FILED August 10, 2018 INDIANA UTILITY REGULATORY COMMISSION

Petitioner's Exhibit No. 2-R

EVANSVILLE WATER AND SEWER UTILITY

INDIANA UTILITY REGULATORY COMMISSION

CAUSE NO. 45073

IURC PETITIONER'S EXHIBIT NO. REPORTER

OFFICIAL EXHIBITS

REBUTTAL TESTIMONY

OF

PATRICK R. KEEPES, P.E.

SPONSORING ATTACHMENTS PRK-1R THROUGH PRK-3R

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City of Evansville

Cause No. 45073

Rebuttal Testimony of Patrick R. Keepes, P.E

I. <u>INTRODUCTION</u>

- 1 Q. Please state your name. 2 Α. My name is Patrick R. Keepes. Are you the same Patrick R. Keepes who prepared Direct Testimony in this 3 Q. 4 Cause on behalf of the Petitioner, City of Evansville ("Evansville")? 5 A. Yes, I am. What is the purpose of your rebuttal testimony? 6 **Q**. 7 The purpose of my rebuttal testimony is to respond to the position taken by the Α. 8 Office of Utility Consumer Counselor ("OUCC") through the testimony of 9 witness James Parks regarding Evansville's Capital Improvement Program ("CIP"), as well as the position taken by witness Carl Seals regarding periodic 10 maintenance expense. 11 12 П. EVANSVILLE'S CAPITAL IMPROVEMENT PROGRAM 13 What criticisms did Mr. Parks raise about Evansville's Capital Improvement **Q**.
- 14 **Plan in his testimony**?

- Mr. Parks raises several issues, but his primary criticism relates to the timing for 1 Α. 2 completing water main replacement projects identified in Evansville's CIP in Cause No. 44760. With respect to the timing, Mr. Parks testified "[i]t appears 3 Petitioner is delayed in completing its projects slated for 2017 and 4 5 2018...[because] less than half of the projects are completed or under 6 construction." Pub. Ex. 3, at p. 5, lines 11-14. Mr. Parks also testifies regarding 7 the delay in completing preliminary engineering and land acquisition for the new 8 water treatment plant. With respect to the projects that were slated to begin in 9 2017/2018 per the 44760 CIP, Mr. Parks indicates "it is unlikely Petitioner can 10 complete design bidding, and construction of these 19 projects yet this year." Id. 11 at p. 8, lines 5-6. Mr. Parks also raises concerns regarding the estimated costs for 12 the water main replacement projects and testified that "total project cost estimates 13 appear to be overstated by approximately 45% above actual total project costs." 14 Id. at p. 18, lines 1-3. Finally, Mr. Parks raises concerns regarding Petitioner's 15 plan to construct a new 6 MG Clearwell and High Service Pump Station and 16 testified that "he [does] not recommend Petitioner receive funding at this time to 17 construct the [project]." Id. at p. 21, lines 2-3.
- 18

Q.

Please respond to Mr. Parks' criticisms.

A. Before I respond to any specific criticism, I want to first and foremost state that
the only potential delay in completing water main replacement projects is funding.
In reality, Evansville is out of money to fund these projects and needs additional
funds to complete the projects at its current rate of replacement. Michael Labitzke

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is responding to Mr. Parks' concerns related to allegedly overstated project costs, 1 2 and Doug Baldessari testifies regarding the overall cost increases utilities across 3 the state have been experiencing for capital projects. With respect to timing of 4 completing projects included in the CIP, Mr. Parks is incorrect in his contention that Evansville is delayed in completing CIP projects. The view that the Utility is 5 6 somehow behind schedule in completing CIP projects is overly simplistic and 7 based on a flawed assumption. Also, with respect to the delay in completing 8 preliminary engineering and land acquisition for the new water treatment plant, 9 I've explained a number of times in my testimony and in response to discovery 10 that Evansville needs to conduct additional drilling because the original test sites 11 did not show promising water quantity results. While Evansville anticipates 12 completing this analysis in 2018 and moving on to the preliminary engineering 13 and land acquisition stages thereafter, it is important to note that this decision will 14 impact the EWSU service area for the next 100-plus years and it is not a decision 15 that can be rushed or taken lightly.

Q. Why do you say Mr. Parks' contention regarding the delay is overly
simplistic and based on a flawed assumption?

A. I say his contention is overly simplistic because it is based solely on a misleading
statistic of the percentage of projects Evansville has "completed". I say it is based
on a flawed assumption because both Mr. Parks' and Mr. Kaufman's testimony
seems to imply that Evansville is delayed in completing projects because its
Engineering Department does not properly manage projects and project costs. As

Evansville has already stated in response to discovery, the CIP proposed in Cause No. 44760 extends until 2020 and Evansville is currently only in Year 2 of the 4year plan. The estimated project timelines included in the CIP are just that estimates. To imply that Evansville should not receive the level of funding it is requesting in this Cause simply because it did not hit every estimated project start date included in the CIP is unwarranted and illogical.

Q. What is the current status of Evansville's Water Main Replacement program?

9 EWSU constructed approximately 8 miles of water line in 2017 and an additional A. 10 12 miles will be constructed, under construction, or in design by the end of 2018. 11 Projects slated for the first two years in Evansville's CIP in Cause No. 44760 that 12 have not been completed either have already commenced, will have commenced 13 by the end of this year, or were re-prioritized, which is an inevitable reality of any 14 capital improvement program and long-term capital improvement planning. 15 Looking forward into years 1, 2 and 3 of the current Cause, once bond 16 anticipation note (BAN) funding is secured, EWSU anticipates completing water 17 main replacement projects at the same or faster rate. However, this will ultimately 18 depend on bid costs and available funding.

