P-4 and P-6 to P-9 on 6/23/2015 and for Piezometer P-5 on 8/25/2015.
4) Material at the piezometer tip is estimated from the as-built topographic map and sections presented by Browning (1949).
5) The District provided an E-Mail indicating a maintenance cleaning of Piezometer P-2B was performed on 2/16/2017 with a new bottom elevation.
6) Elevations are in feet relative to NGVD29 datum.
7) Elev. = Elevation; ft = feet.

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-1A			P-1B			P-2A			P-2B		
Top of Well Elevation -->			385.1			385.1			385.9			385.0		
Bottom of Well Elevation -->			365.7			345.7			342.2			309.4	304.0	Maint. 2/16/2017
Depth of Well -->			19.4			39.4			43.7			75.6	81.0	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/1/2008														
2/1/2008														
3/25/2008	365.10		19.4	365.7	Dry	32.4	352.7		27.7	358.2		45.6	339.4	
4/25/2008	366.40		19.4	365.7	Dry	32.4	352.7		27.7	358.2		45.6	339.4	
5/28/2008	365.30		19.4	365.7	Dry	32.4	352.7		27.7	358.2		46.6	338.4	
6/25/2008	365.00		19.4	365.7	Dry	32.4	352.7		28.2	357.7		46.6	338.4	
7/18/2008	364.50		19.4	365.7	Dry	32.4	352.7		28.8	357.1		46.6	338.4	
8/25/2008	363.50		19.4	365.7	Dry	32.8	352.3		28.8	357.1		46.6	338.4	
9/25/2008	363.00		19.4	365.7	Dry	32.8	352.3		28.8	357.1		46.6	338.4	
10/21/2008	362.00		19.4	365.7	Dry	33.4	351.7		28.2	357.7		47.0	338.0	
11/25/2008	365.00		19.4	365.7	Dry	33.9	351.2		28.2	357.7		46.1	338.9	
12/23/2008	365.00		19.4	365.7	Dry	33.9	351.2		28.2	357.7		46.1	338.9	
1/26/2009	364.50		19.4	365.7		33.4	351.7		28.7	357.2		46.6	338.4	
2/24/2009	364.50		19.4	365.7		33.4	351.7		28.7	357.2		46.6	338.4	
3/23/2009	368.50		19.4	365.7		30.8	354.3		28.7	357.2		44.6	340.4	
4/27/2009	367.50		19.4	365.7		30.8	354.3		28.7	357.2		45.0	340.0	
5/22/2009	367.00		19.4	365.7		31.4	353.7		28.7	357.2		45.0	340.0	
6/29/2009	372.00		19.4	365.7		26.8	358.3		27.7	358.2		43.0	342.0	
7/31/2009	371.00		19.4	365.7		28.8	356.3		28.7	357.2		45.0	340.0	
8/26/2009	370.00		19.4	365.7		29.4	355.7		28.7	357.2		45.6	339.4	
9/29/2009	369.50		19.4	365.7		29.8	355.3		28.7	357.2		46.0	339.0	
10/30/2009	369.00		19.4	365.7		29.4	355.7		27.7	358.2		45.0	340.0	
11/30/2009	368.00		19.4	365.7		29.4	355.7		27.1	358.8		45.0	340.0	
12/30/2009	368.00		19.4	365.7		29.4	355.7		27.1	358.8		45.0	340.0	
3/1/2010	368.00		19.9	365.2	Dry	28.2	356.9		26.3	359.6		44.0	341.0	
3/30/2010	368.00		19.9	365.2	Dry	28.5	356.6		26.2	359.7		44.2	340.8	
4/4/2010	368.70		19.8	365.3	Dry	28.5	356.6		26.1	359.8		44.3	340.7	
4/27/2010	368.40		19.7	365.4		28.8	356.3		26.0	359.9		44.2	340.8	
5/26/2010	367.84		19.9	365.2	Dry	29.1	356.0		26.1	359.8		44.6	340.4	
6/29/2010	367.00		19.6	365.5	Dry	29.5	355.6		26.2	359.7		44.8	340.2	
7/27/2010	367.00		19.8	365.3	Dry	29.9	355.2		26.4	359.5		45.1	339.9	
8/27/2010	366.80		19.6	365.5	Dry	30.3	354.8		26.6	359.3		45.4	339.6	
9/28/2010	366.40		19.7	365.4	Dry	30.7	354.4		26.6	359.3		45.6	339.4	
10/26/2010	368.50		19.7	365.4	Dry	31.0	354.1		27.0	358.9		45.8	339.2	
11/30/2010	371.40		19.6	365.5		29.5	355.6		27.2	358.7		44.7	340.3	
12/28/2010	374.70		19.7	365.4	Dry	27.2	357.9		27.2	358.7		43.1	341.9	
1/4/2011	374.80		19.7	365.4	Dry	27.0	358.1		27.4	358.5		43.1	341.9	
1/6/2011	374.80		19.5	365.6	Dry	27.0	358.1		27.1	358.8		43.1	342.0	
1/7/2011	374.80		19.7	365.4	Dry	26.9	358.2		27.1	358.8		43.0	342.0	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-1A			P-1B			P-2A			P-2B		
Top of Well Elevation -->			385.1			385.1			385.9			385.0		
Bottom of Well Elevation -->			365.7			345.7			342.2			309.4	304.0	Maint. 2/16/2017
Depth of Well -->			19.4			39.4			43.7			75.6	81.0	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/8/2011	374.80		19.7	365.4	Dry	27.2	357.9		27.3	358.6		43.4	341.6	
1/9/2011	374.80		19.7	365.4	Dry	27.2	357.9		27.3	358.6		43.5	341.5	
1/10/2011	374.80		19.5	365.6	Dry	27.0	358.1		27.1	358.8		43.3	341.7	
1/11/2011	374.80		19.7	365.4	Dry	27.1	358.1		27.1	358.8		43.2	341.8	
1/17/2011	374.80		19.6	365.5	Dry	27.1	358.0		27.0	358.9		43.3	341.7	
1/19/2011	374.70		19.7	365.4	Dry	27.2	357.9		27.0	358.9		43.4	341.6	
1/21/2011	374.80		19.5	365.6	Dry	27.2	357.9		26.9	359.0		43.3	341.7	
1/27/2011	374.60		19.7	365.4	Dry	27.2	357.9		26.8	359.1		43.4	341.6	
2/3/2011	374.60		19.5	365.6	Dry	27.5	357.6		26.7	359.2		43.6	341.4	
2/8/2011	374.70		19.5	365.6	Dry	27.5	357.6		26.7	359.2		43.6	341.4	
2/28/2011	373.70		19.7	365.4	Dry	28.0	357.1		26.2	359.7		43.8	341.2	
3/28/2011	372.50	2.35	19.6	365.5		28.9	356.2		26.2	359.7		44.2	340.8	
4/28/2011	372.10	0.27	19.8	365.3	Dry	28.8	356.3		24.2	361.7		44.6	340.4	
5/18/2011	371.80	0.03	19.7	365.4	Dry	29.4	355.7		26.4	359.5		44.4	340.6	
5/25/2011	371.70	0.30	19.7	365.4	Dry	29.4	355.7		26.4	359.5		44.3	340.7	
6/28/2011	370.90	0.03	19.7	365.4	Dry	29.7	355.4		26.5	359.4		44.5	340.5	
7/26/2011	370.30	0.03	19.7	365.4	Dry	30.2	354.9							
8/24/2011	369.60	0.03	19.6	365.5	Dry	30.6	354.5		26.8	359.1		44.8	340.2	
8/30/2011	369.40		19.9	365.2		30.9	354.2		27.1	358.8		45.0	340.0	
9/13/2011	364.30	0.00	19.8	365.3	Dry	33.6	351.5		27.2	358.7		47.1	337.9	
9/27/2011	361.90		19.7	365.4	Dry	36.5	348.6		27.2	358.7		49.6	335.4	
10/11/2011	358.50	1.03	19.6	365.5	Dry	39.6	345.5		27.3	358.6		51.9	333.1	
10/25/2011	356.00	1.03	19.7	365.4	Dry	39.6	345.5		27.7	358.2		53.2	331.8	
11/29/2011	355.00	1.51	19.7	365.4	Dry	39.6	345.5		26.3	359.6		54.2	330.8	
12/28/2011	355.00	0.28	19.8	365.3	Dry	39.7	345.4		28.8	357.1		54.8	330.3	
1/26/2012	355.00	1.05	19.7	365.4	Dry	39.5	345.6		29.0	356.9		54.9	330.1	
2/28/2012	355.00	0.73	19.7	365.4	Dry	39.5	345.6		29.3	356.6		55.2	329.8	
3/27/2012	352.40	0.73	19.9	365.2		39.8	345.3		29.8	356.1		55.3	329.7	
4/23/2012	352.10	1.35	19.7	365.4		39.6	345.5		29.8	356.1		55.2	329.8	
5/30/2012	352.20	0.07	19.7	365.4		39.7	345.4		30.0	355.9		55.6	329.4	
6/13/2012	352.20		19.6	365.5		39.6	345.5		30.2	355.7		55.7	329.3	
6/26/2012	352.20	0.00	19.7	365.4		39.5	345.6		30.3	355.6		56.0	329.0	
7/24/2012	352.20	0.23	19.6	365.5		39.6	345.5		30.5	355.4		53.4	331.6	
8/8/2012	352.20	0.23	19.8	365.3		39.8	345.3		30.5	355.4		53.6	331.4	
8/28/2012	351.80	0.00	19.6	365.5		39.5	345.6		30.6	355.3		54.5	330.5	
8/29/2012	351.80	0.00	19.8	365.3		39.7	345.4		30.8	355.1		54.8	330.2	
9/25/2012	351.30	0.00	19.6	365.5		39.5	345.6		30.9	355.0		55.1	329.9	
10/31/2012	351.00	0.09	19.6	365.5		39.5	345.6		30.9	355.0		55.9	329.1	
11/27/2012	351.00	0.87	19.6	365.5		39.5	345.6		31.2	354.7		56.3	328.7	

