
From: Hess, Amanda J.
Sent: Thursday, April 12, 2007 11:36 AM
To: 'tfrederick@rivanna.org'; 'Jennifer Whitaker'; 'Bill Ellis'; bwichser@rivanna.org
Cc: Keno, Aaron D.
Subject: Tiered Releases at SH - Additional Investigations

All:

I investigated the releases from SH a little further. While I once again found it difficult to actually set the tiers, I think I definitely found justification for **not** going with the 10 MGD maximum. I believe that your tiers are reasonable and think you should propose them without any changes and let TNC or DEQ come up with justification for going with something other than what you proposed.

Here are some details to think about...

Interim Conditions/Phased RM

First, I ran the full height RM for interim conditions (2020) and the tiered releases at 70-50-30. I found that in the 2002 drought the lowest volume reached by RM was 570 MG. Therefore, for these conditions, required usable RM volume to meet a demand of 13.9 MGD is 2014 MG (2584 MG - 570 MG = 2014 MG). Based on the stage-volume information and assuming 15% dead storage, that translates to a pool elevation of about **683 feet, a raise of 42 feet**. This indicates that a raise of 42 feet would be required to meet the interim demand of 13.9 MGD and that, even with the tiered release rules at SH, a 92-foot dam height (El. 666) would not safely meet the demand in 2020.

I know that, at first glance, this may seem incorrect. You would expect that if a 45-foot dam raise is required in 2055 that you could suffice with a 25-foot dam raise in 2020, but this is not the case. Without the pipeline to fill the reservoir and with the treatment capacity issues prior to the pipeline, the volume simply is **not** as "efficient" as it will be in 2055 without any treatment limitations and with a good source to fill the reservoir. This may provide you with the case you need to build the full height RM with no phasing.

Without the tiered releases at SH (10 MGD max all the time), the lowest volume reached by RM in interim 2020 conditions was 500 MG. This would require a pool elevation of about 684 feet, a raise of 43 feet. This indicates that, as you expected, the higher maximum release at SH does translate into lost volume at RM.

Current Conditions

To look at current conditions (representative of filling RM), I first assumed a demand of 12 MGD, and 800 MG usable storage in SFRR. I set RM at the full height volume. With the tiers of releases from SH (based on percent of full volume of RM), the minimum storage in RM during the 2002 drought was 1400 MG (usable storage required is 1180 MG). It took 280 days to refill RM from this point. Without the tiers (10 MGD max), conditions were very similar. This is because with RM at the full height, RM never dropped down into the more restrictive tiers for releases at SH.

Note that in order to meet the 12 MGD demand with the operation as defined for interim conditions, you would need more volume than is currently in RM. This should not be a surprise because when we looked briefly at defining the yield of your system based on approximating current operations (running Observatory from SH water), we estimated that the yield of your current system is around 10 MGD.

Now, to see how the tiers impact RM when it is refilling after being nearly empty, I ran the full height RM with SFRR at current conditions for a demand of 15.5 MGD. With the tiers, the lowest volume in RM is 400 MG (2180 MG usable storage required) and takes about 520 days to refill during the 2002 drought. Without the tiers, the lowest volume in RM is 400 MG (2180 MG usable storage required) and takes about 670 days to refill during the 2002 drought.

Amanda J. Hess, P.E.

Project Engineer

Dams and Hydraulics Section

Gannett Fleming, Inc.

(717) 763-7212 x 2707

Interim Conditions
Safe Yield = 13.9 MGD

RWSA System
RWSA Proposed Permit Conditions
2001-2004

