

## ***Interactive comment on “Quantity and Quality Benefits of in-Service Invasive Cleaning of Trunk Mains” by Iftekhar Sunny et al.***

### **Anonymous Referee #1**

Received and published: 20 February 2017

This paper deals with the impact of ice pigging on the reduction of pipe roughness, and the subsequent growth in roughness over time, from tests conducted on a real 2.4 km AC trunk main in Scotland. I commend the authors for investigating the very complex behaviour and practical difficulties associated with real water supply systems. The paper presents interesting and novel results that makes a contribution to our understanding of pipe roughness behaviour.

However, the paper needs to be improved before it can be published as described below:

1) The paper contains a number of grammatical errors and language problems. (This is surprising given the command of English that most of the co-authors have. It is frustrating as a reviewer to have to deal with issues that should not be present in

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manuscripts with first-language English speakers as co-authors). Here are examples of some of the problems in the manuscript:

- Page 1, Line 15: “had be not been”
  - Page 2, Line 1: The sentence has no verb.
  - Page 3, Line 7: “No known cleaning intervention have ever been”
  - Page 3, Line 24: “These trials were executed before, to establish a base condition,”
- 2) The text also contains logical errors or incomplete descriptions making it ambiguous or hard to follow (again something co-authors should have picked up on). Examples include:
- Page 2, Line 5: “Discolouration is the water quality issue most apparent to customer, causing the highest contact rates worldwide.”
  - Page 4, Line 8: “minimising visual dissimilarities and errors between downstream simulated and measured pressure“.
  - Page 4, Line 9: “While pipe roughness alone can produce accurate simulation of observed pressure”. How does the pipe roughness do this?
  - Page 4, Line 10: “inaccurate representation of velocities which can be significant for quality application can persist as the above is an indeterminate problem space.”
  - Page 4, Line 23: ” Thus, from hydraulic model optimisation, a seven fold reduction in roughness height was found after the invasive cleaning.” This is inaccurate. When a reduction is made, it has to be stated relative to the original value. A reduction of one fold means that the value was reduced by 100 %, i.e. to zero.
- 3) Nothing is mentioned in the paper on the possibility of leakage from the pipe and new leaks forming during the testing period. How would leakage have affected the results?

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4) The calibrated pipe roughness values include minor losses at bends and joints. Why weren't these incorporated in the model and how will they likely impact on the results?

5) Other comments

- Acronyms should be used with discretion in publications since unfamiliar acronyms serve to obfuscate rather than clarify the text. I suggest removing 'TOTEX', 'PODDS' and 'SR'.

- Be consistent with the use of capital or small letters when referencing figures: '1A' not '1a'.

- Page 2, Line 6: What does 'international accepted' research mean? Why not simply state that research was conducted and the findings are. . .

- Page 2, Line 31: "mostly residential with consistent demand across the year". Do you mean that there was not seasonal variation in demand?

- Page 4, Line 1: "two (2) ATI NephNet turbidity loggers were used with a 1 second sampling interval to ensure data validation and confidence." There is no need to repeat the written 'two' with a number '2'. Using two loggers does not automatically ensure data integrity. Describe how this was done.

- Page 4, Line 13: "PEST calibration software". This software was developed for a watershed model. An explanation of the method and how it was applied to the pipe roughness problems is required.

- Page 5: An explanation of the 'operational circumstances' that lead to the changes in consumption pattern should be provided. How are these expected to have influenced the results?

- Page 6, Line 4: "To avoid regulatory turbidity limit (4.0 NTU), shear stress was reduced stepwise to 1.135 N/m<sup>2</sup>". As I understand this test, the shear values were generated by flushing the pipe through a hydrant. Why would the turbidity limit then apply, or was

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consumers simultaneously connected to the system?

- Page 7, Line 7: “Benefits expected due to invasive cleaning included an improvement in hydraulic capacity and a reduction in discolouration risk, as well as improve asset resilience and pipe life span.” It is not clear how invasive cleaning would improve the ‘resilience’ and ‘life span’ of a pipe.

- It will be useful to have a table with the test parameters on which Figure 5 was based to allow the reader to get a better understanding of the variations observed.

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