Notes:
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JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-1A			P-1B			P-2A			P-2B		
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Bottom of Well Elevation -->			365.7			345.7			342.2			309.4	304.0	Maint. 2/16/2017
Depth of Well -->			19.4			39.4			43.7			75.6	81.0	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
12/12/2012	351.00	1.13	19.7	365.4		39.6	345.5		31.2	354.7		56.3	328.7	
1/29/2013	366.10	1.30	19.8	365.3		39.9	345.2		31.2	354.7		46.3	338.7	
2/21/2013	372.10	0.42	19.8	365.3		35.8	349.3		32.7	353.2		43.9	341.1	
3/28/2013	371.90	0.79	19.7	365.4		32.9	352.2		31.5	354.4		42.2	342.8	
4/25/2013	371.40	0.00	19.6	365.5		33.0	352.1		31.4	354.5		42.2	342.8	
5/22/2013	370.90	0.00	19.8	365.3		32.9	352.2		31.4	354.5		42.7	342.3	
6/25/2013	370.20	0.00	19.7	365.4		33.2	351.9		30.7	355.2		42.8	342.2	
7/23/2013	369.40	0.00	19.7	365.4	Dry	33.6	351.5		30.5	355.4		43.2	341.8	
8/21/2013	368.60	0.00	19.7	365.4	Dry	34.1	351.0		30.4	355.5		43.8	341.3	
9/25/2013	367.70	0.00	19.7	365.4	Dry	34.6	350.5		30.2	355.7		44.1	340.9	
10/30/2013	366.90	0.00	19.7	365.4	Dry	35.3	349.8		30.3	355.6		44.8	340.2	
11/26/2013	366.50	0.59	19.7	365.4	Dry	35.6	349.5		30.3	355.6		45.1	339.9	
12/17/2013	366.20	0.70	19.7	365.4	Dry	35.8	349.3		30.4	355.5		45.5	339.5	
1/28/2014	365.50	0.00	19.7	365.4	Dry	36.1	349.0		30.6	355.3		45.9	339.1	
2/25/2014	365.40	0.76	19.8	365.3	Dry	36.6	348.6		30.8	355.1		46.2	338.9	
3/25/2014	365.30		19.8	365.3	Dry	36.4	348.7		30.8	355.1		45.9	339.1	
3/28/2014	365.30	2.02	19.7	365.4		36.5	348.6		30.7			45.9		
4/25/2014	364.50	0.52	19.7	365.4		36.6	348.5		30.8	355.1		46.1	338.9	
5/28/2014	363.80	0.00	19.8	365.3	Dry	37.1	348.0		30.9	355.0		46.5	338.5	
6/25/2014	363.00	0.00	19.9	365.2	Dry	37.7	351.5		31.2	358.7		47.0	337.9	
7/30/2014	361.90	0.00	19.9	365.2	Dry	38.0	348.6		31.1	358.7		47.2	335.4	
8/27/2014	361.10	0.04	19.7	365.4	Dry	38.6	346.5		31.3	354.6		47.9	337.1	
9/23/2014	360.50	0.00	19.5	365.6	Dry	39.1	346.0		31.3	354.6		48.3	336.7	
10/29/2014	359.50	0.00	19.8	365.3	Dry	39.7	345.4		31.8	354.1		49.0	336.0	
11/24/2014	359.40	0.32	19.7	365.4	Dry	39.6	345.5		31.6	354.3		49.4	335.6	
12/30/2014	359.40	3.98	19.7	365.4	Dry	39.7	345.4		31.8	354.1		49.9	335.1	
1/27/2015	359.00	1.42	19.7	365.4	Dry	39.8	345.3		32.1	353.8		49.8	335.2	
2/26/2015	358.60	0.46	19.7	365.4	Dry	39.6	345.5		31.8	354.1		50.1	334.9	
3/27/2015	358.00	0.63	19.7	365.4	Dry	39.5	345.6		32.3	353.6		51.3	333.8	
4/26/2015	331.00	0.22	19.8	365.3	Dry	39.6	345.5	Dry	32.1	353.8		56.5	328.5	
5/27/2015	332.00	1.79	19.8	365.3	Dry	39.6	345.5	Dry	32.2	353.7		56.3	328.7	
6/23/2015	331.00	0.00	19.7	365.4	Dry	39.8	345.3	Dry	32.3	353.6		60.4	324.6	
7/30/2015	331.00	0.00	19.7	365.4	Dry	39.6	345.5	Dry	31.1	354.8	In July maint. cleaned	61.4	323.6	
8/25/2015	331.00	0.00	19.6	365.5	Dry	39.6	345.5	Dry	32.8	353.1	Dry	62.1	322.9	
9/30/2015	331.00	1.97	19.1	366.0	Dry	39.8	345.3	Dry	32.1	353.8		62.4	322.6	
10/29/2015	331.00	0.18	19.7	365.4	Dry	39.7	345.4	Dry	33.2	352.7		62.4	322.6	
11/25/2015	331.00	0.17	19.7	365.4	Dry	39.7	345.4	Dry	33.3	352.6		63.1	321.9	
12/30/2015	331.00	1.42	19.7	365.4	Dry	39.7	345.4	Dry	33.4	352.5	VW installed	63.6	321.4	VW installed
1/26/2016	343.70	2.97	19.6	365.5	Dry	39.6	345.5	Dry	32.3	353.6		46.1	338.9	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-1A			P-1B			P-2A			P-2B		
Top of Well Elevation -->			385.1			385.1			385.9			385.0		
Bottom of Well Elevation -->			365.7			345.7			342.2			309.4	304.0	Maint. 2/16/2017
Depth of Well -->			19.4			39.4			43.7			75.6	81.0	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
2/24/2016	363.80	0.26	20.6	364.5	Dry	39.6	345.5	Dry	32.5	353.5		31.4	353.6	Erroneous
3/29/2016	374.90	1.50	19.6	365.5	Dry	38.4	346.7		32.7	353.2		23.3	361.7	Erroneous
4/28/2016	375.50	0.09	19.7	365.4	Dry	32.4	352.7		32.6	353.3		23.9	361.1	Erroneous
5/24/2016	374.40	0.13	19.5	365.6	Dry	30.8	354.3		31.7	354.2		21.7	363.3	Erroneous
6/29/2016	373.70	0.00	19.5	365.6	Dry	30.8	354.3		30.6	355.3		21.6	363.4	Erroneous
7/28/2016	372.20	0.00	19.7	365.4	Dry	30.7	354.4		30.0	355.9		23.9	361.1	Erroneous
8/25/2016	367.10	0.00	19.7	365.4	Dry	32.2	352.9		29.5	356.4		26.1	358.9	Erroneous
9/27/2016	363.30	0.00	19.6	365.5		34.6	350.5		29.7	356.2		28.2	356.8	Erroneous
10/25/2016	362.10	0.82	19.6	365.5	Dry	35.9	349.2		29.5	356.4		28.5	356.5	Erroneous
11/22/2016	361.80	1.69	19.7	365.4	Dry	36.9	348.2				VW was not logging			VW was not logging
12/28/2016	368.55	3.61	19.7	365.4	Dry	36.9	348.2		30.0	355.9		25.0	360.0	Erroneous
1/25/2017	375.80	6.48	19.8	365.3	Dry	32.5	352.6		29.9	356.0		34.2	350.8	Measured w/sounder
2/28/2017	375.90	3.95	19.6	365.5	Dry	28.2	356.9		29.9	356.0		34.0	351.0	Measured w/sounder
3/15/2017	375.80	3.61	19.8	365.3	Dry	28.4	356.7		28.4	357.5		34.2	350.8	Measured w/sounder
3/28/2017	375.50	0.09	19.7	365.4		27.9	357.2		28.2	357.7		13.2	371.8	Erroneous
4/26/2017	375.00	0.04	19.8	365.3	Dry	27.6	357.5		27.6	358.3		34.0	351.0	Measured w/sounder
5/23/2017	374.60	35.00	19.7	365.4	Dry	28.0	357.1		27.2	358.7		8.3	376.7	Erroneous
6/22/2017	373.80	0.00	19.7	365.4	Dry	28.2	356.9		27.0	358.9		2.0	383.0	Erroneous
7/26/2017	371.40	0.00	19.7	365.4	Dry	29.7	355.4		26.9	359.0		4.1	380.9	Erroneous
8/30/2017	368.60	0.00	19.7	365.4	Dry	31.1	354.0		27.2	358.7		6.0	379.0	Erroneous
9/28/2017	364.80	0.00	19.6	365.5	Dry	33.2	351.9		27.2	358.7		8.1	376.9	Erroneous
10/26/2017	359.00	0.00	19.7	365.4	Dry	34.4	350.7		27.3	358.6		11.6	373.4	Erroneous
11/29/2017	357.80	0.15	19.5	365.6	Dry	39.5	345.6		28.2	357.7		12.9	372.1	Erroneous
12/27/2017	357.30	0.00	19.7	365.4	Dry	39.0	346.1		28.5	357.4		13.3	371.7	Erroneous

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-3A			P-3B			P-4		
Top of Well Elevation -->			385.6			385.6			340.0	342.8	Raised 6/23/2015
Bottom of Well Elevation -->			362.3			340.3			314.7		
Depth of Well -->			23.3			45.3			25.3	28.1	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/1/2008											
2/1/2008											
3/25/2008	365.10		22.7	362.9		38.7	346.9		13.7	326.3	
4/25/2008	366.40		22.7	362.9		38.7	346.9		13.7	326.3	
5/28/2008	365.30		23.3	362.3		39.3	346.3		13.7	326.3	
6/25/2008	365.00		23.3	362.3		39.8	345.8		14.3	325.7	
7/18/2008	364.50		23.3	362.3		39.8	345.8		14.3	325.7	
8/25/2008	363.50		23.3	362.3		40.3	345.3		14.3	325.7	
9/25/2008	363.00		23.3	362.3		40.3	345.3		14.3	325.7	
10/21/2008	362.00		23.3	362.3		40.3	345.3		14.3	325.7	
11/25/2008	365.00		23.3	362.3		39.8	345.8		14.3	325.7	
12/23/2008	365.00		23.3	362.3		39.8	345.8		14.3	325.7	
1/26/2009	364.50		23.3	362.3		40.3	345.3		14.3	325.7	
2/24/2009	364.50		23.3	362.3		40.3	345.3		14.3	325.7	
3/23/2009	368.50		23.3	362.3		38.7	346.9		14.3	325.7	
4/27/2009	367.50		23.3	362.3		39.3	346.3		14.3	325.7	
5/22/2009	367.00		23.3	362.3		39.3	346.3		14.3	325.7	
6/29/2009	372.00		23.3	362.3		36.7	348.9		14.3	325.7	
7/31/2009	371.00		23.3	362.3		38.3	347.3		15.3	324.7	
8/26/2009	370.00		23.3	362.3		38.3	347.3		15.3	324.7	
9/29/2009	369.50		23.3	362.3		39.3	346.3		15.3	324.7	
10/30/2009	369.00		23.3	362.3		38.3	347.3		14.3	325.7	
11/30/2009	368.00		23.3	362.3		38.3	347.3		14.3	325.7	
12/30/2009	368.00		23.3	362.3		38.3	347.3		14.3	325.7	
3/1/2010	368.00		23.0	362.6		37.4	348.2		13.5	326.5	
3/30/2010	368.00		23.1	362.5		37.7	347.9		13.5	326.5	
4/4/2010	368.70		22.9	362.7		37.7	347.9		13.5	326.5	
4/27/2010	368.40		22.8	362.8		37.8	347.8		13.4	326.6	
5/26/2010	367.84		22.9	362.7		37.9	347.7		13.6	326.4	
6/29/2010	367.00		23.0	362.6		38.1	347.5		13.6	326.4	
7/27/2010	367.00		23.6	362.0		38.3	347.3		13.6	326.4	
8/27/2010	366.80		23.4	362.2		38.1	347.5		13.8	326.2	
9/28/2010	366.40		23.0	362.6		38.6	347.0		13.6	326.4	
10/26/2010	368.50		23.1	362.5		38.7	346.9		13.6	326.4	
11/30/2010	371.40		23.0	362.6		37.8	347.8		13.7	326.3	
12/28/2010	374.70		23.2	362.4		36.6	349.0		13.5	326.5	
1/4/2011	374.80		23.4	362.2		36.5	349.1		13.4	326.6	
1/6/2011	374.80		23.4	362.2		36.5	349.2		13.4	326.6	
1/7/2011	374.80		23.4	362.2		36.5	349.1		13.5	326.5	

