

CAUSE NO. 1123430

VICENTE MEDINA, ASHLEY
MEDINA and ARIS ANTONIOU

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COUNTY CIVIL COURT
AT LAW NUMBER 1

v.

SAN JACINTO RIVER AUTHORITY

HARRIS COUNTY, TEXAS

AFFIDAVIT OF HECTOR OLMOS, P.E., CFM

STATE OF TEXAS §
§
COUNTY OF HARRIS §

BEFORE ME, the undersigned authority, on this day appeared Hector Olmos, P.E., CFM who is personally known to me and who, being sworn on oath to tell the truth, testified as follows:

1. "My name is Hector Olmos. I am over the age of eighteen (18) years, have never been convicted of a felony or a crime of moral turpitude, and am competent to make this Affidavit. I have personal knowledge of the facts contained herein, and the facts are true and correct.
2. "I have a Bachelor of Science Degree in Civil Engineering from the Universidad Nacional de Colombia, a Master of Science Degree in Water Resources from Texas A&M University, and over fourteen years of professional experience. I am currently employed as a Principal and Vice President of Freese and Nichols, Inc. I have been employed by Freese and Nichols since 2005, working in the water resources and stormwater management groups, which has allowed me the opportunity to work on various types of projects across Texas, including development of hydrologic and hydraulic models for small to large watersheds, hydrologic and hydraulic evaluation of dams, development of gate operation plans, dam breach analyses, evaluation of hydraulic systems after significant storms, and development of flood mitigation projects. As a result of this work, I have a broad base of technical expertise in the fields of hydrology and hydraulics. My CV is attached to this affidavit as **Exhibit Olmos 1**.
3. "I have worked with the San Jacinto River Authority ("SJRA") since 2009, addressing various issues relating to Lake Conroe and the Lake Conroe Dam. My tasks and activities have included consulting services in dam operations, development of and updates to the SJRA Gate Operations Policy, and development of and updates to the SJRA Emergency Action Plan.

EXHIBIT A

4. "Lake Conroe is a water supply reservoir, constructed in 1973 along the West Fork San Jacinto River. The Lake Conroe sub-watershed drains a 444-square mile area. SJRA is permitted under Texas law to store 430,260 acre feet of water in Lake Conroe, in addition to diversion authorizations. The drainage area of Lake Conroe, along with the locations and watersheds of other area drainages, is shown in the map attached as **Exhibit Olmos 2** hereto.
5. "The normal pool elevation of the lake is 201 feet above mean sea level (msl). Water that is released from Lake Conroe Dam flows into the main channel of the West Fork San Jacinto River. From there, the West Fork San Jacinto River flows downstream.
6. "Downstream from Lake Conroe Dam, numerous creeks flow into the West Fork San Jacinto River, including Lake Creek (12 river miles downstream from Lake Conroe Dam), and Spring Creek, after its convergence with Cypress Creek (41 river miles downstream from Lake Conroe Dam). Cypress Creek, Lake Creek, and Spring Creek all flow unabated into West Fork San Jacinto River upstream of Lake Houston and downstream of Lake Conroe Dam.
7. "Just downstream from its confluence with Spring Creek, the West Fork San Jacinto River flows into Lake Houston, which also receives water from the East Fork San Jacinto River and Luce Bayou, and the flows from these various tributaries combine and continue flowing downstream. The total drainage area contributing to Lake Houston is 2,828 square miles.
8. "Lake Conroe is impounded by the Lake Conroe Dam, which is an earthfill structure with a length of approximately 11,800 feet, including the spillway, a maximum height of 81 feet above the original streambed, and a crest width of approximately 20 feet.
9. "The top of dam design elevation was originally 212 feet; however, due to settlement and consolidation of the embankment, a localized low spot elevation of 210.66 feet (NGVD 29) was identified on the northern edge of the asphalt road. The service spillway is a gate-controlled structure with a concrete ogee-type overflow section.
10. "The crest of the ogee section is at elevation 172.66 feet (NGVD 29), and flow is regulated by five 40-foot wide by 30-foot high steel tainter gates. The total length of the spillway is 232 feet, including four 8-foot wide piers.
11. "When closed, the gates have a top elevation of 203.24 feet (NGVD 29). If the surface level of the lake rises above 203.24 feet and the dam gates have not been raised/opened to release water from the bottom, water would spill uncontrolled over the gates. That means that the flow from the lake will not just be released downstream, but it will also be released in an uncontrolled manner and at an uncontrolled rate that could jeopardize the structural integrity of the gates, possibly resulting in a catastrophic failure.

