

ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER PL-2.13

Witness Responsible:	<u>J. Rowe McKinley</u>
Title:	<u>Consultant-Black & Veatch</u>
Phone No.:	<u>(913) 488-3345</u>
Date Received:	<u>July 1, 2009</u>
Docket No.:	<u>09-0319</u>

PL-2.13

Please answer the following concerning the figure of 0.106 for Pekin on p. 6 of IAWC Ex. 13.01 (Capacity Factors Report);,

- a. Please provide a detailed explanation of how that figure was derived.
- b. Please identify and explain all steps taken by the Company to ensure the accuracy of that figure.
- c. Please provide all formulas used to calculate that figure.
- d. Please provide a copy of all workpapers relied on to derive that figure.

RESPONSE

With respect to items (b) through (d) below, IAWC objects to these requests as overly broad and unduly burdensome. Subject to and without waiving this objection, the Company responds as follows.

- a. The figure of 0.106 reflects the Maximum Hour Storage Contribution reported to Black & Veatch for the Pekin rate area. The figure was derived as follows. In Pekin, the maximum day occurred on June 16, 2006 and the maximum hour for this day occurred at 8:15 p.m. or 20:15:00. As indicated on the first page of Attachment A for the 20:15:00 hour, the 0.106 mg figure includes 0.008 mg for Route 9, 0.082 mg for Sheridan, and 0.016 for the Court booster pump, which if expressed on a daily flow basis would be 2.544 (0.106 mg/hour x 24 hours/day) mgd.

In reviewing the detailed supporting records for the 0.106 figure, however, the Company determined that this figure actually represents booster pump station production instead of reservoir draw down, and therefore the 0.106 figure is not correct. The second page of Attachment A shows hourly reservoir levels for June 16. To determine the storage contribution to maximum hour demand by reservoirs, the change in reservoir levels should have been determined by subtracting the prior hourly levels from the current levels, where a positive value indicates that the reservoir was filling during the hourly period and a negative value indicates that the reservoir was contributing flow to the system during the hourly period. These changes in reservoir levels would be applied to the surface areas of the respective reservoirs to determine hourly volume in cubic feet per hour and totaled. The total net fill or drawdown can be multiplied by 24 to express flow on a daily basis and converted to million gallons per day (mgd) by multiplying by a 7.48 gallons/cubic foot constant and dividing by the 1,000,000 gallons/mg constant. The

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.13
PAGE 2**

dimensions and surface areas of each reservoir is shown on the third page of Attachment A and is used with the changes in reservoir levels to determine a net flow rate into the reservoirs of 0.013 mgd instead of the previously indicated draw down rate of 0.106 mgd, a difference of 0.119 mgd.

Use of the correct value for Maximum Hour Storage Contribution in Pekin results in certain minor changes to maximum hour demand and the resultant capacity factors. The previously reported maximum hour pumpage of 11.976 mgd is correct as verified on the fourth and last page of Attachment A by adding the hourly well production values shown on the 20:15:00 line to derive 0.499 mg/hour and multiplying by 24 hour/day to get a daily flow rate of 11.976 mgd. Subtracting the 0.013 mgd reservoir flow rate from the 11.976 mgd pumping rate derives a total maximum hour demand of 11.963 mgd which is 1.0 percent less than the prior 12.082 mgd total maximum hour demand reported on Page 6 of the Capacity Factors Report. These values are verified by a separate maximum hour demand calculation in Attachment B.

Replacing the 12.082 mgd maximum hour demand with the revised 11.963 mgd maximum hour system demand lowers the residential maximum hour capacity factor for Pekin from 280 to 275 percent and the industrial maximum hour capacity factor from 160 to 155 percent with no changes in the commercial and other public authority maximum hour capacity factors. The Company will provide, at the time of its update, a revised Capacity Factors Report that incorporates these revised maximum hour and capacity factors into the applicable Tables of IAWC Exhibit 13.01.