Notes:
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ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-3A			P-3B			P-4		
Top of Well Elevation -->			385.6			385.6			340.0	342.8	Raised 6/23/2015
Bottom of Well Elevation -->			362.3			340.3			314.7		
Depth of Well -->			23.3			45.3			25.3	28.1	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/8/2011	374.80		23.6	362.0		36.8	348.8		13.6	326.4	
1/9/2011	374.80		23.4	362.2		36.8	348.8		13.7	326.3	
1/10/2011	374.80		23.4	362.2		36.6	349.0		13.6	326.4	
1/11/2011	374.80		23.2	362.4		36.8	348.8		13.4	326.6	
1/17/2011	374.80		23.4	362.2		36.7	348.9		13.5	326.6	
1/19/2011	374.70		23.4	362.2		36.8	348.8		13.5	326.5	
1/21/2011	374.80		23.4	362.2		36.9	348.7		13.5	326.5	
1/27/2011	374.60		23.0	362.6		37.0	348.6		13.5	326.5	
2/3/2011	374.60		23.4	362.2		37.2	348.4		13.5	326.5	
2/8/2011	374.70		23.4	362.2		37.2	348.4		13.5	326.5	
2/28/2011	373.70		22.9	362.7		37.4	348.2		13.5	326.5	
3/28/2011	372.50	2.35	23.0	362.6		37.5	348.1		13.5	326.5	
4/28/2011	372.10	0.27	23.2	362.4		37.9	347.7		13.7	326.3	
5/18/2011	371.80	0.03	23.1	362.5		37.9	347.7		13.5	326.5	
5/25/2011	371.70	0.30	23.0	362.6		37.9	347.7		13.7	326.3	
6/28/2011	370.90	0.03	22.9	362.7		38.0	347.6		13.6	326.4	
7/26/2011	370.30	0.03	23.0	362.7		38.2	347.4		13.7	326.3	
8/24/2011	369.60	0.03	23.7	361.9		38.3	347.3		16.0	324.0	
8/30/2011	369.40		23.1	362.5		38.6	347.0		16.0	324.0	
9/13/2011	364.30	0.00	23.0	362.6		40.4	345.2		15.9	324.1	
9/27/2011	361.90		23.0	362.6		43.1	342.5		16.1	323.9	
10/11/2011	358.50	1.03	23.0	362.6		44.1	341.5		16.1	323.9	
10/25/2011	356.00	1.03	22.9	362.7		45.3	340.3		16.3	323.7	
11/29/2011	355.00	1.51	23.7	361.9		45.5	340.1		16.8	323.2	
12/28/2011	355.00	0.28	23.7	361.9		45.6	340.0		17.4	322.7	
1/26/2012	355.00	1.05	23.6	362.0		45.6	340.0		17.5	322.5	
2/28/2012	355.00	0.73	23.6	362.0		45.6	340.0		17.9	322.1	
3/27/2012	352.40	0.73	23.6	362.0		45.7	339.9		18.4	321.6	
4/23/2012	352.10	1.35	23.6	362.0		45.7	339.9		18.3	321.7	
5/30/2012	352.20	0.07	23.7	361.9		45.6	340.0		18.6	321.4	
6/13/2012	352.20		23.7	361.9		45.6	340.0		18.7	321.3	
6/26/2012	352.20	0.00	23.6	362.0		45.5	340.1		2.8	337.2	Cap was off, bad read
7/24/2012	352.20	0.23	23.6	362.0		45.6	340.0		4.2	335.8	Cap was off, bad read
8/8/2012	352.20	0.23	23.7	361.9		45.7	339.9		4.7	335.3	Cap was off, bad read
8/28/2012	351.80	0.00	23.6	362.0		45.5	340.1		19.2	320.8	
8/29/2012	351.80	0.00	23.8	361.8		45.7	339.9		18.9	321.1	
9/25/2012	351.30	0.00	23.7	361.9		45.6	340.0		19.4	320.6	
10/31/2012	351.00	0.09	23.6	362.0		45.6	340.0		19.6	320.4	
11/27/2012	351.00	0.87	23.6	362.0		45.5	340.1		19.2	320.8	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-3A			P-3B			P-4		
Top of Well Elevation -->			385.6			385.6			340.0	342.8	Raised 6/23/2015
Bottom of Well Elevation -->			362.3			340.3			314.7		
Depth of Well -->			23.3			45.3			25.3	28.1	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
12/12/2012	351.00	1.13	23.6	362.0		45.6	340.0		19.0	321.0	
1/29/2013	366.10	1.30	23.8	361.8		46.0	339.6		19.0	321.0	
2/21/2013	372.10	0.42	23.4	362.2		42.9	342.7		18.8	321.2	
3/28/2013	371.90	0.79	23.7	361.9		41.1	344.5		18.1	321.9	
4/25/2013	371.40	0.00	23.6	362.0		41.0	344.6		17.8	322.2	
5/22/2013	370.90	0.00	23.8	361.8		41.1	344.5		17.7	322.3	
6/25/2013	370.20	0.00	23.6	362.0		41.0	344.6		17.0	323.0	
7/23/2013	369.40	0.00	23.6	362.0	Dry	41.3	344.3		16.8	323.2	
8/21/2013	368.60	0.00	23.7	361.9	Dry	41.7	343.9		16.6	323.4	
9/25/2013	367.70	0.00	23.7	361.9	Dry	42.0	343.6		16.3	323.7	
10/30/2013	366.90	0.00	23.7	361.9	Dry	42.7	342.9		16.1	323.9	
11/26/2013	366.50	0.59	23.6	362.0	Dry	42.6	343.0		15.9	324.1	
12/17/2013	366.20	0.70	23.7	361.9	Dry	43.0	342.6		15.9	324.1	
1/28/2014	365.50	0.00	23.8	361.8	Dry	43.7	341.9		15.7	324.3	
2/25/2014	365.40	0.76	23.8	361.8	Dry	44.0	341.6		15.9	324.2	
3/25/2014	365.30		23.8	361.8	Dry	43.9	341.7		16.0	324.0	
3/28/2014	365.30	2.02	23.6	362.0		43.9	341.7		15.6	324.5	
4/25/2014	364.50	0.52	23.6	362.0		44.1	341.5		15.5	324.5	
5/28/2014	363.80	0.00	23.7	361.9	Dry	44.4	341.2		15.5	324.5	
6/25/2014	363.00	0.00	23.7	361.9		45.0	345.2		15.7	324.3	
7/30/2014	361.90	0.00	23.7	361.9	Wet	45.1	342.5		15.4	324.6	
8/27/2014	361.10	0.04	23.6	362.0	Dry	45.6	340.0	Wet	15.5	324.5	
9/23/2014	360.50	0.00	23.6	362.0	Wet	45.5	340.1	Wet	13.5	326.5	
10/29/2014	359.50	0.00	23.6	362.0	Dry	45.8	339.8	Dry	15.6	324.4	
11/24/2014	359.40	0.32	23.7	361.9	Dry	45.6	340.0	Dry	15.7	324.3	
12/30/2014	359.40	3.98	23.7	361.9	Dry	45.8	339.8	Dry	15.8	324.2	
1/27/2015	359.00	1.42	23.6	362.0	Wet	45.6	340.0	Dry	15.9	324.1	
2/26/2015	358.60	0.46	23.6	362.0	Wet	45.5	340.1	Wet	15.9	324.1	
3/27/2015	358.00	0.63	23.7	361.9		45.9	339.7	Dry	16.0	324.0	
4/26/2015	331.00	0.22	23.6	362.0		45.6	340.0	Dry	16.2	323.8	
5/27/2015	332.00	1.79	23.6	362.0	Dry	45.6	340.0	Dry	16.1	323.9	
6/23/2015	331.00	0.00	23.6	362.0	Wet	45.7	339.9	Wet	20.5	322.3	Extended casing
7/30/2015	331.00	0.00	23.7	361.9	Dry	45.6	340.0	Dry	20.6	322.2	
8/25/2015	331.00	0.00	23.5	362.1	Dry	45.5	340.1	Dry	21.5	321.3	Wet
9/30/2015	331.00	1.97	23.7	361.9	Dry	45.7	339.9	Dry	22.5	320.3	
10/29/2015	331.00	0.18	23.7	361.9	Dry	45.7	339.9	Dry	22.9	319.9	
11/25/2015	331.00	0.17	23.7	361.9	Dry	45.5	340.1	Dry	23.4	319.4	
12/30/2015	331.00	1.42	23.7	361.9	Dry	45.5	340.1	Dry	23.8	319.0	VW installed
1/26/2016	343.70	2.97	23.6	362.0	Dry	45.6	340.0	Dry	17.9	325.0	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-3A			P-3B			P-4		
Top of Well Elevation -->			385.6			385.6			340.0	342.8	Raised 6/23/2015
Bottom of Well Elevation -->			362.3			340.3			314.7		
Depth of Well -->			23.3			45.3			25.3	28.1	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
2/24/2016	363.80	0.26	23.7	361.9	Dry	45.7	339.9	Dry	18.1	324.7	
3/29/2016	374.90	1.50	23.6	362.0		41.9	343.7		17.1	325.7	
4/28/2016	375.50	0.09	23.6	362.0		37.7	347.9		15.6	327.2	
5/24/2016	374.40	0.13	23.3	362.3		38.0	347.6		14.2	328.6	
6/29/2016	373.70	0.00	23.3	362.3		38.1	347.5		14.3	328.5	
7/28/2016	372.20	0.00	23.6	362.0	Dry	38.5	347.1		14.4	328.4	
8/25/2016	367.10	0.00	23.7	361.9	Dry	40.9	344.7		14.5	328.3	
9/27/2016	363.30	0.00	23.8	361.8	Wet	41.8	343.8		14.6	328.2	
10/25/2016	362.10	0.82	23.6	362.0	Wet	42.8	342.8		14.1	328.7	
11/22/2016	361.80	1.69	23.7	361.9	Dry	43.0	342.6				VW was not logging
12/28/2016	368.55	3.61	23.7	361.9		40.7	344.9		13.5	329.3	
1/25/2017	375.80	6.48	23.6	362.0	Dry	36.4	349.2		12.9	329.9	
2/28/2017	375.90	3.95	23.6	362.0	Dry	35.3	350.4		12.6	330.2	
3/15/2017	375.80	3.61	23.7	361.9	Dry	35.7	349.9		12.2	330.6	
3/28/2017	375.50	0.09	23.9	361.7	Dry	35.0	350.6		12.1	330.7	
4/26/2017	375.00	0.04	23.7	361.9	Dry	35.2	350.4		11.9	330.9	
5/23/2017	374.60	35.00	23.6	362.0		35.6	350.0		11.5	331.3	
6/22/2017	373.80	0.00	23.7	361.9		28.2	357.4	Erroneous	11.3	331.5	
7/26/2017	371.40	0.00	23.5	362.1	Dry	36.7	348.9		11.1	331.7	
8/30/2017	368.60	0.00	23.7	361.9	Dry	38.1	347.5		11.1	331.7	
9/28/2017	364.80	0.00	23.5	362.1	Dry	40.1	345.5		10.9	331.9	
10/26/2017	359.00	0.00	23.6	362.0	Dry	42.1	343.5		11.0	331.8	
11/29/2017	357.80	0.15	23.6	362.0	Dry	45.6	340.0	Dry	11.0	331.8	
12/27/2017	357.30	0.00	23.6	362.0	Dry	44.6	341.0		11.0	331.8	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-5			P-6			P-7		
Top of Well Elevation -->			330.7	333.7 Raised 8/25/2015		370.2	371.4 Raised 6/23/2015		349.7	351.3 Raised 6/23/2015	
Bottom of Well Elevation -->			314.0			360.6			338.1		
Depth of Well -->			16.7	19.7		9.5	10.8		11.5	13.2	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/1/2008											
2/1/2008											
3/25/2008	365.10		5.1	325.6							
4/25/2008	366.40		5.1	325.6							
5/28/2008	365.30		5.1	325.6							
6/25/2008	365.00		5.1	325.6							
7/18/2008	364.50		5.1	325.6							
8/25/2008	363.50		5.7	325.0							
9/25/2008	363.00		5.7	325.0							
10/21/2008	362.00		5.7	325.0							
11/25/2008	365.00		5.7	325.0							
12/23/2008	365.00		5.7	325.0							
1/26/2009	364.50		5.7	325.0							
2/24/2009	364.50		5.7	325.0							
3/23/2009	368.50		5.7	325.0							
4/27/2009	367.50		5.2	325.5							
5/22/2009	367.00		5.2	325.5							
6/29/2009	372.00		4.1	326.6							
7/31/2009	371.00		5.1	325.6							
8/26/2009	370.00		5.1	325.6							
9/29/2009	369.50		5.7	325.0							
10/30/2009	369.00		4.7	326.0							
11/30/2009	368.00		4.1	326.6							
12/30/2009	368.00		4.1	326.6							
3/1/2010	368.00		3.0	327.7							
3/30/2010	368.00		3.2	327.5							
4/4/2010	368.70		3.3	327.4							
4/27/2010	368.40		3.2	327.5							
5/26/2010	367.84		3.4	327.3							
6/29/2010	367.00		3.5	327.2							
7/27/2010	367.00		3.6	327.1							
8/27/2010	366.80		3.6	327.1							
9/28/2010	366.40		3.7	327.0							
10/26/2010	368.50		2.5	328.2							
11/30/2010	371.40		3.3	327.4							
12/28/2010	374.70		2.6	328.1							
1/4/2011	374.80		2.3	328.4							
1/6/2011	374.80		2.5	328.2							
1/7/2011	374.80		2.7	328.0							

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-5			P-6			P-7		
Top of Well Elevation -->			330.7	333.7 Raised 8/25/2015		370.2	371.4 Raised 6/23/2015		349.7	351.3 Raised 6/23/2015	
Bottom of Well Elevation -->			314.0			360.6			338.1		
Depth of Well -->			16.7	19.7		9.5	10.8		11.5	13.2	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
1/8/2011	374.80		3.1	327.6							
1/9/2011	374.80		3.1	327.6							
1/10/2011	374.80		3.0	327.8							
1/11/2011	374.80		2.7	328.0							
1/17/2011	374.80		3.0	327.8							
1/19/2011	374.70		2.8	327.9		9.4	360.7		6.9	342.8	
1/21/2011	374.80		2.8	327.9		9.6	360.6		7.0	342.6	
1/27/2011	374.60		2.9	327.8		9.5	360.7		7.2	342.4	
2/3/2011	374.60		3.2	327.5		9.5	360.7		7.7	342.0	
2/8/2011	374.70		3.3	327.4		9.5	360.7		7.7	342.0	
2/28/2011	373.70		2.9	327.8		9.7	360.5	Dry	8.4	341.3	
3/28/2011	372.50	2.35	3.0	327.7		9.6	360.6		5.0	344.7	
4/28/2011	372.10	0.27	3.8	326.9		9.6	360.6		8.6	341.1	
5/18/2011	371.80	0.03	3.4	327.3		9.6	360.6		8.8	340.9	
5/25/2011	371.70	0.30	3.5	327.2		9.6	360.6		9.1	340.6	
6/28/2011	370.90	0.03	3.5	327.2		9.5	360.7		10.0	339.7	
7/26/2011	370.30	0.03	3.9	326.8		9.5	360.7		9.3	340.4	
8/24/2011	369.60	0.03	3.5	327.2		9.5	360.7		9.2	340.5	
8/30/2011	369.40		3.6	327.1		9.8	360.4		10.2	339.5	
9/13/2011	364.30	0.00	4.0	326.7		9.6	360.6		10.1	339.6	
9/27/2011	361.90		5.0	325.7		9.5	360.7		10.0	339.7	
10/11/2011	358.50	1.03	5.6	325.1		9.5	360.7		9.5	340.2	
10/25/2011	356.00	1.03	6.5	324.2		9.5	360.7		9.9	339.8	
11/29/2011	355.00	1.51	7.2	323.5		9.5	360.7		9.8	339.9	
12/28/2011	355.00	0.28	7.6	323.1		9.7	360.5		9.4	340.3	
1/26/2012	355.00	1.05	7.8	322.9		9.5	360.7		10.1	339.6	
2/28/2012	355.00	0.73	7.9	322.8		9.6	360.6		10.6	339.1	
3/27/2012	352.40	0.73	8.3	322.4		9.8	360.4		10.3	339.4	
4/23/2012	352.10	1.35	8.1	322.6		9.7	360.5		10.5	339.2	
5/30/2012	352.20	0.07	8.4	322.3		9.6	360.6		9.9	339.8	
6/13/2012	352.20		8.6	322.1		9.7	360.5		10.4	339.3	
6/26/2012	352.20	0.00	8.7	322.0		9.7	360.5		10.5	339.2	
7/24/2012	352.20	0.23	7.8	323.0		9.6	360.6		10.5	339.2	
8/8/2012	352.20	0.23	7.5	323.2		9.8	360.4		10.7	339.0	
8/28/2012	351.80	0.00	7.9	322.8		9.6	360.6		10.1	339.6	
8/29/2012	351.80	0.00	8.2	322.5		9.8	360.4		10.3	339.4	
9/25/2012	351.30	0.00	8.4	322.3		9.5	360.7		9.9	339.8	
10/31/2012	351.00	0.09	8.9	321.8		9.6	360.6		10.3	339.4	
11/27/2012	351.00	0.87	9.2	321.5		9.6	360.6		10.2	339.5	