12. "SJRA operates Lake Conroe and the Lake Conroe Dam. Freese and Nichols, under contract with SJRA, provides various consulting services to SJRA, including with respect to dam operations/protocols, hydrology analysis, water supply consulting, regulatory compliance counseling, and raw water supply master planning, among other services.
13. "In order to operate the dam in compliance with state regulations and guidance (promulgated by the Texas Commission on Environmental Quality), SJRA engaged Freese and Nichols to develop a Gate Operations Policy for the dam. In doing so, SJRA specifically asked that Freese and Nichols comply with all applicable rules for gate operations, including the rule that gate releases should not produce a maximum rate of outflow that exceeds maximum rate of inflow.
14. "The Gate Operations Policy is targeted, in part, to address protocols and operations during rainfall events. Freese and Nichols prepared an initial Gate Operations Policy in 2010. Freese and Nichols modified the Gate Operations Policy in April of 2017 in order to better optimize and balance the lake levels and releases from the dam. The Gate Operations Policy consists of a written set of guidelines, as well as a spreadsheet that performs calculations to recommend gate operations based on lake level and estimated inflows to Lake Conroe.
15. "The Probable Maximum Flood ("PMF") is the flood magnitude that may be expected from the most critical combination of meteorological and hydrologic conditions that are reasonably possible for a given watershed. State law requires that the spillway be sized and operated in a manner that allows the passage of the PMF without overtopping the dam. The Gate Operations Policy sets forth three gate opening recommendations for each entry in the spreadsheet during a rainfall event, reflecting a minimum, a target, and a maximum gate opening, which can all safely pass the PMF event without overtopping the gates or the dam. Among my primary roles in supporting SJRA, I participated in the development and update to the SJRA Gate Operations Policy, and provided subsequent support related to the implementation of that Policy.
16. "Several years after the initial Gate Operations Policy was put into place, Freese and Nichols met with SJRA staff to receive feedback on the Policy, refresh them on the procedures used in the Policy, provide clarification on the intent of some of the procedures within the Policy, and provide additional guidance to improve the results of the spreadsheet. Various scenarios of gate operations were evaluated for storm events of different magnitude that occurred in 2015 and 2016, as well as storm events used for evaluation of dams, such as the PMF, and the 100-year storm. The updated 2017 Gate Operations Policy adopted the scenario that resulted in the most significant improvement from an operational and flood risk balancing between the areas upstream and downstream of the dam.

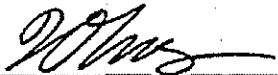
17. "Among the operational criteria and goals reflected in the Gate Operations Policy is the protection of the integrity of the Lake Conroe Dam. Additionally, as part of the formulation of the Policy, SJRA instructed its engineers to develop a Gate Operations Policy that does not produce a maximum rate of outflow that exceeds maximum rate of inflow.

18. "Thus, the spreadsheet includes logic that recommends releasing water through the gates so that the maximum rate of release from the gates in response to a flooding event does not exceed the maximum rate of inflow into Lake Conroe during the event. The Policy was further designed to ensure that the dam's gates are operated consistently across various scenarios, contemplating different inflow quantities.
19. "The Policy recognizes that operating a dam involves variables, and it is designed to take into consideration such conditions. Wind, rain, and waves can all affect lake-elevation reading, which could in turn affect the estimate of inflows into Lake Conroe. Accordingly, the Policy sets release rates far below any peak inflow rate to account for that uncertainty. It sets forth the guidelines by which the gates will be operated in such a manner so as to ensure that peak outflow in any significant rain event is lower than the lake's peak inflow during such rain event. For example, at a lake elevation level – 203.0 feet above msl – the Policy recommends a target release rate of 35% of the peak inflow into the lake, at a lake elevation level of 206.5 feet above msl, it recommends a maximum release rate of 75% of the peak inflow into the lake, at a lake elevation level of 208.5 feet above msl, it recommends a maximum release rate of 80% of the peak inflow into the lake.
20. "SJRA's Gate Operations Policy was implemented during Hurricane Harvey, in August/September 2017. Hurricane Harvey was one of the costliest hurricanes in U.S. history, and the rainfall from the storm caused the flooding of tens of thousands of homes and businesses in Harris, Montgomery and surrounding counties, including tens of thousands of properties outside of the West Fork San Jacinto River watershed.
21. "Between August 26, 2017 and August 29, 2017, the area surrounding Lake Conroe and Plaintiffs' properties received rainfall amounts ranging from 20 to 35 inches, according to National Weather Service (NWS) Quantitative Precipitation Estimates (QPE).
22. "Of the West Fork San Jacinto River tributaries (Cypress Creek, Spring Creek, Lake Creek, West Fork San Jacinto River, and Lake Conroe), Lake Conroe received approximately 21 percent of the total rainfall volume that fell over the West Fork San Jacinto River and its tributaries. The rainfall upstream of Lake Conroe represents approximately 13 percent of the total rainfall volume that fell over the 2,828 square mile Lake Houston watershed during Hurricane Harvey. **Exhibit Olmos 3** shows the NWS QPE rainfall totals for each subwatershed upstream of Lake Houston. **Exhibit Olmos 4** shows the total volume of rainfall, as measured in acre-feet.
23. "As Hurricane Harvey approached southeast Texas, SJRA was monitoring the inflows into Lake Conroe and lake levels in order to determine if, when, and to what extent to begin releasing water from the Lake Conroe Dam in accordance with the Gate Operations Policy prepared by Freese and Nichols. During the event, SJRA monitored lake levels, computed inflows, and reviewed and implemented spreadsheet-based gate opening recommendations developed as part of the Gate Operation Policy.