19 Q. What does Mr. Parks recommend with respect to the \$18 M clearwell?

A. Mr. Parks recommends that funding be disallowed for the \$18 M clearwell and
High Service Pump Station. Pub. Ex. 3 (Parks Direct Testimony), at p. 21, lines 24.

1	Q.	Why is Evansville proposing to construct the new \$18 M clearwell?
2	A.	Evansville is proposing to construct the new 6 MG clearwell in order to perform
3		necessary maintenance and repairs on the existing 6.5 MG clearwell. Evansville
4		will need to take the 6.5 MG clearwell offline to perform these repairs, and the
5		new clearwell is needed in order to create redundancy in the system during this
6		period and for the future.
7	Q.	Why does Mr. Parks testify that Evansville should not receive funding for the
8		\$18 M clearwell?
9	А.	Mr. Parks testifies that Evansville should not receive funding to construct the new
10		clearwell because "it appears that these repairs can be performed during non-peak
11		periods where Petitioner's other two clearwells can be kept in service." Id. at p.
12		20, lines 11-13. Mr. Parks further suggested the decision to build a new clearwell
13		is premature because Petitioner has not made a decision regarding how to proceed
14		with its existing water treatment plant. Id. at p. 21, lines 2-7.
15	Q.	Please respond.
16	А.	I disagree with Mr. Parks' assertion that repairs can be performed during non-
17		peak periods with the other two tanks in service. Also, contrary to the OUCC's
18		suggestion, the need for the clearwell is not tied to any pending decision related to
19		the new water treatment plant. The necessary maintenance and repairs to the

clearwell need to be made whether a new treatment plant is built or not.
Evansville intends to design the new clearwell such that it could be used in the
event a new treatment plant is constructed or any rehabilitation of the existing

- 1 facility is performed.
- Q. Why do you disagree with Mr. Parks' assertion that the necessary repairs
 could be performed during a non-peak period with the other two tanks in
 service?
- 5 A. Attempting to make these repairs as Mr. Parks suggests would require shutting 6 down 3 of the 7 existing high service pumps, which would present a very real 7 possibility that the required pumping capacity to the service area could not be 8 met. Further, reliance on the 2 remaining clearwells, which total only 2 MG (less 9 than 25% of the total clearwell capacity), could put the Utility at risk of not 10 meeting regulatory water quality compliance standards. EWSU is not willing to 11 take the risk; either Mr. Parks does not appreciate that risk or he has not fully 12 considered the implications.
- 13
- 14 Q. Did Evansville ask in discovery about Mr. Parks' understanding of this risk?
- 15 A. Yes. The response is attached as <u>Attachment PRK-1R.</u>
- 16
- 17 Q. In the response, Mr. Parks provided his view on how the repairs could be
 18 performed without building a new clearwell. Please respond.
- A. I will respond to Mr. Parks specific points, but, as I've said, it ultimately comes
 down to what amount of risk we are willing to accept. Taking the clearwell fully
 out of service without redundancy in place will tax the Utility's treatment and
 pumping systems to a level that has not been experienced in decades, if ever.

While on paper the scenario could be feasible, in reality, this process would require the Utility to rely on decades-old equipment to function, without fault, at peak levels for an extended period of time. There is great potential for something to go wrong in this scenario, and, if something did go wrong, we would have to answer for the Utility's inability to provide sufficient water meeting water quality standards. The potential dangers associated with Mr. Parks' suggested approach are very real. As I've said, EWSU is unwilling to accept that risk.

8 Q. What concerns do you see with the OUCC's approach outlined in Mr. Parks' 9 response to Evansville DR 2.2?

10 A. As I previously stated, the approach would require decades-old equipment to 11 function without fault at peak levels for an extended period of time. On a peak 12 demand day, the remaining in-service clearwells (the 0.5 MG and 1.5 MG) would 13 completely turnover nearly 17 times with zero margin for failure or operating 14 flexibility. It's unclear whether the system could even perform at this level, and 15 stress testing of the facility prior to implementation would be required. Further, 16 during the clearwell maintenance period (estimated to be 8+ weeks) the switch 17 from chloramines to free chlorine for an extended period of time could cause 18 significant concern for the formation of disinfection byproducts ("DBPs"). If the 19 formation of DBPs were to occur during this period, the option to switch back to 20 chloramines would be unavailable due to the need for free chlorine's faster 21 inactivation rates. Also, Mr. Parks indicates that "it is not unusual for concrete tanks to have cracks...[and] the result of these cracks is loss of some unquantified 22

1 volume of finished water out of the clearwell... ." See OUCC's response to 2 Evansville DR 2.2. However, the concern related to cracks in the clearwell is not 3 limited to loss of finished water. The bigger concern is related to potential 4 infiltration. While it is true that the typical groundwater elevation is below the 5 clearwell, this is not true of the Ohio River levels. At approximately 40 foot 6 levels, the river is above the clearwell with the possibility for infiltration. The 7 treatment plant is protected by the levee but transient water moving through the 8 ground could be encountered. During historically high river levels, the clearwell 9 has experienced increased turbidity of finished water which indicates infiltration. 10 The Utility has attempted to address this issue by maintaining a high level in the 11 clearwell at all times during high river level events, but the problem will only get 12 worse if the necessary repairs and maintenance are not performed. Mr. Parks also 13 made comparisons between the age of the existing clearwell (52 years) and the 14 age of the Campground Reservoir (91 years) in an effort to show the existing 15 clearwell could continue to serve Evansville for the foreseeable future. However, 16 this comparison is improper because the use of these structures is entirely 17 different. Without the clearwell, Evansville's entire water system would be in 18 jeopardy. In contrast, a failure of the Campground Reservoir would only change 19 how water is moved through the distribution system and would not otherwise jeopardize the health and safety of Evansville's service territory. The 20 21 Campground Reservoir can, and has been, entirely isolated, drained, and 22 inspected without jeopardizing the entire water system. As indicated above, this project is estimated to take at least 8 weeks assuming no major structural deficiencies are found. The implication that only a one to two week time period would be required to drain, clean, inspect, repair, disinfect, and restore service is unrealistic. Further, if significant structural deficiencies are discovered, this time period could extend much longer. And, during the entire time the clearwell is out of service, everything else must work flawlessly under Mr. Parks' approach—or else we cannot meet water quality standards.