These changes in maximum hour demand and capacity factors in Pekin do not have a material effect on the results of the cost allocations set forth in IAWC's cost allocation study (IAWC Ex. 9.01).

- b. See PL 2.18(b).
- c. As indicated in Response (a), the formula for Total System Delivery is Pumpage – Total Reservoir Fill where a negative reservoir fill indicates a draw down of reservoir water. Total Reservoir Fill for circular tanks is determined by the equation, $\Delta V = \frac{1}{4}(\pi)(D^2)(\Delta h)$, where ΔV = change in volume during a one hour period in cubic feet/hour (ft^3/hr); D = diameter of tank in feet; and Δh = change in reservoir level during a one hour period in feet/hour. Total reservoir fill for square reservoirs is determined by multiplying the length of one side by another and by the change in reservoir level during a one hour period in feet/hour. These results are totaled and converted from ft^3/hr to million gallons per day (mgd) using constants of 24 hours/day and 7.48 gallons/ ft^3 . All calculations used to derive the 0.013 mgd value are available in Attachment A and Column Y of Attachment B.
- d. See attachments A and B.

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.13
PAGE 3**

ATTACHMENT

[A – Pekin Production and Tank Levels.pdf](#)

[B – Pekin Peak Demand.xls](#)

Date Response Provided: August 18, 2009

ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER PL-2.14

Witness Responsible:	<u>J. Rowe McKinley</u>
Title:	<u>Consultant-Black & Veatch</u>
Phone No.:	<u>(913) 488-3345</u>
Date Received:	<u>July 1, 2009</u>
Docket No.:	<u>09-0319</u>

PL-2.14

Please answer the following concerning the figure of 0.577 for Sterling on p. 6 of IAWC Ex. 13.01 (Capacity Factors Report):

- a. Please provide a detailed explanation of how that figure was derived.
- b. Please identify and explain all steps taken by the Company to ensure the accuracy of that figure.
- c. Please provide all formulas used to calculate that figure.
- d. Please provide a copy of all workpapers relied on to derive that figure.

RESPONSE

With respect to items (b) through (d) below, IAWC objects to these requests as overly broad and unduly burdensome. Subject to and without waiving this objection, the Company responds as follows.

- a. The figure of 0.577 on line 7 of Table 2 reflects the Maximum Hour Storage Contribution reported to Black & Veatch for the Sterling rate area. The figure was derived as follows. In Sterling, the maximum day occurred on June 23, 2005 and the maximum hour for this day occurred at 11:00 am to 12:00 p.m. The first page of Attachment A shows pumpage rates of flow and hourly reservoir levels for June 23. To determine the storage contribution to maximum hour demand by the two reservoirs in Sterling, the change in reservoir levels is first determined by subtracting the prior hourly levels from the current levels, where a positive value indicates that the reservoir was filling during the hourly period and a negative value indicates that the reservoir was contributing flow to the system during the hourly period. These changes in reservoir levels are applied to the volume per foot levels of the respective reservoirs to determine hourly volume in gallons per hour and totaled. As indicated on Attachment B, the hourly volumes per foot are reported to be 10,400 gallons/foot (g/ft) for the West 7th Tank and 8,333 g/ft for the Tower. The total net drawdown is multiplied by 24 and divided by 1,000,000 to express flow on a daily basis in million gallons per day (mgd). For example, the calculation used to derive the 0.577 mgd value at 11:01 a.m. was: $\{[(37.65 - 39.16) \text{ ft} \times 10,400 \text{ g/ft} + (23 - 24) \text{ ft} \times 8,333 \text{ g/ft}] \times 24 / 1,000,000\}$

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.14
PAGE 2**

In reviewing the detailed supporting records for the 0.577 figure, however, the Company determined that the 0.577 mgd storage draw down value was incorrectly calculated using the change in reservoir levels between 10 a.m. and 11 a.m, the hour prior to the peak hour. The correct value for Maximum Hour Storage Contribution in Sterling is 0.359 $\{[(36.21 - 37.65) \text{ ft} \times 10,400 \text{ g/ft} + (23 - 23) \text{ ft} \times 8,333 \text{ g/ft}] \times 24 / 1,000,000\}$ mgd which occurred at 12 noon on June 23, 2005. This value is derived using the same formulae as previously used to derive the 0.577 value, but for the correct hour.