24. "Being familiar with the Gate Operations Policy, Freese and Nichols staff were monitoring conditions at the lake alongside SJRA through SJRA's Conrail site throughout the event. In order to assist SJRA in an emergency situation, Freese and Nichols provided such information and input to SJRA regarding its gate operations during the event at no cost.
25. The spreadsheet attached as **Exhibit Olmos 5** reflects the estimated lake level, inflow, and discharge from Lake Conroe Dam prepared by SJRA during Hurricane Harvey. Lake levels are based on SJRA's Conrail site that receives readings from a gage located at the dam and reflects the lake level measured at the dam. As mentioned earlier, wind, rain, and waves can all provide an affect on lake-elevation reading, which could affect the estimate of inflows into Lake Conroe. Therefore, lake level readings are averaged over a short period of time to minimize the impact these variables would have when estimating average inflows into Lake Conroe. Average inflows into the Lake are calculated based on changes to lake levels for the interval of time beginning with the previous time entry and ending with the time entry reflected in that spreadsheet row, as well as average releases during the same time interval. Total discharge from the dam is calculated as a function of average lake level during the relevant time interval along with the spillway gate openings, measured in gate-feet during that interval.
26. "The spreadsheet attached as **Exhibit Olmos 6** reflects Freese and Nichols' real-time monitoring of the lake levels, the dam gate operations, and the estimated inflow and outflow from the lake during Hurricane Harvey. At the same time, SJRA conducted its own monitoring of the average lake level, total inflow, and total outflow. To the extent there are discrepancies between the two spreadsheets, it reflects that Freese and Nichols used different time intervals from those used by SJRA. The discrepancies are minor, however, and do not impact the conclusions that can be drawn from the data, which are set forth in this Affidavit.
27. "Following Hurricane Harvey, Freese and Nichols revisited the data using approved United States Geological Survey ("USGS") lake-level data. The discrepancies with that set of data are also minor and do not impact the conclusions that can be drawn. The spreadsheet showing the average lake levels, average inflow, and average discharge during the various time intervals calculated from the approved USGS data, running through September 17, 2017 (when the lake level reached 201 feet above msl and all gates were closed), is attached as **Exhibit Olmos 7**.
28. "At 6:00 a.m. on August 26, 2017, Lake Conroe had a pool elevation of 200.40 feet above msl, or 0.60 feet below the normal pool level. Approximately 11,690 acre-feet of water flowing in from Hurricane Harvey rainfall was detained by the dam until the normal pool elevation of 201.0 feet above msl was reached. The first Harvey-related release of stormwaters occurred 0.04 feet above normal pool elevation (201.04 feet above msl) at 12:15 a.m. on August 27, 2017, and was computed by SJRA to be 529 cfs compared to a computed inflow of 13,777 cfs.

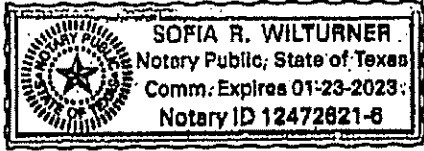
29. "During the Hurricane Harvey event, the maximum reported rate of inflow into Lake Conroe was computed by SJRA to be 129,065 cfs. The maximum rate of outflow from the Lake Conroe Dam gates during that event was computed by SJRA to be 79,141 cfs. The real-time calculations performed by Freese and Nichols validate those flow rates, showing the maximum rate of inflow to be 125,955 cfs and the maximum rate of outflow to be 79,112 cfs. Thus, during the Hurricane Harvey event, the maximum rate of release through the Lake Conroe Dam never exceeded the maximum rate of inflow into the lake. In other words, the presence of the dam and the operation of the gates reduced the peak flow that would have otherwise occurred by approximately 37%.
30. "Lake Conroe returned to normal pool elevation of 201.00 feet above msl at 11:45 p.m. on September 17, 2017. In total, approximately 20.60 inches (NWS QPE) of rain fell on the Lake Conroe subwatershed between August 25 and August 30, 2017, for a total of approximately 495,450 acre-feet of rainfall volume. Inflow computed from lake-level observations indicate approximately 317,450 acre-feet of runoff reached Lake Conroe during Hurricane Harvey event, with approximately 305,900 acre-feet of releases over the same time period, resulting in 11,550 acre-feet of volume being retained behind the dam as of September 17, 2017, and at the peak of Hurricane Harvey, temporarily storing approximately 117,469 acre-feet of volume above the normal pool elevation of Lake Conroe. Thus, during the Hurricane Harvey event, Lake Conroe released less water than what drained into it.
31. "The difference between the peak inflow into the lake and SJRA's maximum outflow rate is approximately 46,000 cfs. Without the dam, which retained 11,550 acre-feet of volume behind the dam as of September 17, 2017, and at the peak of Hurricane Harvey, temporarily stored approximately 117,469 acre-feet of volume above the normal pool elevation of Lake Conroe, and was operated to reduce the maximum rate of flow, that additional 46,000 cfs of flow rate that entered the lake would have increased the depth and velocity of the water flowing downstream. Thus, the presence of the dam and the operation of the gates reduced the peak flow that would have otherwise occurred by approximately 37%.
32. "Even with releases from the gates, the lake level as measured at the dam reached 203.24 feet above msl at 3:00 p.m. on August 27. Had SJRA not raised/opened the tainter gates by 2 gate-feet, increasing the top of the gates to approximately 204.84 feet above msl before then, the water level would have risen above the top of the gates, and water would have then flowed uncontrolled over the top of the gates, and indeed, likely would have caused a failure of the gates, resulting in a catastrophic release."

Further Affiant sayeth not.



Hector Olmos, P.E., CFM

SUBSCRIBED AND SWORN TO BEFORE ME on this 31st day of July, 2019, to
certify which witness my hand and seal.