8

III. PERIODIC MAINTENANCE

9 Q. What did Mr. Seals say in his testimony about periodic maintenance expense 10 to which you wish to respond?

11 Α. Mr. Seals recommends expense adjustments to the following periodic 12 maintenance items: (1) Filter Media, (2) Booster Stations and (3) Pump 13 maintenance. Pub. Ex. 4 (Seals Direct Testimony), at p. 4, lines 2-9. While Mr. 14 Seals testified that he "disagree[s] with certain aspects of the proposed expenditures for...Travelling Screens Maintenance," it doesn't appear he 15 proposed any expense adjustment to the \$61,680 Petitioner originally proposed in 16 17 its case-in-chief. Id. at p. 4, lines 6-9. These three adjustments account for a total 18 decrease in \$950.671 for periodic maintenance expense. However, Schedule 1 provided by the OUCC shows an adjustment for periodic maintenance equal to 19 (\$973,561). Therefore, there appears to be an adjustment of \$22,890 which is not 20 included in the OUCC's testimony. 21

1 Q. Do you agree with Mr. Seals' proposed adjustments?

2 A. No.

Q. Let's take each of his recommendations in turn. Mr. Seals recommends a
reduction to maintenance expense for filter media replacements based on his
disagreement with Evansville's 6-year maintenance schedule, as well as his
belief that the proposed costs have been incorrectly estimated and include
capital costs that should not be included in Periodic Maintenance expense.
Do you oppose this adjustment?

9 Yes. Mr. Baldessari is responding in greater detail to Mr. Seals' recommendation Α. regarding filter media replacement, but I will generally respond to some of his 10 11 points here. First, contrary to Mr. Seals' testimony, Evansville is not proposing a 12 6-year replacement cycle. As I stated in my direct testimony, Evansville's goal 13 with respect to media replacement is "to rehabilitate four beds in each of the three 14 phases of this rate case in order to achieve the 10 to 20 year rehabilitation cycle 15 discussed in the Stipulation and Settlement Agreement for IURC Cause No. 16 44760." Pet. Ex. 2 (Keepes Direct Testimony), at p. 12, lines 2-5. This schedule 17 will leave us with 5 beds that have 20 year-old media at the end of the three-year 18 period this rate case covers. See Attachment PRK-2R for a summary of media 19 replacement. This would leave these 5 beds at the extreme end of the 20 recommended 10-20 year range for media replacement included in the AWWA 21 publication that was referenced by Mr. Seals in Cause No. 44760. With respect to

1	Mr. Seals' criticisms regarding Evansville's estimates of the filter media
2	replacement costs, as explained in Evansville's response to OUCC DR 6-34,
3	Utility Service Group could not perform the work for the amount that was
4	originally quoted. See Evansville's response to OUCC DR 6-34 attached as
5	Attachment PRK-3R. For this reason, Evansville made the decision to
6	competitively bid the work, which resulted in the work being included as part of
7	the larger Deig Brothers contract. Finally, the media replacement costs do not
8	include capital costs for underdrain replacement.

9 Q. Mr. Seals testifies that the Deig Brothers bid is not as detailed as the 10 budgetary estimates from USG. What is your response?

A. The USG budgetary estimate for 2016 was not a bid, and as I indicated, USG is
unwilling to do the work for that estimate. The Deig Brothers price is the result of
competitive bidding and is the best indicator of the actual cost.

14 Q. Please explain why Mr. Seals is incorrect in his contention that media 15 replacement costs do not include capital costs for underdrain replacement.

16 A. This was detailed in Evansville's response to OUCC DR 6-33 and the supporting
17 document titled Agreement between EWSU and Deig Bros. Lumber and
18 Construction Co., Inc. dated December 12, 2017 (OUCC DR 5-4.pdf).
19 Evansville's response is re-stated as follows:

1 \$1,220,723 (Contract A Lump Sum Base Bid for Low Service Pump No. 2 2, High Service Pump No. 4, and Filter Nos. 21, 23, 24, & 29) + 3 \$1,173,678 (Contract B Lump Sum Base Bid for Low Service Pump No. 4 4, High Service Pump No. 5, and Filter Nos. 27, 28, 30 & 31) = 5 \$2,394,401. From this total amount (\$2,394,401), subtract the cost of the 6 low service pumps (2 ea. (a) 100,140/pump = 200,280) and high service 7 pumps (2 ea. (a) 90.240/pump = 180.480). The resulting amount 8 (\$2,013,641) divided by the 8 filter beds yields a unit cost of 9 \$251,705.12/bed. Attention is again called to the Deig Bros. contract 10 where the cost of the underdrains were separately established as 11 mandatory additions and they are clearly not factored into the above 12 calculation.

Q. What about Mr. Seals' criticisms of Evansville's proposed High-Service
Pump and Low-Service Pump maintenance expenses which he testifies are
"unexpectedly high" (at p. 9, lines 14-17)? Do you oppose his reduction to
this expense?