Use of the correct value for Maximum Hour Storage Contribution in Sterling results in certain minor changes to maximum hour demand and the resultant capacity factors in Sterling. The previously reported maximum hour pumpage of 3.004 mgd is correct as verified by Attachment A. This value can be derived as indicated in Attachment B by adding the hourly East and West plant production values shown on the 12:01:00 line of Attachment A to get 125.16 (93.00 + 32.16) thousand gallons per hour (Mg/hour) and then multiplying by 24 hour/day and dividing by 1,000 to get a daily flow rate of 3.004 mgd. Adding the 0.359 mgd reservoir draw down rate to the 3.004 mgd pumping rate derives a total revised maximum hour demand of 3.363 mgd, which is 6.1 percent less than the prior 3.581 mgd total maximum hour demand reported on Page 6 of the Capacity Factors Report.

Replacing the 3.581 mgd maximum hour demand with the revised 3.363 mgd maximum hour system demand lowers the residential maximum hour capacity factor in Sterling from 300 to 280 percent, commercial from 250 to 235 percent, industrial from 185 to 170 percent and other public authority from 220 to 205 percent. Since capacity factors have decreased proportionately, the impact of the change is not considered material. However, the Company will provide, at the time of its update, a revised Capacity Factors Report that incorporates these revised maximum hour and capacity factors into the applicable Tables of IAWC Exhibit 13.01 .

These changes in maximum hour demand and capacity factors in Sterling do not have a material effect on the results of the cost allocations set forth in IAWC's cost allocation study (IAWC Ex. 9.01).

- b. See response to PL 2.18(b).
- c. As indicated in Response (a), the formula for reservoir fill (+) or draw down (-) is simply the change in reservoir levels times a volume per foot constant specific to each reservoir and then multiplied by 24 hours per day and divided by 1,000,000 gallons per million gallons (mg) to convert the hourly change in reservoir volume to a flow rate expressed in million gallons per day (mgd) where a negative reservoir fill indicates a draw down of reservoir water. All calculations used to derive the revised 0.359 mgd value are available in Attachment B.
- d. See attachments A and B.

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.14
PAGE 3**

ATTACHMENTS

[A – ICC PL-2.14 Sterling Operating Data.pdf](#)

[B – ICC PL-2.14 Sterling Max Hour.xls](#)

Date Response Provided: August 18, 2009

ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER PL-2.17

Witness Responsible:	<u>J. Rowe McKinley</u>
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Phone No.:	<u>(913) 488-3345</u>
Date Received:	<u>July 1, 2009</u>
Docket No.:	<u>09-0319</u>

PL-2.17

Please answer the following concerning the figure of 4.601 for Peoria on p. 7 of IAWC Ex. 13.01 (Capacity Factors Report):

- a. Please provide a detailed explanation of how that figure was derived.
- b. Please identify and explain all steps taken by the Company to ensure the accuracy of that figure.
- c. Please provide all formulas used to calculate that figure.
- d. Please provide a copy of all workpapers relied on to derive that figure.

RESPONSE

With respect to items (b) through (d) below, IAWC objects to these requests as overly broad and unduly burdensome. Subject to and without waiving this objection, the Company responds as follows

- a. The figure of 4.601 on line 7 of Table 2a reflects the Maximum Hour Storage Contribution reported by the Company to Black & Veatch for the Peoria service area. . The maximum day occurred on July 18, 2006, and the maximum hour for this day occurred at 9:00 p.m.