Sofia Wilturner

Notary Public, State of Texas

UNOFFICIAL COPY

INPUT
OUTPUT

Max Inflow
Max Outflow
Max Lake Level
Total release

| | | READING | | Total Inflow (cfs) | ACTUAL OPENING | |
|-------------|-----------------|--------------------|-----------------------|--------------------|--------------------------|--|
| Date & Time | | Average Lake Level | Total Discharge (cfs) | | Date & Time of Execution | |
| | | (ft-msl) | | | | |
| 1 | 2 | 3 | 10 | 11 | | |
| 1 | 26-Aug-17 22:00 | 201.00 | 0 | 26-Aug-17 22:00 | | |
| 2 | 26-Aug-17 23:30 | 201.01 | 1,722 | 26-Aug-17 23:50 | | |
| 3 | 26-Aug-17 23:59 | 201.02 | 6,296 | 26-Aug-17 23:59 | | |
| 4 | 27-Aug-17 0:15 | 201.04 | 13,777 | 27-Aug-17 0:25 | | |
| 5 | 27-Aug-17 1:00 | 201.09 | 18,323 | 27-Aug-17 1:00 | | |
| 6 | 27-Aug-17 1:45 | 201.12 | 12,241 | 27-Aug-17 1:45 | | |
| 7 | 27-Aug-17 2:15 | 201.14 | 9,830 | 27-Aug-17 2:15 | | |
| 8 | 27-Aug-17 2:45 | 201.17 | 13,447 | 27-Aug-17 3:00 | | |
| 9 | 27-Aug-17 3:15 | 201.19 | 15,779 | 27-Aug-17 3:15 | | |
| 10 | 27-Aug-17 3:45 | 201.23 | 19,661 | 27-Aug-17 4:10 | | |
| 11 | 27-Aug-17 4:15 | 201.27 | 23,884 | 27-Aug-17 4:15 | | |
| 12 | 27-Aug-17 4:45 | 201.30 | 17,094 | 27-Aug-17 4:45 | | |
| 13 | 27-Aug-17 5:30 | 201.35 | 18,301 | 27-Aug-17 5:30 | | |
| 14 | 27-Aug-17 6:00 | 201.42 | 35,180 | 27-Aug-17 6:20 | | |
| 15 | 27-Aug-17 6:30 | 201.45 | 20,634 | 27-Aug-17 6:30 | | |
| 16 | 27-Aug-17 7:00 | 201.52 | 34,166 | 27-Aug-17 7:20 | | |
| 17 | 27-Aug-17 7:30 | 201.60 | 44,680 | 27-Aug-17 7:30 | | |
| 18 | 27-Aug-17 8:15 | 201.73 | 47,279 | 27-Aug-17 8:15 | | |
| 19 | 27-Aug-17 8:30 | 201.82 | 93,096 | 27-Aug-17 8:30 | | |
| 20 | 27-Aug-17 8:45 | 201.91 | 98,266 | 27-Aug-17 8:45 | | |
| 21 | 27-Aug-17 9:00 | 201.95 | 50,736 | 27-Aug-17 9:20 | | |
| 22 | 27-Aug-17 9:15 | 202.05 | 105,411 | 27-Aug-17 9:15 | | |
| 23 | 27-Aug-17 9:30 | 202.14 | 102,041 | 27-Aug-17 10:00 | | |
| 24 | 27-Aug-17 10:00 | 202.29 | 79,617 | 27-Aug-17 10:00 | | |
| 25 | 27-Aug-17 10:30 | 202.39 | 58,277 | 27-Aug-17 10:30 | | |
| 26 | 27-Aug-17 11:00 | 202.49 | 60,155 | 27-Aug-17 11:00 | | |
| 27 | 27-Aug-17 11:30 | 202.56 | 44,140 | 27-Aug-17 11:30 | | |
| 28 | 27-Aug-17 11:45 | 202.63 | 74,857 | 27-Aug-17 11:45 | | |
| 29 | 27-Aug-17 12:00 | 202.68 | 61,510 | 27-Aug-17 12:00 | | |

| | | READING | | | ACTUAL OPENING | |
|-------------|-----------|--------------------|--------------------|-----------------------|--------------------------|-----------------|
| Date & Time | | Average Lake Level | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution | |
| | | (ft.-msl) | | | | |
| 1 | | 2 | 3 | 4 | 5 | |
| 30 | 27-Aug-17 | 12:15 | 202.71 | 36,961 | 6,520 | 27-Aug-17 12:15 |
| 31 | 27-Aug-17 | 12:45 | 202.81 | 59,934 | 7,074 | 27-Aug-17 12:45 |
| 32 | 27-Aug-17 | 13:15 | 202.88 | 48,738 | 8,171 | 27-Aug-17 13:15 |
| 33 | 27-Aug-17 | 13:30 | 202.93 | 53,038 | 8,177 | 27-Aug-17 13:30 |
| 34 | 27-Aug-17 | 13:45 | 202.97 | 53,043 | 8,182 | 27-Aug-17 13:45 |
| 35 | 27-Aug-17 | 14:00 | 203.02 | 62,240 | 10,916 | 27-Aug-17 14:20 |
| 36 | 27-Aug-17 | 14:45 | 203.19 | 72,278 | 10,946 | 27-Aug-17 14:45 |
| 37 | 27-Aug-17 | 15:00 | 203.24 | 72,776 | 14,254 | 27-Aug-17 15:00 |
| 38 | 27-Aug-17 | 15:15 | 203.30 | 78,085 | 14,266 | 27-Aug-17 15:15 |
| 39 | 27-Aug-17 | 15:45 | 203.41 | 72,790 | 16,496 | 27-Aug-17 15:45 |
| 40 | 27-Aug-17 | 16:15 | 203.49 | 63,882 | 16,522 | 27-Aug-17 16:15 |
| 41 | 27-Aug-17 | 16:30 | 203.55 | 78,354 | 16,537 | 27-Aug-17 16:30 |
| 42 | 27-Aug-17 | 16:45 | 203.61 | 82,786 | 16,554 | 27-Aug-17 16:45 |
| 43 | 27-Aug-17 | 17:00 | 203.67 | 82,802 | 19,900 | 27-Aug-17 17:00 |
| 44 | 27-Aug-17 | 17:15 | 203.74 | 103,617 | 19,925 | 27-Aug-17 17:15 |
| 45 | 27-Aug-17 | 17:30 | 203.82 | 103,842 | 22,177 | 27-Aug-17 17:53 |
| 46 | 27-Aug-17 | 17:45 | 203.88 | 89,430 | 22,201 | 27-Aug-17 17:45 |
| 47 | 27-Aug-17 | 18:00 | 203.95 | 95,077 | 22,225 | 27-Aug-17 18:00 |
| 48 | 27-Aug-17 | 18:15 | 204.01 | 93,402 | 22,249 | 27-Aug-17 18:15 |
| 49 | 27-Aug-17 | 18:45 | 204.12 | 83,846 | 22,269 | 27-Aug-17 18:45 |
| 50 | 27-Aug-17 | 19:15 | 204.22 | 76,757 | 22,325 | 27-Aug-17 19:15 |
| 51 | 27-Aug-17 | 19:30 | 204.29 | 107,862 | 22,353 | 27-Aug-17 19:30 |
| 52 | 27-Aug-17 | 19:45 | 204.37 | 107,809 | 25,728 | 27-Aug-17 19:45 |
| 53 | 27-Aug-17 | 20:00 | 204.40 | 65,077 | 25,744 | 27-Aug-17 20:00 |
| 54 | 27-Aug-17 | 20:15 | 204.49 | 121,548 | 25,780 | 27-Aug-17 20:15 |
| 55 | 27-Aug-17 | 20:30 | 204.55 | 96,492 | 25,807 | 27-Aug-17 20:30 |
| 56 | 27-Aug-17 | 20:45 | 204.61 | 96,519 | 26,076 | 27-Aug-17 20:45 |
| 57 | 27-Aug-17 | 21:15 | 204.71 | 87,396 | 28,124 | 27-Aug-17 21:15 |
| 58 | 27-Aug-17 | 21:30 | 204.78 | 98,838 | 28,153 | 27-Aug-17 21:30 |
| 59 | 27-Aug-17 | 21:45 | 204.84 | 103,429 | 28,184 | 27-Aug-17 21:45 |
| 60 | 27-Aug-17 | 22:00 | 204.91 | 103,460 | 28,215 | 27-Aug-17 22:00 |
| 61 | 27-Aug-17 | 22:15 | 204.99 | 117,177 | 28,251 | 27-Aug-17 22:15 |