17 Yes. Mr. Seals testifies that Evansville's proposed pump maintenance expenses Α. 18 are unexpectedly high "particularly when compared with the same costs from the 19 previous rate case." Pub. Ex. 4 (Seals Direct Testimony), at p. 9, lines 14-17. 20 Because he views the costs as unexpectedly high, Mr. Seals recommends that the 21 prior Xylem budgetary estimates for periodic maintenance included in Cause No. 22 44760 be used to calculate annual periodic maintenance costs instead of the actual 23 bids Evansville currently has in hand for such work. It makes absolutely no sense 24 to base periodic maintenance costs off of stale budgetary estimates received from 25 a contractor that has not been engaged, when Evansville has current, actual bids 26 for the projects from the contractor who is engaged to perform the work. While 27 Mr. Seals may view the costs as unexpectedly high, it does not change the fact that the market price for this work, the price that Evansville will ultimately pay, is what is reflected in the Dieg Brothers' bid. As Mr. Baldessari explains in his testimony, costs for these types of projects have increased all across the state; therefore, it is not unexpected that these costs would have increased from the last rate case.

6 Q. Do you also oppose Mr. Seals' reduction to Evansville's proposed Booster 7 Station Maintenance expenses?

8 A. Yes. Mr. Seals' again recommends a reduction to this expense because the costs 9 have increased from the last rate case, and because he views the prior Xylem 10 budgetary estimates as the best evidence for this cost. Mr. Seals suggests that one 11 reason for the costs increasing from the last case is "at least one of [the] quotes 12 involve *replacement* of the pump and not maintenance." *Id.* at p. 11, lines 8-10 13 (emphasis original). First and foremost, Mr. Seals provides no evidence 14 supporting his suggestion that maintenance of the pump in question is more 15 appropriate than replacement. He does not dispute the need for the work, and whether it is to be replaced or repaired, Evansville needs to recover the funds to 16 17 do so. Nowhere does the OUCC provide funding for this necessary work. 18 Nevertheless, even if Mr. Seals does want to debate replacement versus repair, it 19 still does not make sense why periodic maintenance expense would be based off 20 of stale Xylem estimates included in the last case when actual cost information is 21 available.

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- 1 Q. Does this conclude your rebuttal testimony in this Cause?
- 2 A. Yes.

DMS 12985816v1

VERIFICATION

I, Patrick R. Keepes, P.E., affirm under penalties of perjury that the foregoing representations are true and correct to the best of my knowledge, information and belief.

Patrick R. Keepes, P.E.

Date: <u>August 9,2018</u>

services of the service and and advective one advect a balance.

2.2 Refer to the testimony of James Parks, p. 20, line 11. Please state all facts supporting Mr. Parks' statement that "it appears that these repairs can be performed during non-peak periods where Petitioner's other two clearwells can be kept in service." Please provide all calculations made by Mr. Parks supporting this statement. What is Mr. Parks' understanding of the other two clearwells, their purpose, and the operation of Evansville's treatment plant and distribution system that leads him to believe this conclusion? If, in fact, Evansville cannot meet demand with water meeting water quality standards during non-peak periods with only the two other clearwells in service, would it change Mr. Parks' opinion concerning the need for the new clearwell?

Objection:

The forgoing request consists of four parts. The OUCC objects to that part of Q 2.2 which states "If, in fact, Evansville cannot meet demand with water meeting water quality standards during non-peak periods with only the two other clearwells in service, would it change Mr. Parks' opinion concerning the need for the new clearwell?" The question is vague in that it does not adequately define precisely what "cannot meet demand" means or precisely what water quality standards would not be met or what would constitute not meeting such standards. Finally, the OUCC objects to the question in that the hypothetical embedded in the question assumes facts that have not been well founded or established. The question suggests that the clearwell cannot ever be taken out of service to make repairs without the construction of a new \$21 million clearwell. Mr. Parks rejects this premise. Without waiving this objection, Mr. Parks responds to Q 1.1 in its entirety as follows:

Response:

Mr. Parks' opinion is that Evansville can achieve the concentration time values ("CT" or "CT values") required for water disinfection using two of Evansville's three existing interconnected clearwells and High Service Pump Station No. 2 ("HSP Station No. 2") while the 6.5 million gallon ("MG") clearwell is offline for inspection and chemical grout injections to repair concrete wall cracks.¹ In forming his opinion, Mr. Parks considered Evansville's total treatment processes (filtration and disinfection) for removal and inactivation of the pathogens Cryptosporidium ("Crypto"), Giardia Iamblia ("Giardia"), and viruses based on certain assumptions and factors. First, Evansville is classified as a Bin 2 system due to average Cryptosporidium counts in raw Ohio River water of >0.075 oocysts/L but less than 1.0 oocysts/L.² Second, Bin 2 systems such as Evansville's must provide 2.0 log removal of Cryptosporidium (99% removal), 3.0 log inactivation and/or removal of Giardia (99.9% removal), and 4.0 log inactivation and/or removal of viruses (99.99% removal). Third, Evansville's pathogen removal consists of removal through its water treatment processes and <u>inactivation</u> by disinfection of remaining pathogens that might pass through the filters.

¹ Chemical Grout Injection to Repair Existing 6.5 MG Clearwell Concrete has an estimated \$150,000 construction cost. *See* 2016 Water Master Plan, HNTB, Table D-1, Evansville response to OUCC DR 3-11, page 114 of 459.

² Long Term 2 Enhanced Surface Water Treatment Rules (LT2ESWTR) 71 FR 654, January 5, 2006, Vol. 71, No.3.

Mr. Parks considers it premature to construct another clearwell in 2019 as shown in Pctitioner's Attachment PRK-4³ particularly where Evansville has not decided whether to construct a new groundwater treatment plant, rehabilitate the existing surface water treatment plant, or convert the surface water treatment plant to treat groundwater. Evansville has indicated that the construction costs only (with 10% contingency) for the proposed 6.0 MG clearwell, High Service Pump Station No. 4, and new transmission mains are \$21,032,153.⁴ Pctitioner has stated that the new 6.0 MG clearwell and HSP Station No. 4 are needed because the existing 6.5 MG clearwell cannot be taken out of service for inspection or repair. ⁵ Emphasis added. Petitioner further states that the new clearwell will provide additional capacity and allow for repair to the existing clearwell.