In reviewing the detailed supporting records for max hour demands in Peoria, however, the Company determined that the 4.601 figure is not correct Reservoir levels for July 18 are also shown in 15 minute increments on the last two pages of Attachment A. To determine flow contributed to maximum hour demand by the three reservoirs, the change in reservoir levels is first determined by subtracting the prior hourly levels from the current levels, where a positive value indicates that the reservoir was filling during the hourly period and a negative value indicates that the reservoir was contributing flow to the system during the hourly period. These changes in reservoir levels are applied to the volume per foot levels of the respective reservoirs to determine hourly volume expressed on a million gallons per day (mgd) flow rate basis and totaled. As indicated on Attachment A, the hourly volumes per foot are reported to be 1.525 mgd/foot for the Route 40 Tank, 5.139 mgd/foot for the Grand Boulevard tanks and 1.191 mgd/foot for the University tank. These factors are based on the inside diameters of the various tanks to determine area and volume per foot of storage and then converted to million

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.17
PAGE 2**

gallons per day as indicated by the formula at the top of the tank level pages in Attachment A. Applying these factors to the respective changes in reservoir levels determines the daily flow rate for each hourly period. The total maximum hour net drawdown is indicated to be 7.338 mgd at 21:00:00 hours compared to the 4.601 mgd value previously reported. The 4.601 mgd value should have been calculated by the same methodology but the differences in tank levels indicate that a different day may have been used. Attachment B shows a comparison of the prior and current maximum hour values.

In addition, based on the pumpage rates of flow in 15 minute increments, as shown on the first two pages of Attachment A, the Company determined that the maximum hour pumpage for Peoria is indicated to be 39.43 mgd instead of the 39.09 mgd value as originally reported to Black & Veatch and shown in Table 2a of IAWC Exhibit 13.01. This is an increase of about 0.9 percent. The revised maximum hour demand is therefore 46.768 (39.430 + 7.338) mgd.

Replacing the total 43.691 mgd maximum hour demand shown on Line 8 of Table 2a with the revised 46.768 mgd maximum hour system demand increases the capacity factors previously indicated for the SPSPSB rate area in Table 19 of IAWC Exhibit 13.01. The revised residential maximum hour capacity factor increases from 255 to 260 percent, commercial from 200 to 205 percent, industrial from 170 to 175 percent and other public authority from 190 to 1905 percent. Capacity factors for large industrial and other water utilities in the SPSPSB rate area did not change as a result of the revised maximum hour system demands for Peoria. Since capacity factors appear to have increased proportionately, the impact of the change is not considered material. The Company will provide, at the time of its update, a revised Capacity Factors Report that incorporates these revised maximum hour and capacity factors into the applicable Tables of IAWC Exhibit 13.01.

These changes in maximum hour demand and capacity factors in Peoria do not have a material effect on the results of the cost allocations set forth in IAWC's cost allocation study (IAWC Ex. 9.01).

- b. See PL 2.18(b).
- c. As indicated in Response (a), the formula for reservoir fill (+) or draw down (-) is simply the change in reservoir levels times a volume per foot constant specific to each reservoir expressed on a million gallons per day (mgd) flow basis where a negative reservoir fill indicates a draw down of reservoir water. All calculations used to derive the revised 7.338 mgd draw down value are available in Attachments A and C where the tank flow calculations in Attachment A was prepared by Black & Veatch and Attachment C was independently prepared by IAWC staff. Attachment C also shows the combined pumpage and net storage demand in the Peoria system for each hour on July 18, 2006.
- d. See attachments A, B and C.

**ILLINOIS-AMERICAN WATER COMPANY
RESPONSE TO ILLINOIS COMMERCE COMMISSION
DATA REQUEST NUMBER ICC PL-2.17
PAGE 3**

ATTACHMENT

[A – ICC PL-2.17 Peoria Max Hour Data.pdf](#)

[B – ICC PL-2.17 Peoria Max Hour Summary.pdf](#)

[C – ICC PL-2.17 Hourly Max Hour Flow and Draw Down.pdf](#)

Date Response Provided: August 18, 2009