| | READING | | | ACTUAL OPENING | | | |
|----|-------------|--------------------|--------|--------------------|-----------------------|--------------------------|-------|
| | Date & Time | Average Lake Level | | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution | |
| | | (ft-msl) | | | | | |
| 1 | 2 | 3 | 10 | 11 | | | |
| 62 | 27-Aug-17 | 22:30 | 205.06 | 117,273 | 33,917 | 27-Aug-17 | 22:45 |
| 63 | 27-Aug-17 | 22:45 | 205.13 | 102,389 | 33,954 | 27-Aug-17 | 22:45 |
| 64 | 27-Aug-17 | 23:00 | 205.20 | 105,181 | 39,604 | 27-Aug-17 | 23:15 |
| 65 | 27-Aug-17 | 23:15 | 205.26 | 101,029 | 39,647 | 27-Aug-17 | 23:15 |
| 66 | 27-Aug-17 | 23:30 | 205.32 | 104,592 | 39,689 | 27-Aug-17 | 23:30 |
| 67 | 27-Aug-17 | 23:45 | 205.37 | 92,063 | 50,908 | 27-Aug-17 | 23:45 |
| 68 | 27-Aug-17 | 23:59 | 205.42 | 105,906 | 50,952 | 27-Aug-17 | 23:59 |
| 69 | 28-Aug-17 | 0:15 | 205.47 | 103,006 | 61,891 | 28-Aug-17 | 0:15 |
| 70 | 28-Aug-17 | 0:30 | 205.53 | 118,468 | 61,951 | 28-Aug-17 | 0:30 |
| 71 | 28-Aug-17 | 0:45 | 205.58 | 118,527 | 62,011 | 28-Aug-17 | 0:45 |
| 72 | 28-Aug-17 | 1:00 | 205.65 | 129,065 | 62,082 | 28-Aug-17 | 1:00 |
| 73 | 28-Aug-17 | 1:15 | 205.70 | 122,849 | 62,146 | 28-Aug-17 | 1:15 |
| 74 | 28-Aug-17 | 1:30 | 205.76 | 116,627 | 62,204 | 28-Aug-17 | 1:30 |
| 75 | 28-Aug-17 | 1:45 | 205.80 | 108,303 | 73,201 | 28-Aug-17 | 2:00 |
| 76 | 28-Aug-17 | 2:00 | 205.84 | 104,161 | 73,255 | 28-Aug-17 | 2:00 |
| 77 | 28-Aug-17 | 2:30 | 205.90 | 104,710 | 73,336 | 28-Aug-17 | 2:30 |
| 78 | 28-Aug-17 | 3:00 | 205.98 | 112,655 | 73,437 | 28-Aug-17 | 3:00 |
| 79 | 28-Aug-17 | 3:30 | 206.03 | 102,354 | 73,506 | 28-Aug-17 | 3:30 |
| 80 | 28-Aug-17 | 4:00 | 206.08 | 103,910 | 73,573 | 28-Aug-17 | 4:00 |
| 81 | 28-Aug-17 | 4:30 | 206.12 | 97,897 | 73,627 | 28-Aug-17 | 4:30 |
| 82 | 28-Aug-17 | 4:45 | 206.13 | 90,644 | 73,645 | 28-Aug-17 | 4:45 |
| 83 | 28-Aug-17 | 5:15 | 206.15 | 87,327 | 73,675 | 28-Aug-17 | 5:15 |
| 84 | 28-Aug-17 | 5:45 | 206.19 | 96,479 | 73,728 | 28-Aug-17 | 5:45 |
| 85 | 28-Aug-17 | 6:15 | 206.21 | 85,888 | 73,753 | 28-Aug-17 | 6:15 |
| 86 | 28-Aug-17 | 6:45 | 206.22 | 82,266 | 73,771 | 28-Aug-17 | 6:45 |
| 87 | 28-Aug-17 | 7:00 | 206.23 | 76,202 | 73,774 | 28-Aug-17 | 7:00 |
| 88 | 28-Aug-17 | 8:00 | 206.23 | 76,209 | 73,785 | 28-Aug-17 | 8:00 |
| 89 | 28-Aug-17 | 8:30 | 206.23 | 71,352 | 73,779 | 28-Aug-17 | 8:30 |
| 90 | 28-Aug-17 | 9:00 | 206.22 | 69,219 | 73,769 | 28-Aug-17 | 9:00 |
| 91 | 28-Aug-17 | 9:30 | 206.22 | 69,817 | 73,761 | 28-Aug-17 | 9:30 |
| 92 | 28-Aug-17 | 10:15 | 206.21 | 69,299 | 73,746 | 28-Aug-17 | 10:15 |
| 93 | 28-Aug-17 | 10:30 | 206.20 | 67,668 | 73,739 | 28-Aug-17 | 10:30 |