Notes:
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TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-5			P-6			P-7		
Top of Well Elevation -->			330.7	333.7 Raised 8/25/2015		370.2	371.4 Raised 6/23/2015		349.7	351.3 Raised 6/23/2015	
Bottom of Well Elevation -->			314.0			360.6			338.1		
Depth of Well -->			16.7	19.7		9.5	10.8		11.5	13.2	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
12/12/2012	351.00	1.13	9.2	321.5		9.5	360.7		10.5	339.2	
1/29/2013	366.10	1.30	5.4	325.3		9.7	360.5		11.0	338.7	
2/21/2013	372.10	0.42	4.3	326.4		9.7	360.5		11.2	338.5	
3/28/2013	371.90	0.79	3.1	327.6		9.6	360.6		10.8	338.9	
4/25/2013	371.40	0.00	2.7	328.0		9.4	360.8		10.3	339.4	
5/22/2013	370.90	0.00	2.9	327.8		9.8	360.4		11.2	338.5	
6/25/2013	370.20	0.00	2.5	328.2		9.7	360.5		10.9	338.8	
7/23/2013	369.40	0.00	2.7	328.0		9.6	360.6	Dry	11.1	338.6	
8/21/2013	368.60	0.00	2.8	327.9		9.7	360.5	Dry	11.0	338.7	
9/25/2013	367.70	0.00	2.8	327.9		9.6	360.6	Dry	11.1	338.6	
10/30/2013	366.90	0.00	3.0	327.7		9.7	360.5	Dry	11.1	338.6	
11/26/2013	366.50	0.59	3.0	327.7		9.7	360.5	Dry	11.1	338.6	Wet
12/17/2013	366.20	0.70	3.2	327.5		9.7	360.5	Dry	10.9	338.8	
1/28/2014	365.50	0.00	3.4	327.3		9.7	360.5	Dry	10.3	339.4	
2/25/2014	365.40	0.76	3.7	327.1		9.8	360.4	Dry	11.2	338.5	Wet
3/25/2014	365.30		3.4	327.3		9.6	360.6	Dry	10.8	338.9	
3/28/2014	365.30	2.02	3.4	327.3		9.6	360.6	Dry	11.1	338.6	
4/25/2014	364.50	0.52	3.5	327.2		9.6	360.6	Dry	10.7	339.0	
5/28/2014	363.80	0.00	3.7	327.0		9.7	360.5	Dry	10.8	338.9	
6/25/2014	363.00	0.00	3.9	326.8		9.8	360.4	Dry	10.3	339.4	
7/30/2014	361.90	0.00	3.9	326.8		9.8	360.4	Dry	10.5	339.2	
8/27/2014	361.10	0.04	4.3	326.4		9.7	360.5	Dry	11.1	338.6	Wet
9/23/2014	360.50	0.00	4.2	326.5		9.6	360.6	Dry	11.1	338.6	Wet
10/29/2014	359.50	0.00	4.5	326.2		9.7	360.5	Dry	11.1	338.6	Wet
11/24/2014	359.40	0.32	4.6	326.1		9.7	360.5	Dry	10.9	338.8	Wet
12/30/2014	359.40	3.98	4.7	326.0		9.7	360.5	Dry	10.5	339.2	Wet
1/27/2015	359.00	1.42	4.7	326.0		9.7	360.5	Dry	10.9	338.8	
2/26/2015	358.60	0.46	4.8	325.9		9.7	360.5	Dry	11.1	338.6	Wet
3/27/2015	358.00	0.63	5.3	325.4		9.7	360.5	Dry	11.2	338.5	Wet
4/26/2015	331.00	0.22	8.0	322.7		9.6	360.6	Dry	11.1	338.6	Wet
5/27/2015	332.00	1.79	7.9	322.8		9.6	360.6	Dry	11.1	338.6	Wet
6/23/2015	331.00	0.00	12.3	318.4		10.8	360.6	Dry; Extended casing	12.3	339.0	Extended casing
7/30/2015	331.00	0.00	13.7	317.0		10.4	361.0	Dry	11.0	340.3	Wet
8/25/2015	331.00	0.00	17.6	316.1	Extended casing	10.8	360.6	Dry	12.5	338.8	Wet
9/30/2015	331.00	1.97	18.3	315.4		10.9	360.5	Dry	12.6	338.7	Wet
10/29/2015	331.00	0.18	18.4	315.3		10.8	360.6	Dry	12.5	338.8	
11/25/2015	331.00	0.17	19.5	314.2	Dry	10.9	360.5	Dry	12.7	338.6	Dry
12/30/2015	331.00	1.42	19.5	314.2	Dry; VW installed	10.9	360.5	Dry; VW installed	12.7	338.6	Dry; VW installed
1/26/2016	343.70	2.97	16.1	317.6		10.8	360.6	Dry	12.5	338.8	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-5			P-6			P-7		
Top of Well Elevation -->			330.7	333.7 Raised 8/25/2015		370.2	371.4 Raised 6/23/2015		349.7	351.3 Raised 6/23/2015	
Bottom of Well Elevation -->			314.0			360.6			338.1		
Depth of Well -->			16.7	19.7		9.5	10.8		11.5	13.2	
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment
2/24/2016	363.80	0.26	9.9	323.8		10.9	360.5	Dry	12.5	338.8	Dry
3/29/2016	374.90	1.50	5.4	328.3		10.9	360.5		12.5	338.8	
4/28/2016	375.50	0.09	4.3	329.4		10.9	360.5		12.5	338.8	
5/24/2016	374.40	0.13	4.0	329.7		10.9	360.5		12.5	338.8	
6/29/2016	373.70	0.00	4.1	329.6		10.9	360.5		12.5	338.8	
7/28/2016	372.20	0.00	4.1	329.6		10.9	360.5		12.5	338.8	
8/25/2016	367.10	0.00	4.7	329.0		10.9	360.5		12.5	338.8	
9/27/2016	363.30	0.00	5.3	328.4		10.9	360.5		12.5	338.8	
10/25/2016	362.10	0.82	5.0	328.7		10.9	360.5		12.5	338.8	
11/22/2016	361.80	1.69			VW was not logging			VW was not logging			VW was not logging
12/28/2016	368.55	3.61	3.0	330.7		10.9	360.5		12.5	338.8	
1/25/2017	375.80	6.48	1.3	332.4		10.8	360.6		12.5	338.8	
2/28/2017	375.90	3.95	1.2	332.5		10.9	360.5		12.5	338.8	
3/15/2017	375.80	3.61	1.1	332.6		10.9	360.5		12.5	338.8	
3/28/2017	375.50	0.09	1.1	332.6		10.9	360.5		12.5	338.8	
4/26/2017	375.00	0.04	1.1	332.6		10.9	360.5		12.5	338.8	
5/23/2017	374.60	35.00	1.1	332.6		10.9	360.5		12.5	338.8	
6/22/2017	373.80	0.00	1.4	332.3		10.9	360.5		12.5	338.8	
7/26/2017	371.40	0.00	2.0	331.7		10.9	360.5		12.5	338.8	
8/30/2017	368.60	0.00	2.9	330.8		10.9	360.5		12.5	338.8	
9/28/2017	364.80	0.00	3.5	330.2		10.9	360.5		12.5	338.8	
10/26/2017	359.00	0.00	4.8	328.9		10.9	360.5		12.5	338.8	
11/29/2017	357.80	0.15	5.8	327.9		10.9	360.5		12.5	338.8	
12/27/2017	357.30	0.00	5.9	327.8		10.9	360.5		12.5	338.8	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-8			P-9			Seepage Flow Point		
Top of Well Elevation -->			345.3	346.4 Raised 6/23/2015		344.9	346.4 Raised 6/23/2015		(liter/min)		
Bottom of Well Elevation -->			336.8			335.4					
Depth of Well -->			8.5	9.6		9.5	11.0				
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (liter/min)	Reading (gal/min)	Comment
1/1/2008											
2/1/2008											
3/25/2008	365.10										
4/25/2008	366.40										
5/28/2008	365.30										
6/25/2008	365.00										
7/18/2008	364.50										
8/25/2008	363.50										
9/25/2008	363.00										
10/21/2008	362.00										
11/25/2008	365.00										
12/23/2008	365.00										
1/26/2009	364.50								32.0	8.5	
2/24/2009	364.50								32.0	8.5	
3/23/2009	368.50								37.9	10.0	
4/27/2009	367.50								37.9	10.0	
5/22/2009	367.00								32.0	8.5	
6/29/2009	372.00								56.8	15.0	
7/31/2009	371.00								37.9	10.0	
8/26/2009	370.00								56.8	15.0	
9/29/2009	369.50								45.4	12.0	
10/30/2009	369.00								37.9	10.0	
11/30/2009	368.00								37.9	10.0	
12/30/2009	368.00								37.9	10.0	
3/1/2010	368.00								131.0	34.6	
3/30/2010	368.00								46.8	12.4	
4/4/2010	368.70								38.4	10.1	
4/27/2010	368.40								40.2	10.6	
5/26/2010	367.84								37.5	9.9	
6/29/2010	367.00								39.0	10.3	
7/27/2010	367.00								31.5	8.3	
8/27/2010	366.80								31.2	8.3	
9/28/2010	366.40								31.6	8.3	
10/26/2010	368.50								35.3	9.3	
11/30/2010	371.40								37.5	9.9	
12/28/2010	374.70								75.0	19.8	
1/4/2011	374.80								69.0	18.2	
1/6/2011	374.80										
1/7/2011	374.80										

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-8			P-9			Seepage Flow Point		
Top of Well Elevation -->			345.3	346.4 Raised 6/23/2015		344.9	346.4 Raised 6/23/2015		(liter/min)		
Bottom of Well Elevation -->			336.8			335.4					
Depth of Well -->			8.5	9.6		9.5	11.0				
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (liter/min)	Reading (gal/min)	Comment
1/8/2011	374.80								30.3	8.0	
1/9/2011	374.80								31.2	8.2	
1/10/2011	374.80										
1/11/2011	374.80								28.6	7.5	
1/17/2011	374.80								26.9	7.1	
1/19/2011	374.70		3.9	341.4		4.5	340.4		33.8	8.9	
1/21/2011	374.80		4.2	341.2		4.8	340.1				
1/27/2011	374.60		4.2	341.1		4.9	340.0		45.0	11.9	
2/3/2011	374.60		4.4	340.9		5.3	339.6				
2/8/2011	374.70		4.5	340.9		5.3	339.6				
2/28/2011	373.70		4.8	340.5		5.6	339.3		34.3	9.1	
3/28/2011	372.50	2.35	4.0	341.3		4.9	340.0		52.9	14.0	
4/28/2011	372.10	0.27	4.5	340.8		5.9	339.0		11.7	3.1	
5/18/2011	371.80	0.03	4.2	341.1		6.5	338.4		16.6	4.4	
5/25/2011	371.70	0.30	4.6	340.8		6.9	338.0		13.0	3.4	
6/28/2011	370.90	0.03	6.1	339.2		7.4	337.5		29.1	7.7	
7/26/2011	370.30	0.03	6.3	339.0		7.4	337.5		3.6	1.0	
8/24/2011	369.60	0.03	8.4	336.9		9.5	335.4		7.0	1.8	
8/30/2011	369.40		8.4	336.9		9.5	335.4		7.0	1.8	
9/13/2011	364.30	0.00	7.7	337.6		9.5	335.4		31.5	8.3	
9/27/2011	361.90		7.7	337.6		9.5	335.4		0.1	0.0	
10/11/2011	358.50	1.03	7.0	338.3		9.3	335.6		0.1	0.0	
10/25/2011	356.00	1.03	7.1	338.2		9.5	335.4		0.0	0.0	Reservoir was low
11/29/2011	355.00	1.51	7.5	337.8		9.6	335.3		0.0	0.0	Reservoir was low
12/28/2011	355.00	0.28	6.9	338.4		9.6	335.3		0.0	0.0	Reservoir was low
1/26/2012	355.00	1.05	7.4	337.9		9.4	335.5		0.0	0.0	Reservoir was low
2/28/2012	355.00	0.73	7.8	337.5		9.4	335.5		0.0	0.0	Reservoir was low
3/27/2012	352.40	0.73	7.9	337.4		9.6	335.3		0.0	0.0	Reservoir was low
4/23/2012	352.10	1.35	7.9	337.4		9.4	335.5		0.0	0.0	Reservoir was low
5/30/2012	352.20	0.07	7.8	337.5		9.4	335.5		0.0	0.0	Reservoir was low
6/13/2012	352.20		7.7	337.6		9.4	335.5		0.0	0.0	Reservoir was low
6/26/2012	352.20	0.00	7.6	337.7		9.5	335.4		0.0	0.0	Reservoir was low
7/24/2012	352.20	0.23	8.1	337.2		9.4	335.5		0.0	0.0	Reservoir was low
8/8/2012	352.20	0.23	8.3	337.0		9.6	335.3		0.0	0.0	Reservoir was low
8/28/2012	351.80	0.00	7.6	337.7		9.4	335.5		0.0	0.0	Reservoir was low
8/29/2012	351.80	0.00	8.0	337.3		9.7	335.2		0.0	0.0	Reservoir was low
9/25/2012	351.30	0.00	7.4	337.9		9.4	335.5		0.0	0.0	Reservoir was low
10/31/2012	351.00	0.09	7.6	337.7		9.4	335.5		0.0	0.0	Reservoir was low
11/27/2012	351.00	0.87	7.5	337.8		9.5	335.4		0.0	0.0	Reservoir was low