Mr. Parks' opinion is that the existing 6.5 MG clearwell can be again inspected while in service as was done in 2011 or taken off-line for cleaning and inspection during a non-peak water demand period of Evansville's choosing. Evansville's average daily production at the water treatment plant was 22.3 MGD over the 2008-2017 period. Maximum day production for 2017 ranged between 27.4 MGD and 33.6 MGD.

Mr. Parks considered the fact that Petitioner provided no evidence supporting the assertion made in Preliminary Engineering Report "A" that the existing 6.5 MG clearwell has "major structural concerns" or that it is danger of failure.⁶ Petitioner indicates it only knows of one tank inspection it has performed and that it has not performed any maintenance or repairs in the last ten years.⁷ Planned repairs identify possible chemical grout injection for crack repairs. Mr. Parks states that it is not unusual for concrete tanks to have cracks. The result of these cracks is loss of some unquantified volume of finished water out of the clearwell since it is located higher than the local water table. Mr. Parks believes that absent an inspection and engineering structural evaluation of the concrete tank floor, walls and ceiling showing major structural issues exist, that the 6.5 MG clearwell, built in 1966⁸ can continue to serve Evansville for the foreseeable future. For comparison, the 20 MG Campground Reservoir is a similar buried concrete tank constructed in 1927 that has provided 91 years of continuous service. Petitioner has programmed in replacement of the Campground Reservoir in the 2027 to 2031 period solely on the basis that the reservoir will be 100 years old.⁹

³ Petitioner's Exhibit No. 2, Direct Testimony of Patrick R. Keepes, Attachment PRK-4.

⁴ Preliminary Engineering Report "A". Project No. 25 - High Service Pump Station and Clearwell

⁵ See 2016 Water Master Plan, HNTB, page 3-37, Evansville response to OUCC DR 3-11, page 85 of 459.

⁶ Preliminary Engineering Report "A". Project No. 25 - High Service Pump Station and Clearwell, pages 25-10 and 25-11. "The 6.5 MG clearwell has significant structural concerns and is in need of full inspection to determine all needed repairs. It is anticipated that chemical grout injection may resolve the issues, but a full inspection needs performed."

⁷ Petitioner's response to OUCC DRs 3-1 through 3-6.

⁸ 2017 Annual Report to the IURC, page W-7.

⁹ See 2016 Water Master Plan, HNTB, page 2-35, Evansville response to OUCC DR 3-11, page 48 of 459.

The basis for Mr. Parks' opinion that inspection and repairs to the 6.5 MG clearwell can be made with the remaining facilitics providing treatment, storage and pumping, thereby avoiding the immediate need to build a new \$21 million clear well begins with the treatment processes Evansville employs. Evansville provides excellent water treatment through coagulation, flocculation, primary sedimentation, secondary sedimentation, and conventional filtration using granular media (anthracite coal and filter sand). Average filtration rates at 0.548 gallons per minute (gpm) per square foot ("gpm/ft²") are significantly below Indiana's typical 3.0 gpm/ ft² design filtration rate.¹⁰

Evansville has optimized its conventional filtration process by producing water with an average turbidity of 0.06 Nephelometric Turbidity Units ("NTU") combined filter effluent ("CFE") and CFE turbidities that range between 0.04 to 0.07 NTUs.¹¹ According to Evansville's 2017 Consumer Confidence Report "Combined effluent turbidity must be <0.3 NTU in 95% of monthly measurements." Evansville reported that all water was completely within the required limits.¹² Thus, Evansville complies with that indicator.

Because Evansville's combined filter effluent has been shown to be well below the treatment standard for turbidity, Evansville may also have optimized its Individual Filter Effluent ("IFE") filtration. With its filter optimization and low filtration rates, Evansville is probably allowed treatment removal credits of at least 2.0 logs for Crypto, 3.0 logs for Giardia, and 2.0 logs for viruses based on CFE NTU values. To meet the required pathogen treatment, Evansville would have to inactivate an additional 2.0 logs for viruses through its disinfection system (0 additional logs for Crypto and 0 additional logs for Giardia).

Mr. Parks approximated Evansville's CT values required and available for disinfection assuming the use of free chlorine, a pH below 8.0, and a water temperature of 25° C corresponding to June or September river temperatures. He assumed that 2.0 million gallons of storage is available in Clearwells 1 and 2 and that they have a 0.25 baffling factor. Mr. Parks reviewed maximum day demands reported on Petitioner's Monthly Reports of Operation ("MRO"). Mr. Parks assumed Evansville would choose a one to two week period of lower peak demand to stay below the 40 MGD peak pumping capacity available with HSP Station No. 2 only.

¹⁰ See Evansville's response to OUCC DR 6-25. Evansville reports that "based on the total filter bed area of 29,320 ft² and average daily production rate of 23.15 million gallons per day (MGD), the filtration rate is 0.548 gpm/ ft². Based on the total filter bed area of 29,320 ft² and maximum daily production rate of 31.15 million gallons per day (MGD), the filtration rate is 0.738 gpm/ ft²."

¹¹ 2017 Consumer Confidence Report.

 $^{^{12}}$ Id., "Turbidity is the measure of the cloudiness of the water. It is a good indicator of the effectiveness of our filtration system. Combined effluent turbidity is measured every four hours. Combined effluent turbidity must be <0.3 NTU in 95% of monthly measurements. All water was completely within the required limits."