| | READING | | | | ACTUAL OPENING | | |
|-----|-------------|--------------------|--------|--------------------|-----------------------|--------------------------|-------|
| | Date & Time | Average Lake Level | | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution | |
| | | (ft-msl) | | | | | |
| | 1 | 2 | 3 | 10 | 11 | | |
| 94 | 28-Aug-17 | 10:45 | 206.20 | 67,662 | 73,732 | 28-Aug-17 | 10:45 |
| 95 | 28-Aug-17 | 11:00 | 206.19 | 70,086 | 73,728 | 28-Aug-17 | 11:00 |
| 96 | 28-Aug-17 | 11:15 | 206.19 | 66,435 | 73,720 | 28-Aug-17 | 11:15 |
| 97 | 28-Aug-17 | 11:30 | 206.18 | 63,996 | 73,710 | 28-Aug-17 | 11:30 |
| 98 | 28-Aug-17 | 11:45 | 206.17 | 63,986 | 79,141 | 28-Aug-17 | 12:00 |
| 99 | 28-Aug-17 | 12:00 | 206.16 | 61,544 | 79,127 | 28-Aug-17 | 12:00 |
| 100 | 28-Aug-17 | 12:15 | 206.15 | 64,540 | 79,109 | 28-Aug-17 | 12:15 |
| 101 | 28-Aug-17 | 12:30 | 206.14 | 64,522 | 79,092 | 28-Aug-17 | 12:30 |
| 102 | 28-Aug-17 | 12:45 | 206.12 | 64,505 | 79,074 | 28-Aug-17 | 12:45 |
| 103 | 28-Aug-17 | 13:15 | 206.11 | 67,519 | 79,046 | 28-Aug-17 | 13:15 |
| 104 | 28-Aug-17 | 13:30 | 206.09 | 63,851 | 79,028 | 28-Aug-17 | 13:30 |
| 105 | 28-Aug-17 | 13:45 | 206.07 | 54,716 | 78,998 | 28-Aug-17 | 13:45 |
| 106 | 28-Aug-17 | 14:00 | 206.06 | 68,235 | 78,983 | 28-Aug-17 | 14:00 |
| 107 | 28-Aug-17 | 14:15 | 206.04 | 64,672 | 78,954 | 28-Aug-17 | 14:15 |
| 108 | 28-Aug-17 | 15:00 | 206.00 | 60,516 | 78,896 | 28-Aug-17 | 15:00 |
| 109 | 28-Aug-17 | 15:30 | 205.97 | 65,254 | 78,848 | 28-Aug-17 | 15:30 |
| 110 | 28-Aug-17 | 15:45 | 205.96 | 64,177 | 78,827 | 28-Aug-17 | 15:45 |
| 111 | 28-Aug-17 | 16:00 | 205.94 | 66,252 | 78,809 | 28-Aug-17 | 16:00 |
| 112 | 28-Aug-17 | 16:30 | 205.92 | 66,226 | 78,774 | 28-Aug-17 | 16:30 |
| 113 | 28-Aug-17 | 16:45 | 205.90 | 57,816 | 78,744 | 28-Aug-17 | 16:45 |
| 114 | 28-Aug-17 | 17:00 | 205.88 | 55,167 | 78,711 | 28-Aug-17 | 17:00 |
| 115 | 28-Aug-17 | 17:15 | 205.87 | 68,756 | 78,697 | 28-Aug-17 | 17:15 |
| 116 | 28-Aug-17 | 17:45 | 205.83 | 58,773 | 78,641 | 28-Aug-17 | 17:45 |
| 117 | 28-Aug-17 | 18:15 | 205.80 | 61,863 | 78,593 | 28-Aug-17 | 18:15 |
| 118 | 28-Aug-17 | 18:45 | 205.78 | 60,767 | 78,543 | 28-Aug-17 | 18:45 |
| 119 | 28-Aug-17 | 19:15 | 205.73 | 62,814 | 78,499 | 28-Aug-17 | 19:15 |
| 120 | 28-Aug-17 | 19:45 | 205.70 | 59,623 | 78,446 | 28-Aug-17 | 19:45 |
| 121 | 28-Aug-17 | 20:15 | 205.65 | 51,181 | 78,369 | 28-Aug-17 | 20:15 |
| 122 | 28-Aug-17 | 20:45 | 205.60 | 52,153 | 78,295 | 28-Aug-17 | 20:45 |
| 123 | 28-Aug-17 | 21:15 | 205.55 | 58,108 | 78,238 | 28-Aug-17 | 21:15 |
| 124 | 28-Aug-17 | 21:45 | 205.50 | 48,089 | 78,153 | 28-Aug-17 | 21:45 |
| 125 | 28-Aug-17 | 22:15 | 205.44 | 48,441 | 78,068 | 28-Aug-17 | 22:15 |