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-8			P-9			Seepage Flow Point		
Top of Well Elevation -->			345.3	346.4 Raised 6/23/2015		344.9	346.4 Raised 6/23/2015		(liter/min)		
Bottom of Well Elevation -->			336.8			335.4					
Depth of Well -->			8.5	9.6		9.5	11.0				
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (liter/min)	Reading (gal/min)	Comment
12/12/2012	351.00	1.13	8.0	337.3		9.5	335.4		0.0	0.0	Reservoir was low
1/29/2013	366.10	1.30	8.3	337.0		9.5	335.4				Vault is being relocated
2/21/2013	372.10	0.42	8.1	337.2		9.5	335.4				Vault is being relocated
3/28/2013	371.90	0.79	8.3	337.0		9.4	335.5				Vault is being relocated
4/25/2013	371.40	0.00	7.9	337.4		9.4	335.5				Vault is being relocated
5/22/2013	370.90	0.00	8.5	336.8		9.6	335.3				Vault is being relocated
6/25/2013	370.20	0.00	8.3	337.0		9.4	335.5				Vault is being relocated
7/23/2013	369.40	0.00	8.3	337.0		9.4	335.5				Vault is being relocated
8/21/2013	368.60	0.00	8.3	337.0	Wet	9.5	335.4				Vault is being relocated
9/25/2013	367.70	0.00	8.3	337.0	Dry	9.5	335.5				Vault is being relocated
10/30/2013	366.90	0.00	8.4	336.9	Dry	9.1	335.8		23.6	6.2	
11/26/2013	366.50	0.59	8.3	337.0	Wet	10.9	334.0	Wet	22.2	5.9	
12/17/2013	366.20	0.70	8.3	337.0	Wet	9.5	335.4		23.6	6.2	
1/28/2014	365.50	0.00	8.4	336.9		9.5	335.4		18.4	4.9	
2/25/2014	365.40	0.76	8.4	336.9	Wet	9.6	335.3	Dry	15.0	4.0	
3/25/2014	365.30		8.3	337.0		9.5	335.4		17.3	4.6	
3/28/2014	365.30	2.02	8.3	337.0		9.4	335.5		11.8	3.1	
4/25/2014	364.50	0.52	8.3	337.0		9.5	335.4		18.0	4.8	
5/28/2014	363.80	0.00	8.1	337.2		9.4	335.5		15.0	4.0	
6/25/2014	363.00	0.00	8.4	336.9		9.6	335.3		14.2	3.7	
7/30/2014	361.90	0.00	8.4	336.9		9.6	335.3		14.7	3.9	
8/27/2014	361.10	0.04	8.3	337.0	Wet	9.5	335.4		15.2	4.0	
9/23/2014	360.50	0.00	8.2	337.1		9.5	335.4	Wet	13.2	3.5	
10/29/2014	359.50	0.00	8.3	337.0		9.4	335.5		12.0	3.2	
11/24/2014	359.40	0.32	8.2	337.1		9.5	335.4		8.7	2.3	
12/30/2014	359.40	3.98	8.3	337.0		9.5	335.4		8.1	2.1	
1/27/2015	359.00	1.42	8.2	337.1		9.5	335.4		6.9	1.8	
2/26/2015	358.60	0.46	8.3	337.0		9.5	335.4		6.4	1.7	
3/27/2015	358.00	0.63	8.3	337.0		9.6	335.3		6.1	1.6	
4/26/2015	331.00	0.22	8.4	336.9	Wet	9.6	335.3	Wet	0.0	0.0	
5/27/2015	332.00	1.79	8.4	336.9	Wet	9.6	335.3	Wet	0.0	0.0	
6/23/2015	331.00	0.00	9.5	336.9	Wet; Extended casing	11.0	335.4	Dry; Extended casing	0.0	0.0	
7/30/2015	331.00	0.00	8.3	338.1	Dry	10.9	335.5	Wet	0.0	0.0	
8/25/2015	331.00	0.00	9.5	336.9	Wet	10.9	335.5	Wet	0.0	0.0	
9/30/2015	331.00	1.97	9.5	336.9	Dry	11.0	335.4	Wet	0.0	0.0	
10/29/2015	331.00	0.18	9.5	336.9	Dry	11.0	335.4	Dry	0.0	0.0	
11/25/2015	331.00	0.17	9.5	336.9	Dry	11.0	335.4	Dry	0.0	0.0	
12/30/2015	331.00	1.42	9.5	336.9	Dry; VW installed	11.0	335.4	Dry; VW installed	0.0	0.0	
1/26/2016	343.70	2.97	9.3	337.1		10.8	335.6		0.0	0.0	

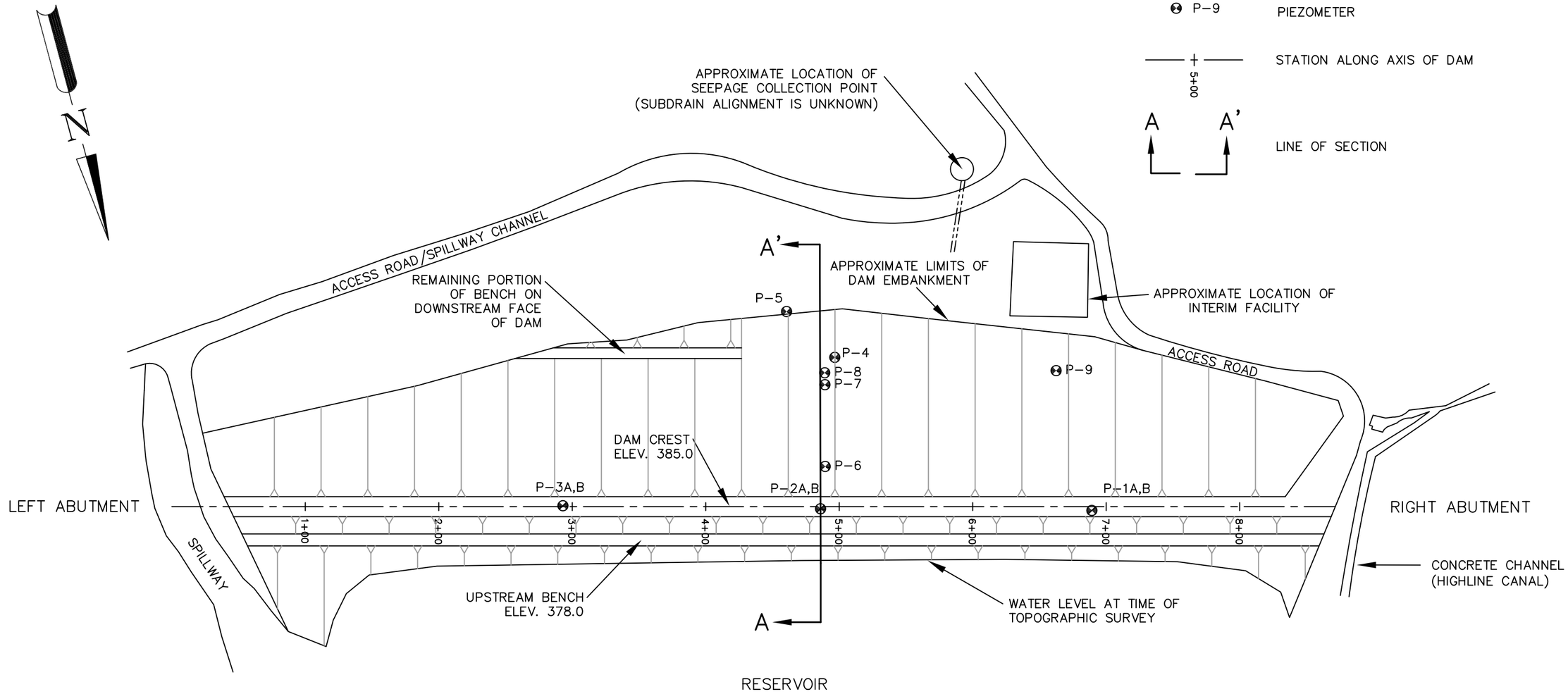
Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

TABLE 2
SYPHON CANYON DAM
PIEZOMETER WATER LEVELS AND SEEPAGE MEASUREMENTS
JANUARY 2008 THROUGH DECEMBER 2017

Monitoring Well -->			P-8			P-9			Seepage Flow Point		
Top of Well Elevation -->			345.3	346.4 Raised 6/23/2015		344.9	346.4 Raised 6/23/2015		(liter/min)		
Bottom of Well Elevation -->			336.8			335.4					
Depth of Well -->			8.5	9.6		9.5	11.0				
Date	Reservoir Elevation (ft)	Monthly Rainfall (in.)	Reading (ft)	Elev. (ft)	Comment	Reading (ft)	Elev. (ft)	Comment	Reading (liter/min)	Reading (gal/min)	Comment
2/24/2016	363.80	0.26	9.5	336.9	Dry	10.9	335.5		0.0	0.0	
3/29/2016	374.90	1.50	9.5	336.9		11.0	335.4		0.9	0.2	
4/28/2016	375.50	0.09	9.5	336.9		11.0	335.4		3.9	1.0	
5/24/2016	374.40	0.13	9.5	336.9		11.0	335.4		4.2	1.1	
6/29/2016	373.70	0.00	9.5	336.9		11.0	335.4		4.6	1.2	
7/28/2016	372.20	0.00	9.5	336.9		11.0	335.4		5.1	1.3	
8/25/2016	367.10	0.00	9.5	336.9		11.0	335.4		3.8	1.0	
9/27/2016	363.30	0.00	9.5	336.9		11.0	335.4		1.8	0.5	
10/25/2016	362.10	0.82	9.5	336.9		10.9	335.5		3.4	0.9	
11/22/2016	361.80	1.69			VW was not logging			VW was not logging	4.9	1.3	
12/28/2016	368.55	3.61	9.5	336.9		11.0	335.4		6.1	1.6	
1/25/2017	375.80	6.48	9.5	336.9		10.8	335.6		22.0	5.8	
2/28/2017	375.90	3.95	9.5	336.9		11.0	335.4		22.3	5.9	
3/15/2017	375.80	3.61	9.5	336.9		11.0	335.4		22.3	5.9	
3/28/2017	375.50	0.09	9.5	336.9		11.0	335.4		25.7	6.8	
4/26/2017	375.00	0.04	9.5	336.9		11.0	335.4		28.0	7.4	
5/23/2017	374.60	35.00	9.5	336.9		11.0	335.4		16.3	4.3	
6/22/2017	373.80	0.00	9.5	336.9		11.0	335.4		30.1	8.0	
7/26/2017	371.40	0.00	9.5	336.9		11.0	335.4		30.6	8.1	
8/30/2017	368.60	0.00	9.5	336.9		11.0	335.4		36.0	9.5	
9/28/2017	364.80	0.00	9.5	336.9		11.0	335.4		16.0	4.2	
10/26/2017	359.00	0.00	9.5	336.9		11.0	335.4		2.8	0.7	
11/29/2017	357.80	0.15	9.5	336.9		11.0	335.4		9.2	2.4	
12/27/2017	357.30	0.00	9.5	336.9		11.0	335.4		6.8	1.8	

Notes:
Elevations are in feet relative to NGVD29 datum; Elev. = elevation;
ft = feet; in. = inches; Maint. = maintenance; VW = Vibrating Wire

FIGURES



1"=80'

80' 0' 80'

SCALE

NOTES:
1) TOPOGRAPHIC SURVEY PROVIDED BY C&V CONSULTANTS ON 2/26/2011.
2) ELEVATIONS ARE IN FEET RELATIVE TO NGVD29 DATUM.
3) SECTION A-A' IS SHOWN ON FIGURE 2.

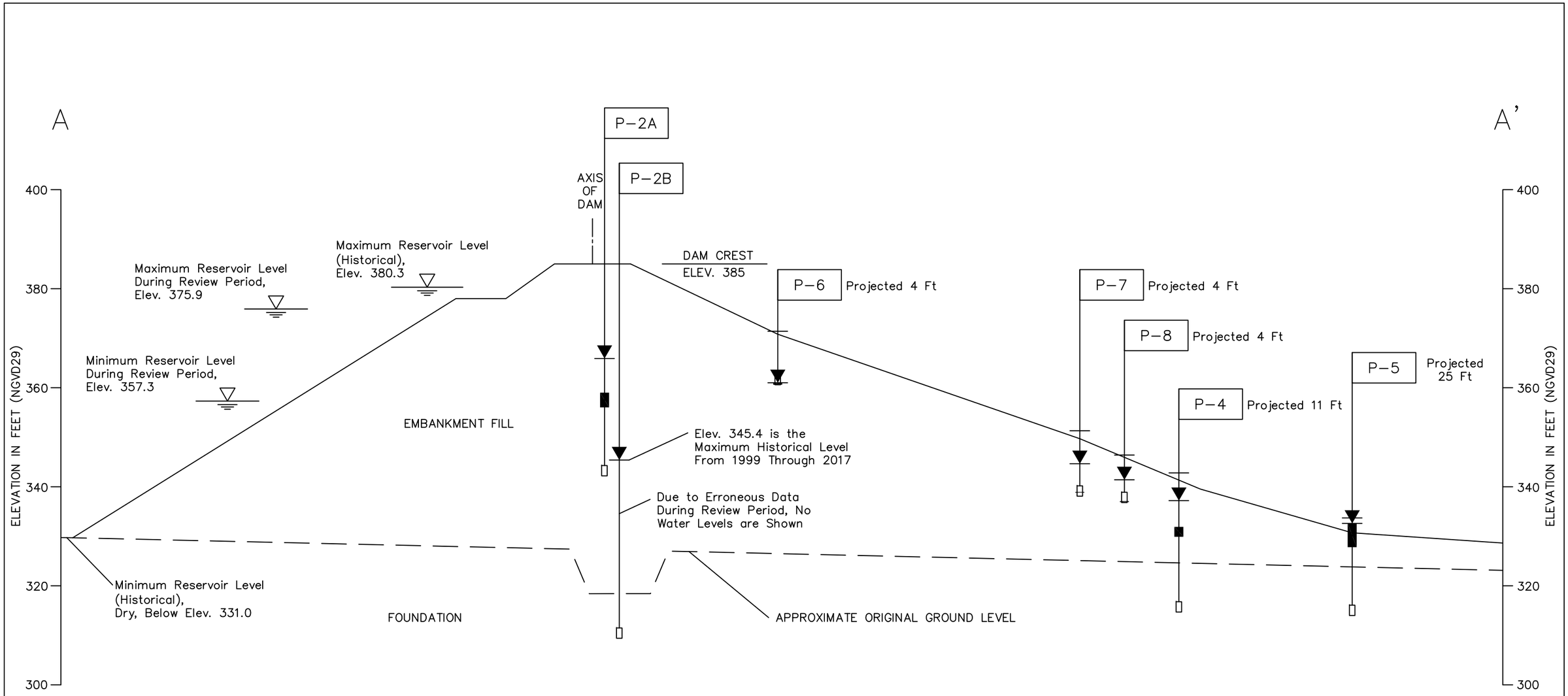
Irvine Ranch WATER DISTRICT

GENTERRA CONSULTANTS, INC.
Engineering & Geotechnical Services
Irvine, California

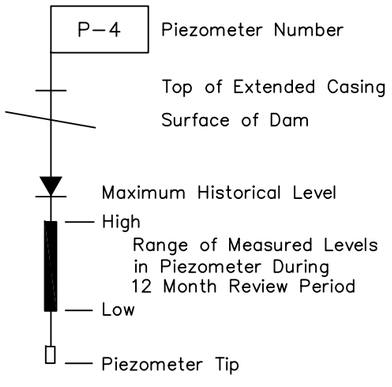
SYPHON CANYON DAM

SITE AND INSTRUMENTATION PLAN

PROJECT NO.	DATE	FIGURE
397D-IRW	DECEMBER 2018	1



LEGEND



SECTION A–A' (MAXIMUM SECTION)

1"=20'

20' 0' 20'

SCALE

NOTES:
1) LOCATION OF SECTION A–A' IS SHOWN ON FIGURE 1.
2) ELEVATIONS ARE IN FEET RELATIVE TO NGVD29 DATUM.