The achieved CT values in Evansville's two clearwells (2.0 MG total volume) exceeds the CT values required for inactivation of Giardia and viruses. Available contact times, CT values required, and CT Values achievable are as follows based on the assumed peak flows listed:

Peak Flow (MGD) ¹³	Contact Time Based on 2.0 MG Clearwells (minutcs) ¹⁴	CT Value Achieved at Contact Times Listed and Free Chlorine Dose of 3.0 mg/l (minutes-mg/L)	CT Value Required for 2.0 Log Inactivation of Giardia at pH 8, Temp. of 25°C, and Free Chlorine at 3.0 mg/L ¹⁵	CT Value Required for 4.0 Log Inactivation of Viruses at pH 6-9, Temp. of 25°C, and Free Chlorine ¹⁶
30	24 ¹⁷	72	45	15
35	20.6	62	45	15
40	18	54	45	15

At the time Mr. Parks developed his opinion, Mr. Parks did not include additional contact time for chlorine disinfection that would be available in the four 30-inch diameter transmission mains leaving the filtration plant before reaching the first customer. Nor did he include the contact time available in the secondary clarifiers and filters due to Evansville adding chlorine *after* primary clarification. These two factors also support there being sufficient contact time.

As to the question asking "If, in fact, Evansville cannot meet demand with water meeting water quality standards during non-peak periods with only the two other clearwells in service, would it change Mr. Parks' opinion concerning the need for the new clearwell?," Mr. Parks adds the following:

When Mr. Parks testified that "it appears that these repairs can be performed during nonpeak periods where Petitioner's other two clearwells can be kept in service", Mr. Parks was referring to Petitioner's need to inspect the clearwell and make crack repairs in the near term.

¹³ Peak flows would be 20,833 gallons per minute ("gpm") (for 30 MGD), 24,306 gpm (for 35 MGD) and 27,778 gpm (for 40 MGD).

¹⁴ Based on 2 MG clearwell volume and an assumed 0.25 baffling factor,

¹⁵ Based on an additional 2 log removal of Giardia. See Table E-6 CT Values for Inactivation of Giardia Cysts by Free Chlorine at 25°C, Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources, US EPA, March, 1991.

¹⁶ Based on an additional 4 log removal of viruses. See Table E-7 CT Values for Inactivation of Viruses by Free Chlorine, Guidance Manual for Compliance with the Filtration and Disinfection Requirements for Public Water Systems Using Surface Water Sources, US EPA, March, 1991

¹⁷ Calculated as (2.0 MG times 0.5)/ 30 MGD) times 1,440 minutes per day equals 48 minutes contact time.

Mr. Parks notes that a new clearwell was originally identified in the 2000 Master Plan to meet overestimated 2020 average day demand of 57.3 MGD (compared to 2017 avg. day demand of 22.3 MGD). The 2000 Water Master Plan also identified the 2020 low and high range for maximum day demand of 49.2 MGD to 65.7 MGD (page 3-13). Actual 2017 Maximum Day production was 33.6 MGD. Mr. Parks notes that Evansville has not established it is required to routinely test its finished water for the microbial contaminants Crypto, Giardia, or viruses. They do test for total colliform bacteria as an indicator organism of fecal contamination. Evansville also tests for the disinfection byproducts ("DBP") total tribalomethanes ("TTHM") and haloacteric acids ("HAA"). Mr. Parks considers the DBP standards to be based on customers drinking the water every day.

Mr. Parks' opinion is based in part on the premise that Evansville can temporarily switch from its normal chloramine disinfection process to free chlorine (as it does every August - September) to benefit from free chlorine's faster Giardia and viruses inactivation rates in order to minimize the 6.5 MG clearwell's time out of service for inspection and then repairs.

Cause No. 45073 Attachment PRK-2R Page 1 of 1

r	Τ	1	r	r	1	
	Media		Year 1	Year 2	Year 3	
Filter Bed	Replacement	Current	(2019)	(2020)	(2021)	
No.	Date	Age (yrs.)	Age (yrs.)	Age (yrs.)	Age (yrs.)	
13	2001	17	18	19	20	
14	2001	17	18	19	20	
15	2001	17	1.8	19	20	
16	2001	17	18	19	20	
17	2001	17	18	19	20	
18	2001	17	18	19	20	
19	2001	17	18	19	20	
20	2001	17	18	19	20	
21*	1969	0	1	2	3	
22	2012	6	7	8	9	
23	1969	49	50	51	52	
24	1969	49	50	51	52	
25	2013	5	6	7	8	
26	2013	5	6	7	8	
27	1969	49	50	51	52	
28	1969	49	50	51	52	
	at least 36					
29*	years ago	0	1	2	3	
	at least 36					
30	years ago	36	37	38	39	
	at least 36					
31	years ago	36	37	38	39	
	at least 36					
32	years ago	36	37	38	39	
33	1999	19	20	21	22	
34	1999	19	20	21	22	
35	2009	9	10	11	12	
36	2009	9	10	11	12	

.

*Currently being replaced

Cause No. 45073 Attachment PRK-3R Page 1 of 1

OUCC DR 6-34

DATA REQUEST

City of Evansville Cause No. 45073

Information Requested:

Please explain why the cost for filter media maintenance has increased by approximately 125% from quotes provided in Petitioner's previous rate case, Cause #44760, from \$112,000 to \$251,705 per filter.

Information Provided:

The \$251,705 amount per filter bed was based on the most recent pricing available (the previously provided document titled *Agreement between EWSU and Deig Bros. Lumber and Construction Co., Inc. dated December 12, 2017* (OUCC DR 5-4.pdf)).

The basis for the \$112,000 amount per filter bed that was provided in Petitioner's previous rate case (IURC Cause No. 44760) was the attached document titled *Filter Bed Replacement (January 6, 2016 Quote – Utility Service Group)* (OUCC DR 6-34.pdf). After receipt of that quote, negotiations with that vendor took place over a period of several months. It eventually became clear that the vendor could not perform the work that was quoted for the amount that was quoted and the vendor stated as much – that they had simply under-quoted the project. The decision was then made to competitively bid the work that resulted in the herein and prior extensively discussed contract with Deig Brothers Lumber and Construction Co., Inc.

