

Comments on 48-hour pumping test report for Portsmouth Well #5 along Freshet Road in Madbury and recommendations for the longer term pumping test

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Specific Report Comments (48-hour pumping test report)

Page	Comment
3	Haven well yield was obtained from OneStop, The preferred source of data is the well pumping records. Without such substance, there is little substance to the request. Water use data for wells #2, #3, and #4 were presented on pages 2-3, so why not for Haven?
3	Request for 500 gpm from well #5 seems excessive without affecting yield of other wells. It was never clear in this report how well field pumping was intended.
5	Johnson Creek bed "hydraulically isolated". Was this verified with stream bed piezometers? Stream gaging is a very poor way to measure this. Stream bed piezometers are preferred and recommended.
7	Precipitation of 1 in. in 3 days before PT and 1 in. at end makes well water level data very suspect, especially in an overburden formation. No calibration of water level changes seem to have been made for this condition. Close attention must be paid to precipitation during the longer term pumping test. At least 6 months of pre-pumping test water level data should be collected in order to understand precipitation effects on data.
8	No piezometers in Johnson Creek streambed and nearby wetlands is an omission. Such piezometers need to be installed long before the long term pumping test, during the test, and a few weeks afterwards.
8	Well #4 was pumped just prior to the well #5 PT. This resulted in a curious 0.1-in. per day recovery correction for all wells, irrespective of distance to Well #5 or Well #4. This is not consistent with groundwater flow theory. The efficacy of this correction should be demonstrated. Some explanation of this well field response is warranted.
8	The previous correction resulted in nearly constant MW water levels for the three days prior to the PT...yet it rained every day and therefore MW water levels should be increasing during this time (unless there is little connection to precipitation recharge). This point needs discussion plus should be fully explored for the longer term pumping test.
9	Explain why some MW close to Well #5 saw no drawdown.
9	How did rain on last day of PT (~ 1 in.) affect recovery?

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9	"No pumping induced effect in Johnson Creek": how determined?
Figure 4	Why is MSW2 not on cross section A-A'?
	Show Johnson Creek hydrographs associated with rainfall and runoff.
	Stream Stats – Johnson Creek DA at Freshet Rd ~ 2 mi <sup>2</sup> . What is water balance for the aquifer at 500 gpm long term pumping?
Figure 10	Explain the E-W pumping influence in the absence of MWs. It is strongly recommended to have monitoring wells in these directions. Just because one does not expect drawdown in a direction is not a reason to avoid monitoring wells there. To the contrary, this is an assumption that must be verified by monitoring.
Figure 10	The northern extent of the pumping test effects seems subjective and based solely on PMW-M13
10	$T = 7,059 \text{ ft}^2/\text{day}$ and $S = 0.09$
10	180 day estimate maximum drawdown in well #5 = 13.43 ft
10	Recharge to aquifer assumed to occur over entire WHPA. How does this happen with clay over gravel?
Figure 11	Distance-drawdown plot. After formation hydraulic characteristics are identified, use them in a Theis solution to predict drawdowns. Hydraulic properties do not seem to accurately predict long term performance.
Figure 11	Discounting PMW#5, there is a much steeper slope to the distance-drawdown data. Is the analytical method for T and S valid (Cooper-Jacob)? How would this affect 180-day predictions?
Figure 13	Show the watershed map over the WHPA
	Is ASR contemplated?
	At 20% - 25% rainfall recharge requested amount ~ recharge...leaving almost nothing for natural systems.
	Were any abutter wells monitored? Recommended for long term PT.
	Were any bedrock wells monitored? Recommended for long term PT.
	Did WQ tests look for PFOAs? Given the occupants along Mast/Pudding Hill Roads, a FULL sweep of analyses is recommended. Pulling contaminants into this formation should be avoided at all costs.
Figure 18	Recommend more E-W wells for 7 day PT
	Recommend streambed piezometers in Johnson Creek (~every 500 ft)
	Recommend bedrock well at well #5
	Recommend bedrock monitoring wells in NNE-SSW directions
	Recommend a northerly monitoring well at edge of 7-day PT effect as witness for PFOAs
	How does the WHPA relate to that for the Dover wells?
10	Cite reference for 40% recharge in this formation, especially with clay layer present
11	"981 gpm of recharge". Does piezometric map verify this? Formation flow seems inconsistent with this estimate.