Irvine Ranch WATER DISTRICT

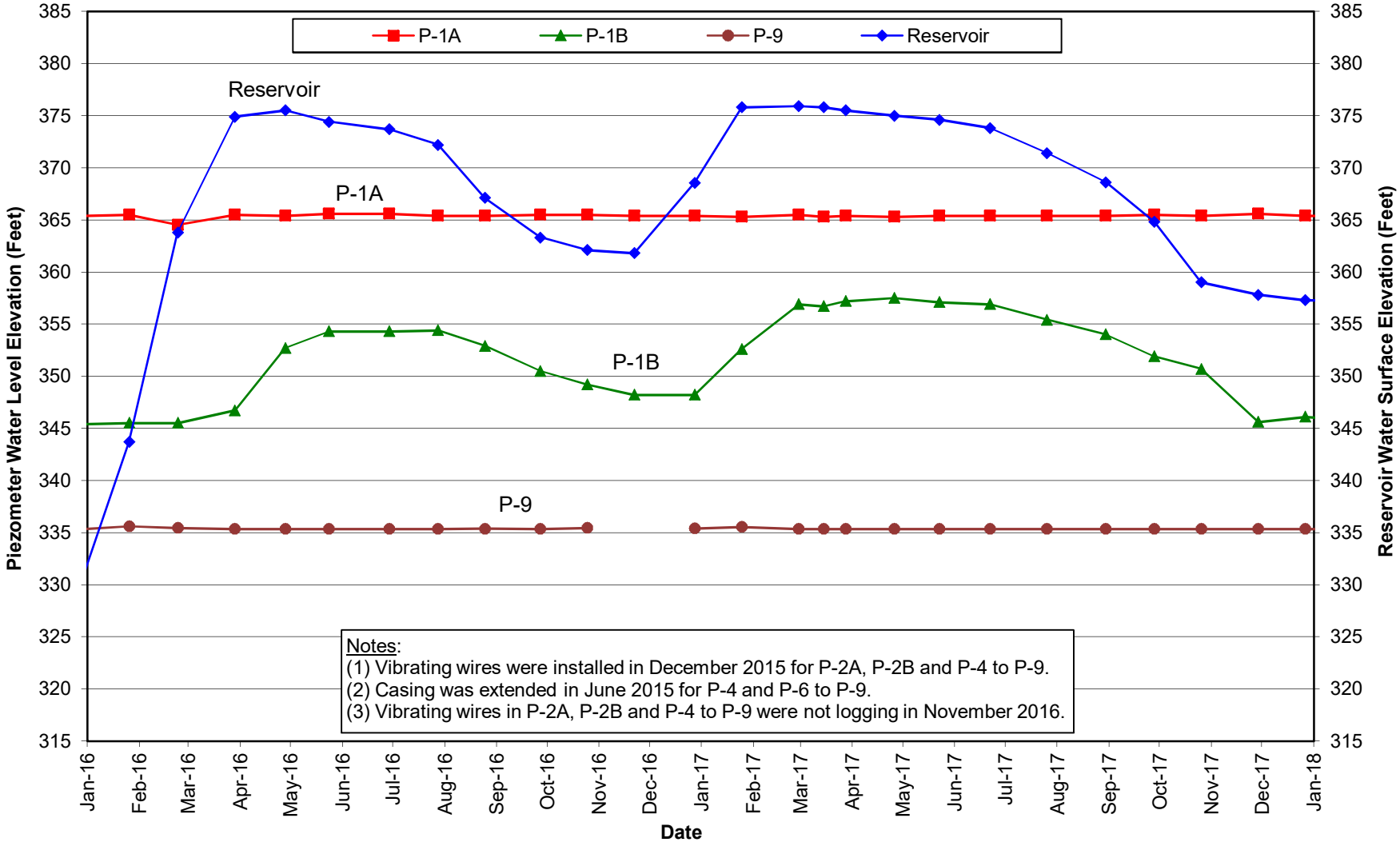
GENTERRA CONSULTANTS, INC.
Engineering & Geotechnical Services
Irvine, California

SYPHON CANYON DAM

SECTION A–A'

PROJECT NO.	DATE	FIGURE
397D–IRW	DECEMBER 2018	2

SYPHON CANYON DAM
2-YR PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-1A, P-1B, AND P-9
JANUARY 2016 THROUGH DECEMBER 2017

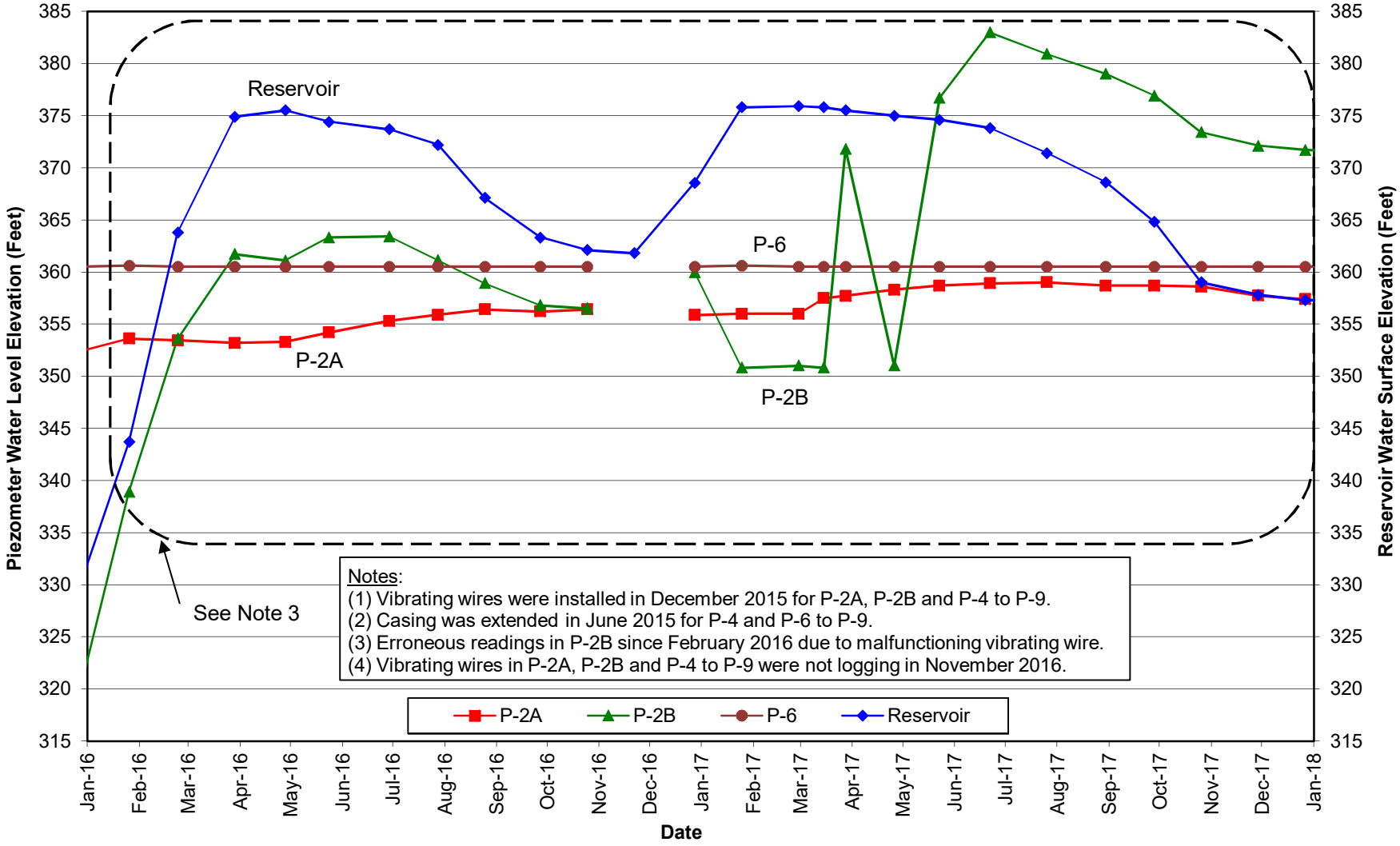


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 3A

SYPHON CANYON DAM
2-YR PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-2A, P-2B, AND P-6
JANUARY 2016 THROUGH DECEMBER 2017

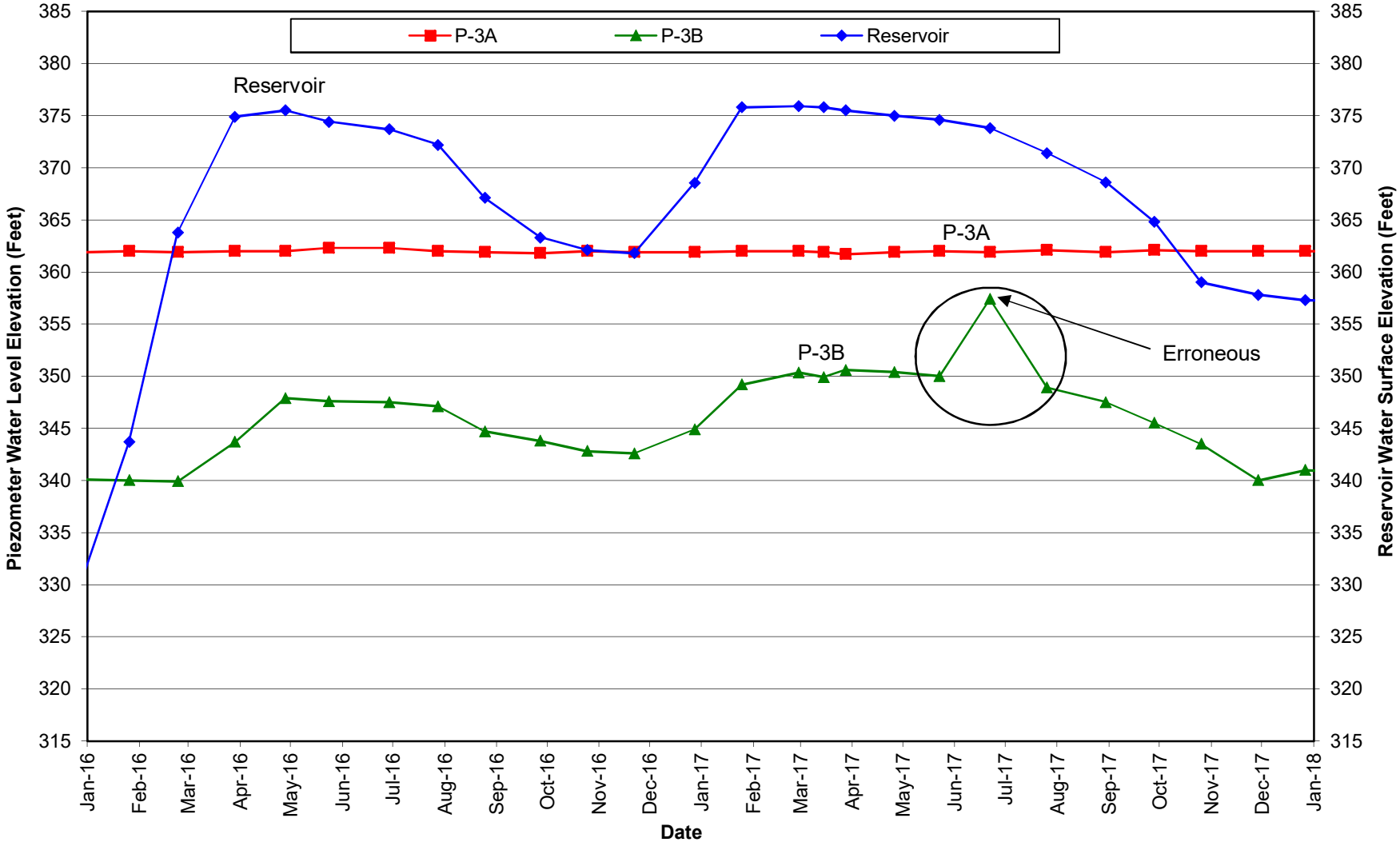


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 3B

SYPHON CANYON DAM
2-YR PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-3A AND P-3B
JANUARY 2016 THROUGH DECEMBER 2017