Attachments:

OUCC DR 6-34.pdf

CITY OF EVANSVILLE, INDIANA ATTACHMENTS PRK-2 THROUGH PRK-6

FILED

March 29, 2018 INDIANA UTILITY REGULATORY COMMISSION

Project	2019		2020		2021		3 Year Total
President's Neighborhood Central	\$ 3,905,300.00					\$	3,905,300.00
President's Neighborhood West	\$ 3,666,600.00					\$	3,666,600.00
President's Neighborhood East	\$ 1,435,800.00					\$	1,435,800.00
Franklin Ave. and Illinois East of Pigeon Creek	\$ 1,406,800.00					\$	1,406,800.00
Washington and Second - Relocation	\$ 1,704,200.00					\$	1,704,200.00
Hogue Road, Red Bank to Williams	\$ 2,391,900.00					\$	2,391,900.00
New Harmony Road, Allens Lane to Harmony							
Way	\$ 1,061,800.00					\$	1,061,800.00
Harmony Way, Franklin Heights Neighborhood	\$ 4,478,700.00					\$	4,478,700.00
Sweetser Rotherwood Area	\$ 5,619,200.00					\$	5,619,200.00
Kansas Road, St. Petersburg to I-69 - Relocation	\$ 3,463,200.00					\$	3,463,200.00
Waterworks Road - (4) 30" Water Main							
Relocations	\$ 5,693,700.00				·	\$	5,693,700.00
Road Project Relocations (unknown)	\$ 3,289,200.00					\$	3,289,200.00
Bartels Lane, Evergreen Road South		\$	800,300.00			\$	800,300.00
Ingle Ave, Forest to Marion		\$	477,400.00			\$	477,400.00
Fendrich Neighborhood		\$	2,866,000.00			\$	2,866,000.00
Stapley Ave. Governor to dead end east of	 						
Kerth		Ś	1.636.600.00			Ś	1.636.600.00
Kerth Avenue St. George to Christ		ς ζ	590 300 00			γ ¢	590 300 00
Christ Rd - Extension Kerth to Fares	 	\$	138 000 00			γ ¢	138 000 00
Allens I.n Phase I	 	<u>ې</u> د	1 155 000 00			ې د	1 155 000 00
Grove Street, South of Allens Lane	 	ب د	1 112 200 00			ې د	1 112 200 00
	 	, , ,	1,112,200.00			Ļ	1,112,200.00
Rosewood Drive, weaver to Hermann and		ć	402 100 00			ć	402 100 00
Gaves Street West of Van Noss	 - 1 999-01-01-01-01-01-01-01-01-01-01-01-01-01-	ې د	508 000 00			ې د	598 900 00
		<u>ې</u>	398,900.00			ې ب	558,500.00
Upper Mt Vernon - Phase I, Red Bank Road,		L C	7 100 900 00			ć	7 100 200 00
Tunman Boad, parth of Upper Mt Verson	 	ې د	7,100,800.00			ې	7,100,800.00
Pead Project Polocations (unknown)	 	ې د	3 2 8 7 900 00			ې د	3 3 8 7 9 0 0 0
Rollaire Road, Oak Hill to Weinbach	 	ې د	3,387,900.00			ې د	3,387,300.00
UIS 41 and Lynch Bd	 	ې د	5 732 000 00			ې د	5 732 000 00
Schmitt Lane, east of Oak Hill	······································	ب د	513 300 00			ې د	513 300 00
Whetstone Boad, west of Oak Hill		ب د	265 300 00			ې د	265 300 00
Boxlov Road, east of Oak Hill		ې د	598 900 00			ې د	598 900 00
New York Ave. Payse to Pivercide		ې د	<u> </u>			ې د	998,900.00
Clarement Besse and Craig Aves	 	ې د	3 1 2 2 6 0 0 0			ې د	2 122 600 00
Charlotte and Russel Ste	 	ې ا	5,122,000.00		1 542 200 00	ې د	1 542 200 00
Poorloss Road, Unper Mt Vernen to Mova	 			ې د	2,202,000,00	ې د	2,302,000,00
Morgan Avo. Faros to Ganvin	 			ې د	2,203,000.00	ې د	2,203,000.00
	 			ې	1,800,400.00	Ļ	1,800,400.00
Neighborhood of Covert, Vann, Graham, and				ė	4 272 800 00	ć	4 272 800 00
	 			ې	4,273,800.00	ې ب	4,273,800.00
Senate Ave, Petersburg to Kentucky & St				4	4 217 700 00	ç	4 217 700 00
George	 			ې د	4,317,700.00	ې د	4,317,700.00
First Ave, Pigeon Creek to Booster Station	 			ې د	3,374,900.00	ې د	3,374,900.00
				ې د	1 5 42 200 00	ې د	1 5 42 200 00
Mesker Park - Phase I	 			ې د	1,542,200.00	ې د	1,542,200.00
Speaker Ku, James Ave, Nolan Ave	 			ې د	1,277,800.00	ې د	1,277,800.00
Covert Ave. Base II and Mader Ave				ج ح	1,719,400,00	ې د	1,719,400,00
Covert Ave - Phase II and Wedge Ave	 			>	1,718,400.00	Ş	1,718,400.00
					4 1 4 4 500 00	_ ح	4 4 4 4 500 00
Columbia - Phase I, Fares, Columbia to Morgan	 			<u>></u>	4,141,500.00	ې د	4,141,500.00
Frence Street & Louisian	 			> ~	2,335,100.00	ې د	2,335,100.00
Evans Street & Louisiana				>	010,800.00	Ş	616,800.00
Obio Street Wast of Diggon Grank to St. Joseph				ć		¢	
Pand Drojoct Polocations (unknown)	 			ب د	2 /00 600 00	ې د	2 400 600 00
	 	L			3,465,000.00	رې م	3,465,000.00