| | | READING | | ACTUAL OPENING | | |
|-----|-----------------|--------------------------------|--------------------|-----------------------|--------------------------|--|
| | Date & Time | Average Lake Level (ft-msl) | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution | |
| | 1 | 2 | 3 | 10 | 11 | |
| 126 | 28-Aug-17 22:45 | 205.37 | 41,365 | 77,063 | 28-Aug-17 22:45 | |
| 127 | 28-Aug-17 23:15 | 205.31 | 46,604 | 77,874 | 28-Aug-17 23:15 | |
| 128 | 28-Aug-17 23:45 | 205.26 | 49,910 | 77,794 | 28-Aug-17 23:45 | |
| 129 | 29-Aug-17 0:30 | 205.18 | 50,976 | 77,690 | 29-Aug-17 0:30 | |
| 130 | 29-Aug-17 1:00 | 205.10 | 35,734 | 77,560 | 29-Aug-17 1:00 | |
| 131 | 29-Aug-17 1:30 | 205.01 | 20,767 | 77,416 | 29-Aug-17 1:30 | |
| 132 | 29-Aug-17 2:00 | 204.93 | 33,521 | 77,300 | 29-Aug-17 2:00 | |
| 133 | 29-Aug-17 2:45 | 204.85 | 48,102 | 77,185 | 29-Aug-17 2:45 | |
| 134 | 29-Aug-17 3:15 | 204.76 | 25,803 | 71,787 | 29-Aug-17 3:30 | |
| 135 | 29-Aug-17 3:45 | 204.67 | 23,039 | 71,662 | 29-Aug-17 3:45 | |
| 136 | 29-Aug-17 4:15 | 204.58 | 20,287 | 71,538 | 29-Aug-17 4:15 | |
| 137 | 29-Aug-17 4:30 | 204.56 | 39,210 | 68,170 | 29-Aug-17 4:30 | |
| 138 | 29-Aug-17 4:45 | 204.50 | 566 | 66,098 | 29-Aug-17 4:45 | |
| 139 | 29-Aug-17 5:15 | 204.45 | 38,965 | 66,038 | 29-Aug-17 5:15 | |
| 140 | 29-Aug-17 5:30 | 204.40 | 8,091 | 65,974 | 29-Aug-17 5:30 | |
| 141 | 29-Aug-17 5:45 | 204.35 | 11,760 | 65,914 | 29-Aug-17 5:45 | |
| 142 | 29-Aug-17 6:00 | 204.33 | 42,525 | 60,604 | 29-Aug-17 6:30 | |
| 143 | 29-Aug-17 6:30 | 204.25 | 20,511 | 60,513 | 29-Aug-17 6:30 | |
| 144 | 29-Aug-17 7:00 | 204.17 | 10,575 | 55,157 | 29-Aug-17 7:00 | |
| 145 | 29-Aug-17 7:15 | 204.15 | 33,482 | 55,138 | 29-Aug-17 7:15 | |
| 146 | 29-Aug-17 7:30 | 204.10 | 4,942 | 55,093 | 29-Aug-17 7:30 | |
| 147 | 29-Aug-17 7:45 | 204.07 | 23,150 | 55,064 | 29-Aug-17 7:45 | |
| 148 | 29-Aug-17 8:00 | 204.05 | 23,121 | 49,717 | 29-Aug-17 8:15 | |
| 149 | 29-Aug-17 8:30 | 203.98 | 17,287 | 49,661 | 29-Aug-17 8:30 | |
| 150 | 29-Aug-17 8:45 | 203.96 | 18,736 | 49,635 | 29-Aug-17 8:45 | |
| 151 | 29-Aug-17 9:00 | 203.92 | 14,292 | 38,741 | 29-Aug-17 9:00 | |
| 152 | 29-Aug-17 9:15 | 203.89 | 5,611 | 36,720 | 29-Aug-17 9:15 | |
| 153 | 29-Aug-17 9:30 | 203.87 | 14,425 | 38,705 | 29-Aug-17 9:30 | |
| 154 | 29-Aug-17 9:45 | 203.85 | 14,410 | 27,717 | 29-Aug-17 9:45 | |
| 155 | 29-Aug-17 10:00 | 203.83 | 7,840 | 27,708 | 29-Aug-17 10:00 | |
| 156 | 29-Aug-17 10:30 | 203.81 | 14,178 | 22,172 | 29-Aug-17 10:15 | |
| 157 | 29-Aug-17 10:45 | 203.80 | 2,846 | 22,167 | 29-Aug-17 10:45 | |