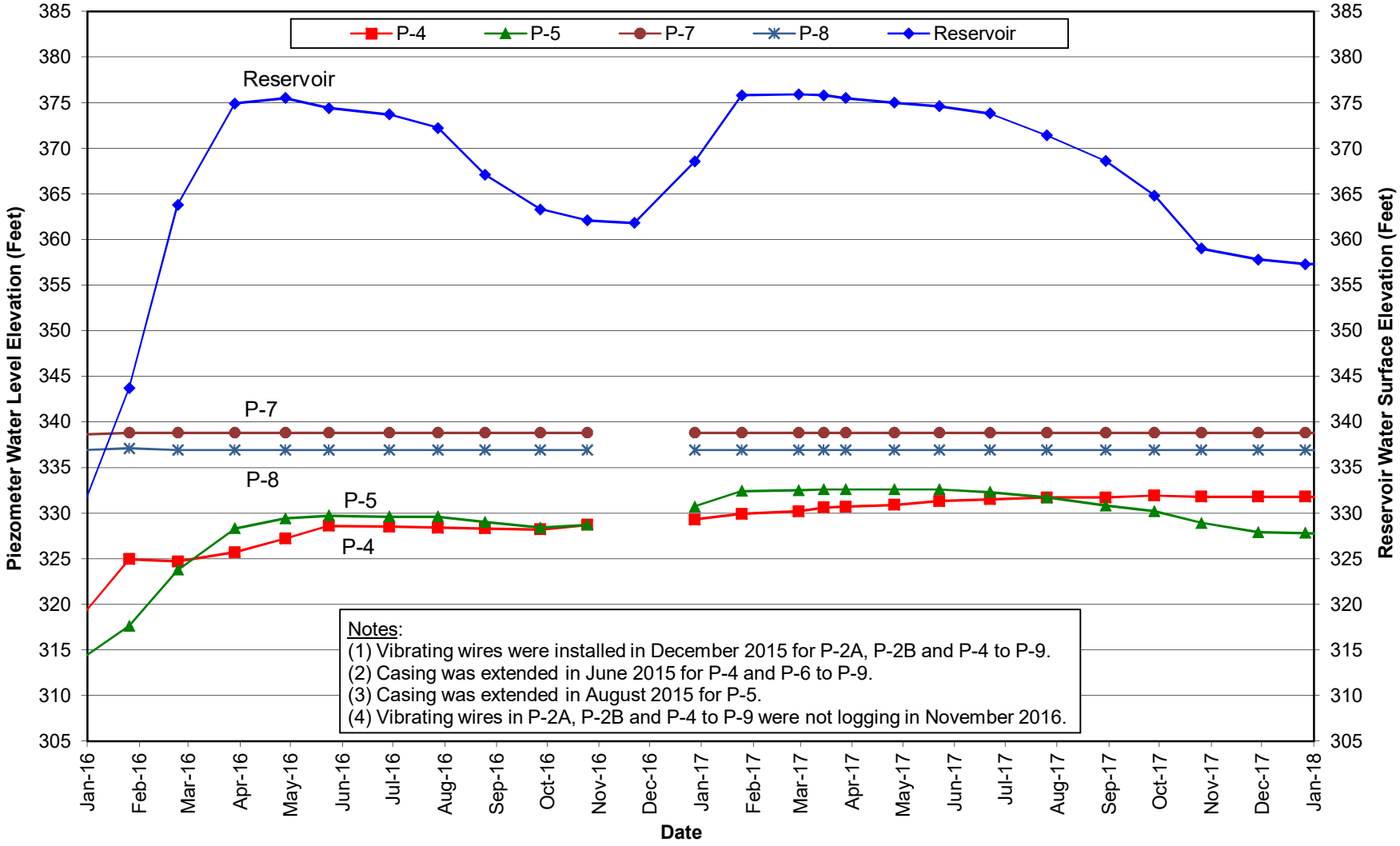


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 3C

SYPHON CANYON DAM
2-YR PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-4, P-5, P-7, AND P-8
JANUARY 2016 THROUGH DECEMBER 2017

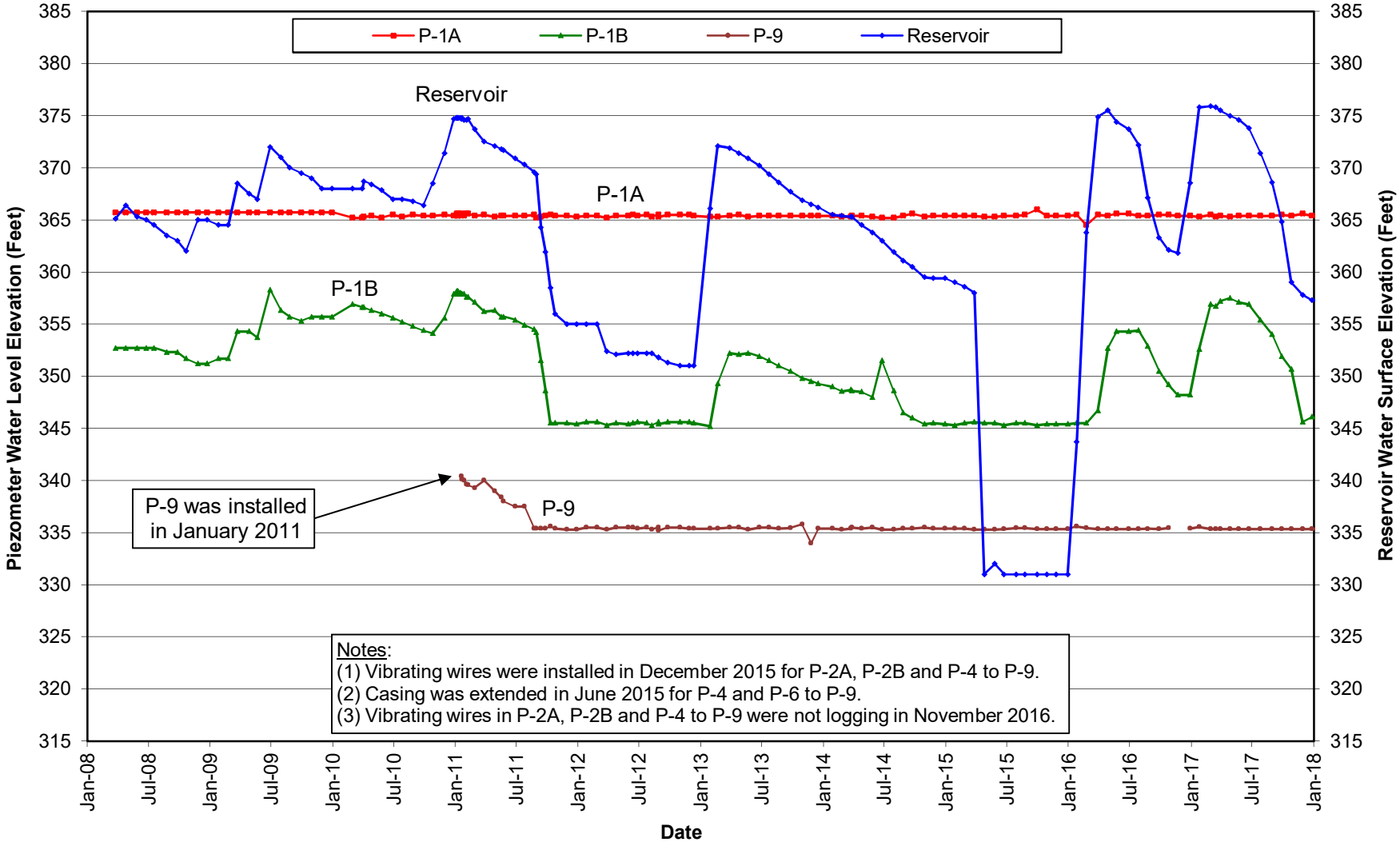


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 3D

SYPHON CANYON DAM
10-YR HISTORICAL PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-1A, P-1B, AND P-9
JANUARY 2008 THROUGH DECEMBER 2017

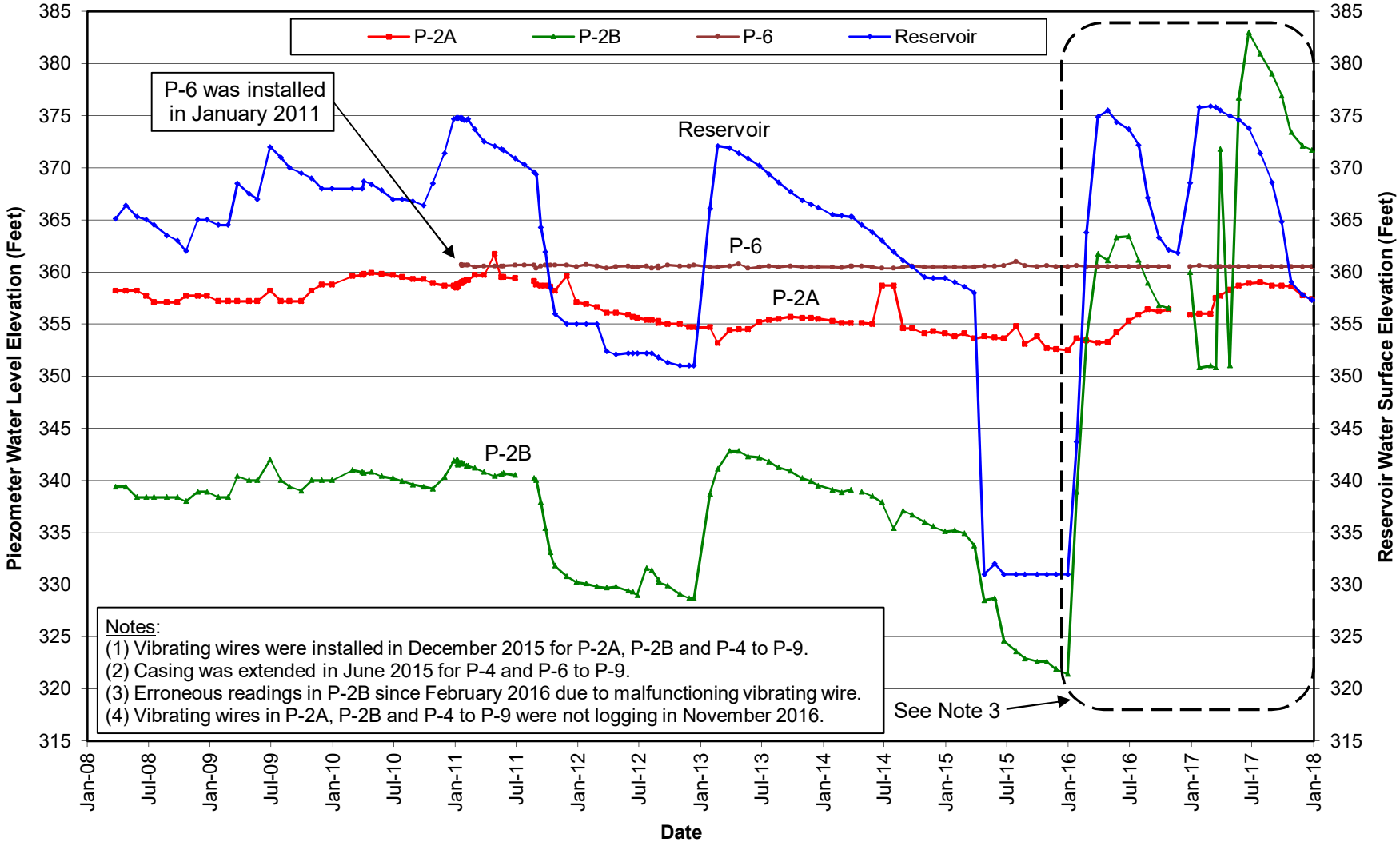


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 4A

SYPHON CANYON DAM
10-YR HISTORICAL PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-2A, P-2B, AND P-6
JANUARY 2008 THROUGH DECEMBER 2017

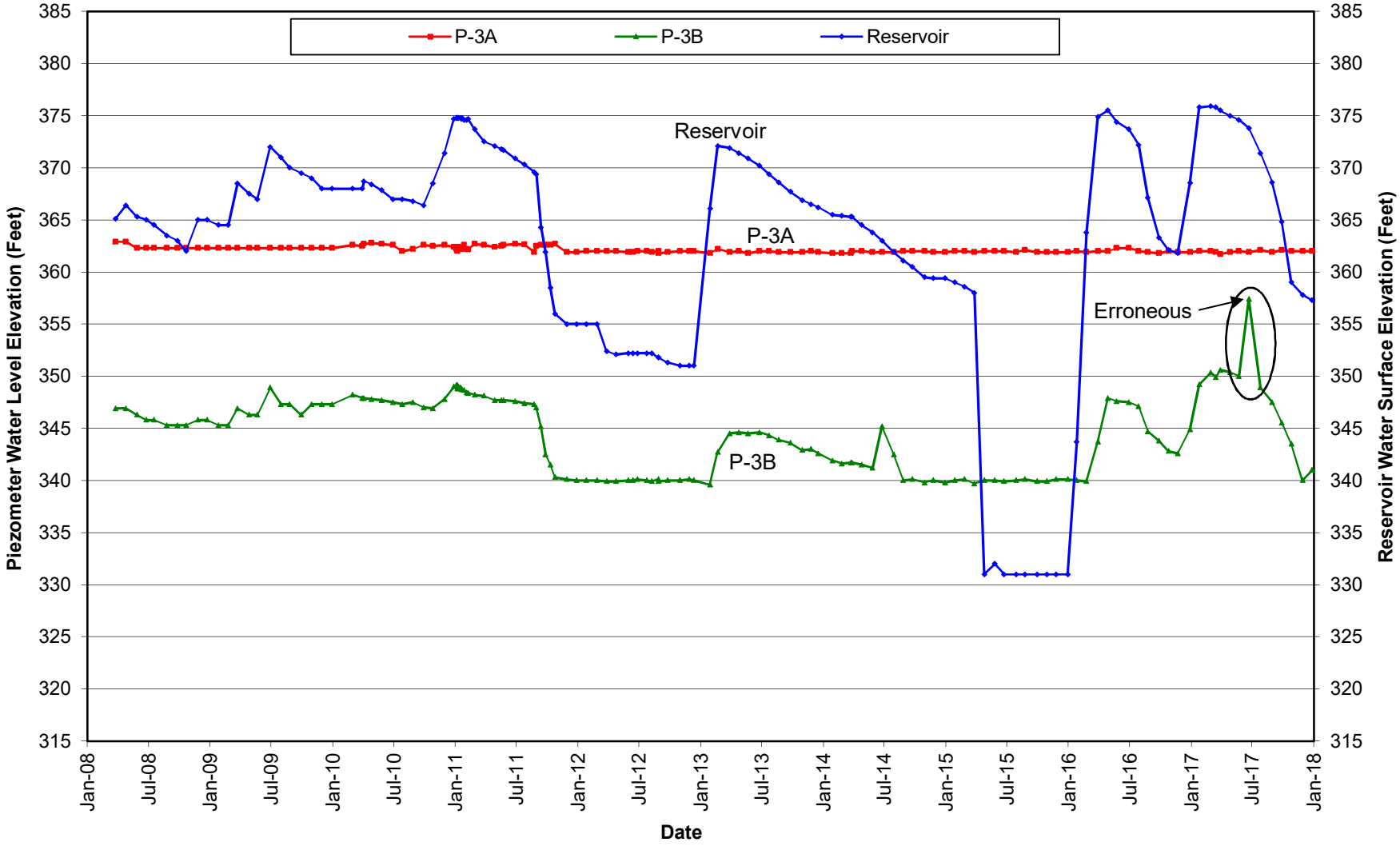


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 4B

SYPHON CANYON DAM
10-YR HISTORICAL PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-3A AND P-3B
JANUARY 2008 THROUGH DECEMBER 2017

