

DD/08-230-02

April 28, 2012

Melody Ranch HOA  
P.O. Box 4337  
Jackson, WY 83001

ATTN: HOA Board of Directors

RE: **Melody Ranch –3<sup>rd</sup> Well Review**

Dear Board Members:

We have reviewed the April 13, 2012 reply to our June 21, 2011 letter which was prepared by Jorgensen Associates (JA). The JA reply responds directly to the 12 points that were raised in our June 21, 2011 letter. Rather than replying to each response, our review of their response prompted a re-consideration of the calculated flows and projections of future demands at build out of the Melody Ranch, Upper Ranch Development.

Our findings are generally the same as stated in our June 21, 2011 letter. However, there are a few key points which are discussed as follows:

- 1. JA indicated that the flow used to provide water for chlorination is taken from the system after the meter and is returned to the system.**

After further review, we agree that the water used for chlorination supply does indeed return to the system and therefore should be deducted from the total flow. JA states that 197,000 gallons is the average monthly usage for chlorination purposes which would equate to 197,000 gallons per a 30 day period. JA's calculations for both monthly and weekly averages deducted 197,000 gallons from the supply regardless of the number of days in each computation. For example, in a typical weekly average computation JA deducted the full monthly volume of 197,000 gallons even though the flow period was only for one week.

During our review we calculated that the water used for chlorination amounts to approximately 2% (+/-0.1%) of the total flow through the meter. With this determined, we recalculated the average monthly and weekly flows by using 98% of the total flow through the meter per each period (to account for the water used in chlorination) and then dividing by the number of days in the period and then dividing by the number of lots using water during the period. Our calculations show



that the weekly per lot averages increased and the monthly per lot averages decreased from the values presented by JA.

The recalculated figures for peak flows per month and peak flows per week provide results which are more in line with what would be anticipated. In other words, the peak weekly flow per lot during a given month exceeded the peak monthly flow per lot. In one instance (in August 2010), the highest calculated peak weekly flow (2188 gpd/lot) was as much as 13.7% higher than the peak monthly flow (1925 gpd/lot) for August. This indicates, as is typically seen in water distribution, an increase in flow values at Melody Ranch when shortening the time period of measurement. This finding reinforces our recommendation that the monthly averages and weekly averages should not be used to determine the maximum day flow for the water distribution system without application of a peaking factor. The finding that in August 2010 the peak weekly flow per lot exceeded the monthly flow per lot by 13.7% indicates that the 5% peaking factor that we recommended in our June letter was too low. Also, these findings indicate that the peak day flow per lot will be greater than the peak weekly flow per lot, and therefore, we recommend that a peaking factor even greater than 13.7% be used to determine the MDD from monthly flow data. For the purposes of our computations and recommendations, we recommend a peaking factor of 15% be used to determine the MDD from monthly flow data.

Our computations reveal an actual monthly average peak value from August 2007 of 2603 gpd/lot per lot (actual weekly data was not available for comparison) and an actual weekly average peak value from the week of 19 July 2010 of 2606 gpd/lot (monthly average of 2563 gpd/lot). These averages are not indicative of maximum day flows. Rather, as stated above we recommend that the average monthly flow be increased by a 15% peaking factor to account for peak flow that could occur on a single day. Accordingly, we compute the maximum daily flow per lot as  $2603 \text{ gal/day/lot} \times 1.15 = 2993 \text{ gal/day per lot}$ . Hence, when multiplying by the number of lots at build out (367) the projected maximum day flow is  $2993 \times 367 = 1,098,431$  gallons. Total well supply from the two existing wells is 972,000 gallons, which is less than computed MDD.

- 2. JA indicated that the total available supply is the total flow available from the wells plus the 180,000 gallons (volume after leaving 120,000 gallon reserve for fire flow) available from the water tank.**

The WDEQ regulation for Number and Capacity of Groundwater Supply states: "The total developed groundwater source, along with other water sources, shall provide a combined capacity that shall equal or exceed the design maximum daily demand. A minimum of 2 wells, or 1 well and finished water storage equal to twice the maximum daily demand shall be provided. Where two wells are provided, the sources shall be capable of meeting the design average daily demand with the largest producing well out of service."



Per this WDEQ rule, when two wells are used as supply source, the finished water storage does not count towards meeting the 2X maximum daily demand requirement. Although the water may be available initially to aid in meeting peak demands, the water will no longer be available on subsequent days. In other words, once the water in the tank is used, the wells would be pumping at maximum output in effort to meet the maximum daily demand and therefore would be unable to replenish the volume in the storage tank.

**Conclusions:**

By studying the actual usage data at Melody Ranch it is clear that water demands in the summer are quite high. These demands are clearly in excess of the values that WDEQ requires be used as default minimums for demand when designing water supplies in the absence of actual water use data. Although it was appropriate for JA to utilize the WDEQ figures when originally designing water supply to the subdivision, the determination of the need for a third well, per the Melody Ranch Infrastructure Phasing Plan (April 16, 1999), is to be determined by water use data. The water use data shows that projected build-out demands during the summer have the potential to generate Maximum Day Demand (MDD) in excess of the available supply from the two wells, indicating the need for a third well.

It is also important to understand that the water supply system will significantly fall short of meeting demands during summer periods if a well is out of service (a single well can supply 540,000 gallons/day). Although a single well can meet the Average Day Demand (ADD) which is less than 400,000 gallons/day, typical demands during the summer will not be met with a single well. Therefore, if a well is out of service in the summer, Melody Ranch would have to significantly reduce water use until such time that the second well is put back on line. Depending upon the issue that causes the loss of a well, Melody Ranch could face a lengthy period of water restrictions. A third well, equal to, or exceeding the capacity of each of the existing wells, would protect the Melody Ranch water users from facing water restrictions.

Finally, it is outside of the scope of this review for Nelson Engineering to study the land records and the layout of the system in order to identify potentially appropriate locations for a third well. However, consideration should be made in regards to the potential location for a third well. If the Melody Ranch HOA does not possess land in an appropriate location where a third well could be installed, we recommend the HOA also discuss this topic with the developer.

Respectfully Submitted,

A handwritten signature in blue ink, appearing to read 'D. Dufault', is written over the printed name.

Dave Dufault, PE  
Project Engineer