| | | READING | | ACTUAL OPENING | |
|-----|-----------------|--------------------------------|--------------------|--------------------------|--------------------------|
| | Date & Time | Average Lake Level (ft-msl) | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution |
| | 1 | 2 | 3 | 10 | 11 |
| 158 | 29-Aug-17 11:15 | 203.79 | 16,645 | 22,164 | 29-Aug-17 11:15 |
| 159 | 29-Aug-17 11:30 | 203.78 | 11,122 | 22,160 | 29-Aug-17 11:30 |
| 160 | 29-Aug-17 11:45 | 203.77 | 13,878 | 22,157 | 29-Aug-17 11:45 |
| 161 | 29-Aug-17 12:00 | 203.77 | 20,501 | 22,156 | 29-Aug-17 12:00 |
| 162 | 29-Aug-17 12:15 | 203.76 | 17,740 | 22,155 | 29-Aug-17 12:15 |
| 163 | 29-Aug-17 12:30 | 203.76 | 19,947 | 22,154 | 29-Aug-17 12:30 |
| 164 | 29-Aug-17 12:45 | 203.76 | 22,154 | 22,154 | 29-Aug-17 12:45 |
| 165 | 29-Aug-17 13:00 | 203.76 | 22,154 | 22,154 | 29-Aug-17 13:00 |
| 166 | 29-Aug-17 13:15 | 203.76 | 19,946 | 22,153 | 29-Aug-17 13:15 |
| 167 | 29-Aug-17 13:30 | 203.75 | 17,737 | 22,152 | 29-Aug-17 13:30 |
| 168 | 29-Aug-17 13:45 | 203.75 | 15,527 | 22,150 | 29-Aug-17 13:45 |
| 169 | 29-Aug-17 14:00 | 203.74 | 15,525 | 22,148 | 29-Aug-17 14:00 |
| 170 | 29-Aug-17 14:15 | 203.73 | 13,314 | 22,145 | 29-Aug-17 14:15 |
| 171 | 29-Aug-17 14:30 | 203.73 | 15,519 | 22,142 | 29-Aug-17 14:30 |
| 172 | 29-Aug-17 14:45 | 203.72 | 15,517 | 22,140 | 29-Aug-17 14:45 |
| 173 | 29-Aug-17 15:00 | 203.72 | 15,515 | 22,138 | 29-Aug-17 15:00 |
| 174 | 29-Aug-17 15:15 | 203.71 | 13,304 | 22,135 | 29-Aug-17 15:15 |
| 175 | 29-Aug-17 15:30 | 203.70 | 13,301 | 22,132 | 29-Aug-17 15:30 |
| 176 | 29-Aug-17 15:45 | 203.69 | 13,296 | 22,129 | 29-Aug-17 15:45 |
| 177 | 29-Aug-17 16:00 | 203.69 | 15,504 | 22,127 | 29-Aug-17 16:00 |
| 178 | 29-Aug-17 16:15 | 203.68 | 15,501 | 22,124 | 29-Aug-17 16:15 |
| 179 | 29-Aug-17 16:30 | 203.67 | 15,499 | 22,122 | 29-Aug-17 16:30 |
| 180 | 29-Aug-17 16:45 | 203.67 | 13,289 | 22,119 | 29-Aug-17 16:45 |
| 181 | 29-Aug-17 17:00 | 203.66 | 11,077 | 22,115 | 29-Aug-17 17:00 |
| 182 | 29-Aug-17 17:15 | 203.65 | 11,073 | 22,112 | 29-Aug-17 17:15 |
| 183 | 29-Aug-17 17:30 | 203.64 | 11,070 | 22,108 | 29-Aug-17 17:30 |
| 184 | 29-Aug-17 17:45 | 203.63 | 11,066 | 22,104 | 29-Aug-17 17:45 |
| 185 | 29-Aug-17 18:00 | 203.62 | 13,271 | 22,101 | 29-Aug-17 18:00 |
| 186 | 29-Aug-17 18:15 | 203.61 | 13,268 | 22,098 | 29-Aug-17 18:15 |
| 187 | 29-Aug-17 18:30 | 203.60 | 13,265 | 22,095 | 29-Aug-17 18:30 |
| 188 | 29-Aug-17 18:45 | 203.59 | 11,053 | 22,091 | 29-Aug-17 18:45 |
| 189 | 29-Aug-17 19:00 | 203.58 | 6,633 | 22,086 | 29-Aug-17 19:00 |

| READING | | | | ACTUAL OPENING | | | |
|-------------|-----------------|--------------------------------|--------------------|--------------------------|--------------------------|-------|--|
| Date & Time | | Average Lake Level (ft-msl) | Total Inflow (cfs) | Total Discharge (cfs) | Date & Time of Execution | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | |
| 190 | 29-Aug-17 19:15 | 203.57 | 8,836 | 22,082 | 29-Aug-17 | 19:15 | |
| 191 | 29-Aug-17 19:30 | 203.55 | 8,831 | 22,077 | 29-Aug-17 | 19:30 | |
| 192 | 29-Aug-17 19:45 | 203.54 | 8,827 | 22,073 | 29-Aug-17 | 19:45 | |
| 193 | 29-Aug-17 20:15 | 203.53 | 12,865 | 22,066 | 29-Aug-17 | 20:15 | |
| 194 | 29-Aug-17 20:30 | 203.51 | 5,503 | 22,061 | 29-Aug-17 | 20:30 | |
| 195 | 29-Aug-17 20:45 | 203.50 | 5,498 | 22,055 | 29-Aug-17 | 20:45 | |
| 196 | 29-Aug-17 21:00 | 203.49 | 16,534 | 22,053 | 29-Aug-17 | 21:00 | |
| 197 | 29-Aug-17 21:15 | 203.47 | 4,396 | 22,047 | 29-Aug-17 | 21:15 | |
| 198 | 29-Aug-17 21:30 | 203.46 | 8,797 | 22,043 | 29-Aug-17 | 21:30 | |
| 199 | 29-Aug-17 21:45 | 203.45 | 8,792 | 22,038 | 29-Aug-17 | 21:45 | |
| 200 | 29-Aug-17 22:00 | 203.44 | 6,579 | 22,033 | 29-Aug-17 | 22:00 | |