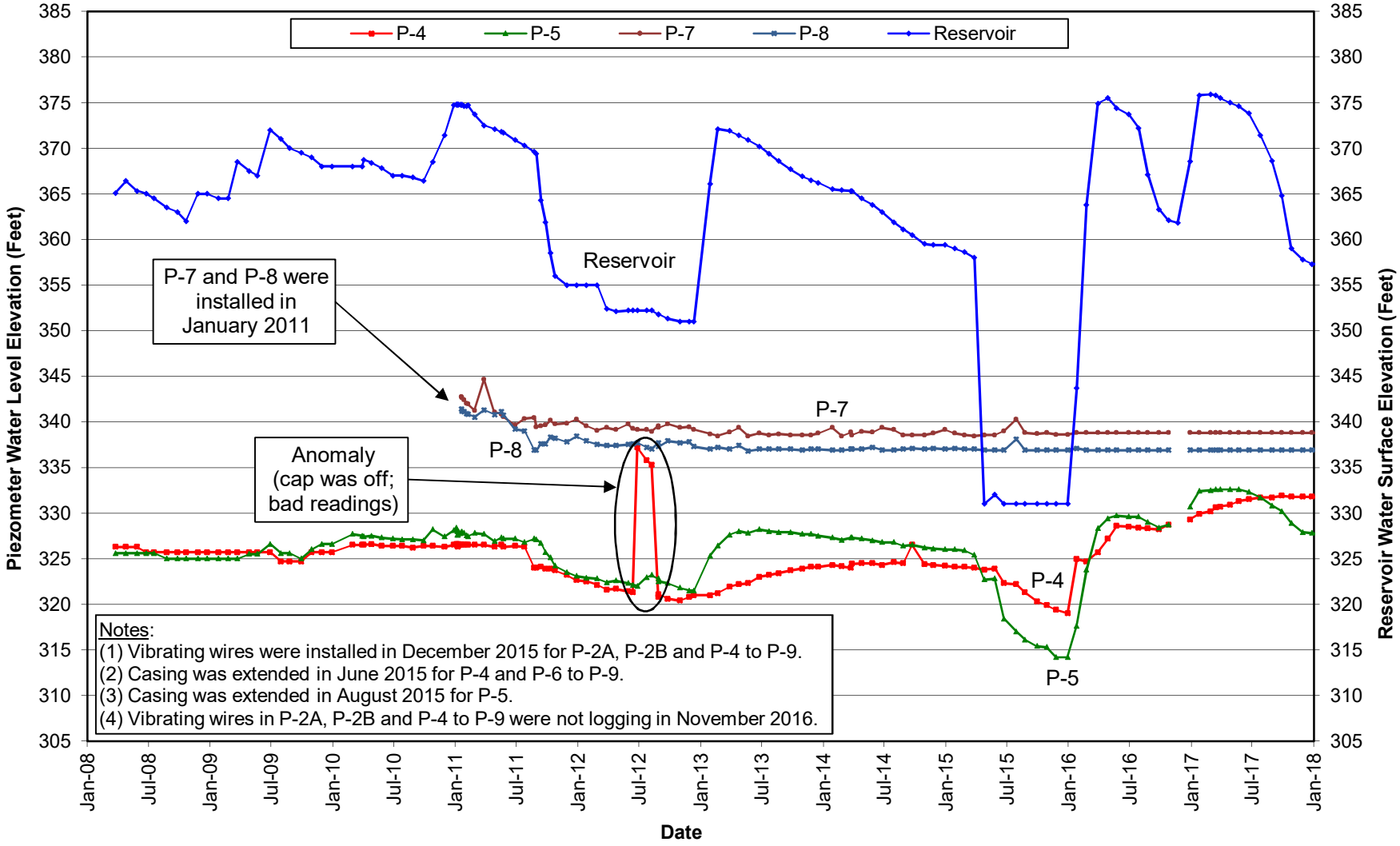


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 4C

SYPHON CANYON DAM
10-YR HISTORICAL PIEZOMETER AND RESERVOIR WATER SURFACE ELEVATIONS
PIEZOMETERS P-4, P-5, P-7, AND P-8
JANUARY 2008 THROUGH DECEMBER 2017

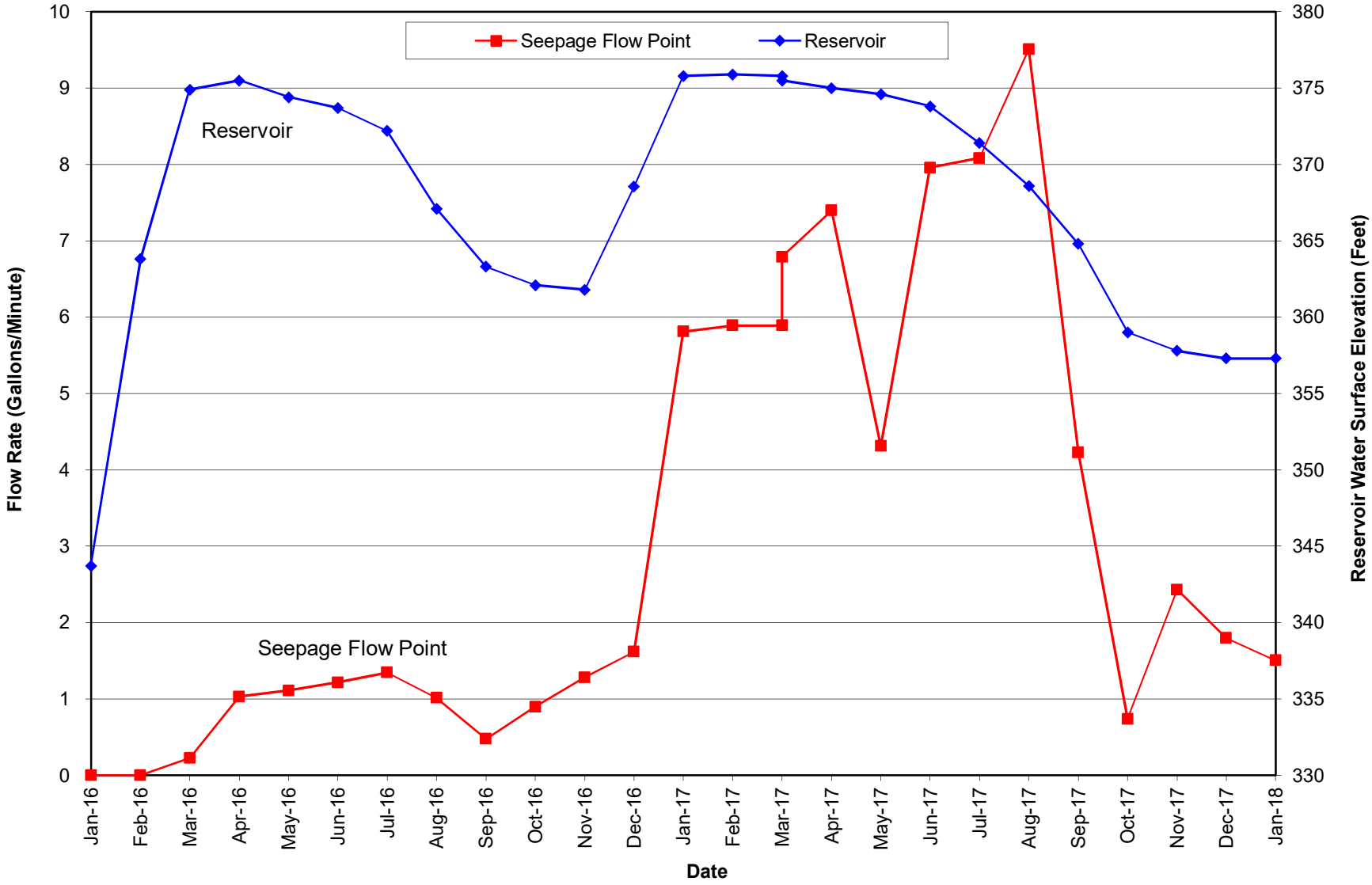


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 4D

SYPHON CANYON DAM
2-YR SEEPAGE MEASUREMENTS
SEEPAGE FLOW POINT
JANUARY 2016 THROUGH DECEMBER 2017

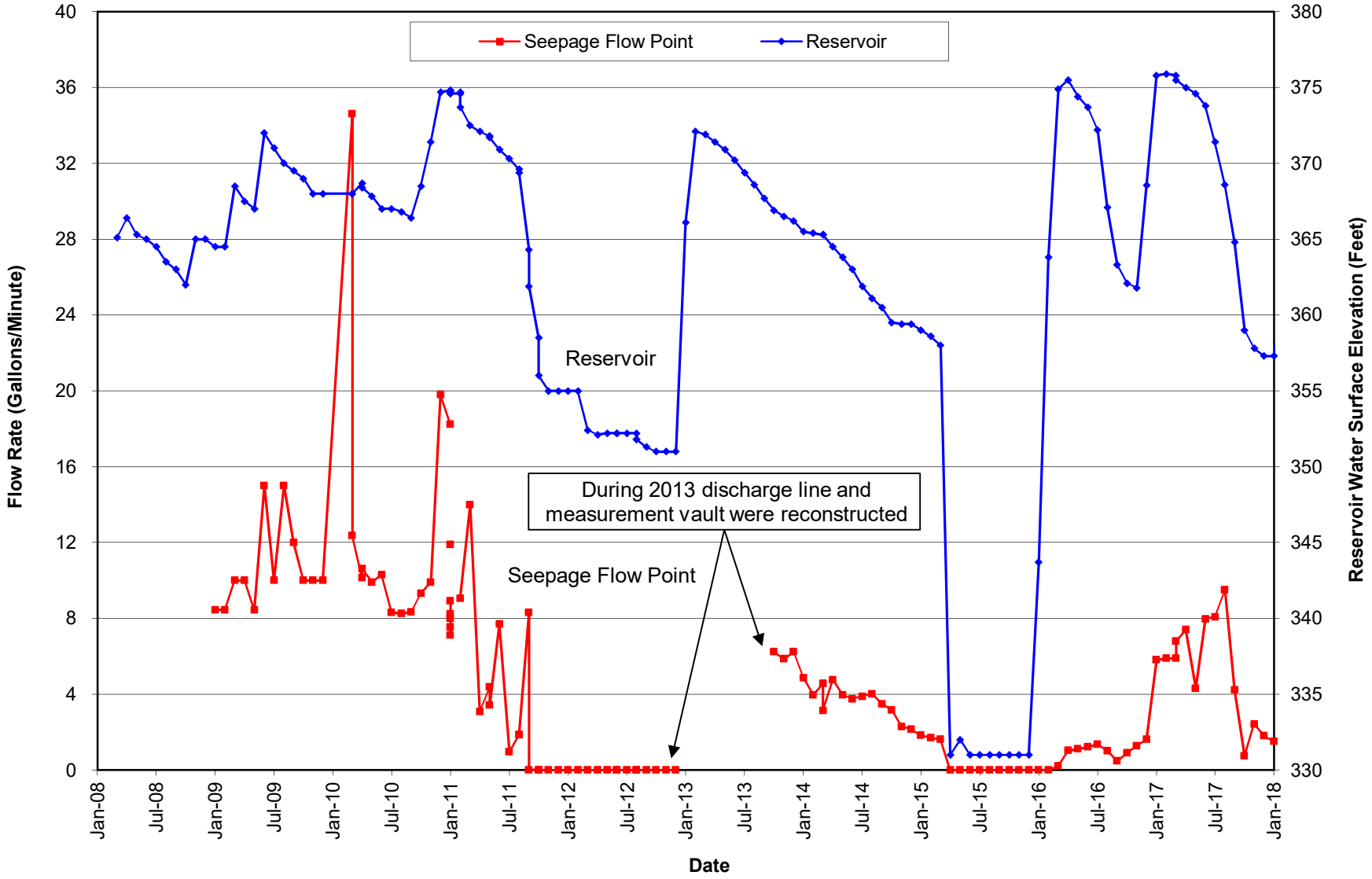


NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 5

SYPHON CANYON DAM
10-YR HISTORICAL SEEPAGE MEASUREMENTS
SEEPAGE FLOW POINT
JANUARY 2008 THROUGH DECEMBER 2017



NGVD29 DATUM

IRVINE RANCH WATER DISTRICT

FIGURE 6