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App B	Rainfall not reflected in measured/corrected well water levels
App B	Discuss analysis methods. Prefer to see a derivative-drawdown plot included.
App B	No mention if steady state or boundaries were found, or how either may effect 500 gpm desired flow.
Figure 9	Well data exhibits no steady state or boundaries or recharge.
Figure 11	Distance drawdown method of analysis is presumably Cooper-Jacob...using the reported aquifer hydraulic characteristics, $u \leq 0.01$ at $\sim 100$ ft. Therefore monitoring well data inapplicable
12	PFOA detected. What is the potential source?
12	If all wells are pumped (2-5) how does this relate to the water balance?
Figure 10	WHPA and pre-pumping and ZOI seem incompatible with Figure 13 WHPA. Why does WHPA go into the till? Is this WHPA for only well #5?
12	Water level in a dug well 1,200 ft to the north was affected. Whose well was this?
14	Withdrawal $\sim Q80$ of Johnson Creek exceeds $Q95$ criteria for surface water withdrawals (de minimis use). On this basis, the 500 gpm request seems excessive.
16	No domestic wells within 1,000 ft, yet 180 day effects extend beyond 1,000 ft. There are domestic wells within 2,000 ft.
16	Wetlands have clay at the base, therefore how does aquifer recharge occur here?
16	NHB indicates sensitive plants along Johnson Creek to the south
	CONUNDRUM -1 in. of precipitation before and after the PT, assume up to 40% rainfall recharge, yet monitoring wells display no change? (App B figures). This deserves explanation. Prior to the longer term pumping test, a much more thorough understanding of precipitation, recharge, and groundwater levels needs to be explored and discussed.
14	Need additional monitoring for the 7-day PT
	Water levels in stream not really helpful to determine effects of pumping on the stream. This is a very weak method to demonstrate flow changes due to pumping, especially given the amount of rainfall that fell before and during the test.
	Could not find PMW-SW3
	PT discharge into the drainage system is notoriously suspect due to system leaks, Request monitoring this drain to ensure there is no leakage, or piping to Johnson Creek at Freshet Road
	Request longer pre-monitoring period (6 months or more) in order to calibrate well water level changes with precipitation, atmospheric pressure, and ambient temporal trend.
	What if 500 gpm PT is unsustainable? When is that call made?
	For 7-day PT, request background samples in monitoring wells to the north for chemicals known to be in groundwater along Pudding Hill/Mast Road. We want assurance that we are not moving plumes around.
	Strongly recommend a PT with all planned wells operating at the same time at desired production capacity
23	Show locations of shallow piezometers

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24	No other public wells other than Portsmouth exist in this formation. However in the future other public wells could be situated in this formation. Madbury is very concerned that in the future when it needs its own water supply; other towns will have already been permitted to take town waters thereby making the sharing of these resources a potential conflict. Madbury wants guarantees that it will be able to tap these sources in the future and that it is not losing any rights to the water. The Town certainly is willing to share its bountiful supplies with its thirsty neighbors, as has been demonstrated for decades. The Town understands that the State has appropriated the rights to all groundwaters in the state. However if and when Madbury moves to public water supplies in the future, it should not be forced to look outside of its own boundaries for such supplies, when ample sources exist within town boundaries.
24	Want to see the Portsmouth water conservation plan before approval of 7-day PT (should have had one by now). This includes major improvements to the Portsmouth system to control unaccounted for water, and documentation of historic unaccounted for water quantities and control strategies.
App C	180-day projections. Explain the well #5 plot. Almost 2 log cycles pass before drawdown commences
App C	Most 180-day projections assume linear log-log relationships yet it is not clear that this is the case.
	Not one monitoring well indicates that recharge was achieved during this short pumping test.
App D	Full watershed should only be to Freshet Road

### Big Picture Issues

- If the wellhead protection area extends past the property line, does that mean that those neighboring properties lose the ability to put large production wells on their property?
- Portsmouth will need to ensure proper land use on Madbury and Dover properties within the wellhead area
- Portsmouth should negotiate with Madbury about connections in the future