 \$
 38,116,400.00
 \$
 32,610,700.00
 \$
 36,808,100.00
 \$
 107,535,200.00

Project	2019	2020	2021	3 Year Total		
Campground Booster Station						
Improvements		\$ 461,900.00		\$461,900.00		
Lincoln Booster Station Replacement		\$ 2,134,000.00	\$ -	\$2,134,000.00		
	\$-	\$ 2,595,900.00	\$ -	\$2,595,900.00		

Project	2019	2020	2021	3 Year Total		
Replace MCCs/Switchgear/Transformers	\$ 1,115,000.00					
Filter Backwash System - Replace Main In/Out of Floodwall						
to Tanks	\$ 787,000.00					
Extend Existing Outfall Sewers	\$ 656,000.00					
Line 36" Outfall #4 Sewer and Below Existing Filter Buildings	\$ 88,000.00					
New 6.0 MG Clear well and HSP #4	\$ 18,096,000.00					
Replace and Upgrade Main Plant Switchgear	\$ 1,312,000.00					
Rehab/Repair North Secondary Sed Basin Structural Rehab	\$ 656,000.00					
Transformer Switches (Allows Bypass of Main Switchgear)	\$ 79,000.00		- •			
Clearwell Vent (for Dehumidification Project)	\$ 66,000.00					
Filters 13-20 Pipe Gallery Coating, Rehab, Replace (As Needed)	\$ 131,127.00					
Flow Meters and Vaults for Transmission Mains (Four 30" and One 48")		\$ 877,897.00				
Grout Injection to Repair Existing 6.5 MG Clearwell			\$ 418,000.00	\$	418,000.00	
	\$ 22,986,127.00	\$ 877,897.00	\$ 418,000.00	\$	24,282,024.00	

Project	2	019	2	020	2021	3 Year Total		
Schroeder Road to Volkman Tank - Extension					\$ 1,446,800.00	\$	1,446,800.00	
Stallings Booster Station Replacement					\$5,008,100.00	\$	5,008,100.00	
	\$	_	\$	-	\$ 6,454,900.00	\$	6,454,900.00	

Project		2019	2020			2021	3 Year Total		
Annual Blowoffs	\$	41,400.00	\$	42,600.00	\$	43,900.00	\$	127,900.00	
Distribution System Improvements	\$	268,000.00	\$	268,000.00	\$	268,000.00	\$	804,000.00	
Engineering Equipment	\$	36,540.00	\$	37,700.00	\$	38,830.00	\$	113,070.00	
Hydrant Replacement Program	\$	275,000.00	\$	275,000.00	\$	275,000.00	\$	825,000.00	
Operations Equipment	\$	360,948.00	\$	500,632.00	\$	649,596.00	\$	1,511,176.00	
Surveying Equipment			\$	53,350.00			\$	53,350.00	
Annual Resetters	\$	45,672.00	\$	45,672.00	\$	45,672.00	\$	137,016.00	
Residential Meters	\$	494,888.00	\$	648,970.00	\$	826,583.00	\$	1,970,441.00	
Industrial Meters	\$	366,000.00	\$	377,000.00	\$	388,000.00	\$	1,131,000.00	
Valve Replacement Program	\$	113,000.00	\$	113,000.00	\$	113,000.00	\$	339,000.00	
Annual Vehicles	\$	477,914.00	\$	646,520.00	\$	390,120.00	\$	1,514,554.00	
320 ft. of New 8" Main on Kathleen									
Avenue	\$	167,000.00					\$	167,000.00	
Annual Capital On-Call CES/RPR	\$	1,200,000.00	\$	1,200,000.00	\$	1,200,000.00	\$	3,600,000.00	
Enclose Switchgear Housing	\$	70,000.00					\$	70,000.00	
Inglefield Road Between Darmstadt									
Rd. & U.S. 41	\$	490,000.00					\$	490,000.00	
Install New 8" Main on Dexter									
Avenue & Jackson Avenue	\$	300,000.00					\$	300,000.00	
Pump Replacement					\$	130,000.00	\$	130,000.00	
Replacement of 8" Main on Lake									
Drive (E. of Oak Hill - Replace 6" C.I.)			\$	384,000.00			\$	384,000.00	
Replace Water Main on Cardinal									
Drive (Stringtown to N. Kentucky)			\$	288,000.00			\$	288,000.00	
Replace 4" Water Main on Wall									
Street			\$	160,000.00			\$	160,000.00	
E. Virginia St Replace 4" C.I. Water									
Main Replacement			\$	338,000.00			\$	338,000.00	
1,100 ft. of 8" Main to Replace 2"									
Line Along S. Helfrich Avenue					\$	200,000.00	\$	200,000.00	
2,600 ft. of 8" Main to Replace Exist.									
4" and 6" Along Alvord & Columbia					\$	338,000.00	\$	338,000.00	
1,100 ft. of 8" Main to Replace Exist.									
2" and 4" Along Washington Avenue									
(W. of Martin's Lane)					\$	253,000.00	\$	253,000.00	
Southeast Blvd Phase I Tie-in at									
Powell Avenue					\$	35,000.00	\$	35,000.00	
Add VFD for Pump No. 1 at									
Campground Booster Station					\$	33,000.00	\$	33,000.00	
Annual New Service Connections	\$	373,000.00	\$	384,000.00	\$	395,000.00	\$	1,152,000.00	
	\$	5,079,362.00	\$	5,762,444.00	\$	5,622,701.00	\$	16,464,507.00	