

January 10, 2019

To: Sara Jane Ward
Raft River Ground Water District
PO Box 122
Almo, Idaho 83312

RE: CALCULATIONS CONCERNING TRANSFER 81940

1.0 INTRODUCTION

This memo is a review of Brockway Engineering's "estimated East Valley Cattle's (EVC) current total annual volume of commercial/stockwater wastewater and diffuse stormwater runoff" (East Valley Cattle's Supplemental Response To Protestants' Requests For Production). The purpose of the Brockway submittal is it to establish the number of additional acres that can be irrigated from the wastewater stream. First, calculate the crop requirement. Second, calculate the volume of water that can be collected and stored in ponds during the winter and used for irrigation on crop land during the summer. In addition to the stored winter volume of water, the ponds will be used as catch basins and refilled during the irrigation season. Third, divide the number of calculated acre feet of waste water by the average crop demand. Fourth, the result is the number of acres EVC wants to increase their irrigable crop land.

Brockway's calculated crop demand is 2.2 acft/ac. Brockway's calculated waste stream is 1,562.7 ac ft. Therefore, EVC desires to increase their irrigable crop land by 619 acres (letter from M. Creamer to K. Fletcher, 1/2/2019).

1.1 Crop Requirement

Brockway calculates the water requirement for the EVC farm from the Malta Agri Met Station. The purpose of this calculation is to determine how many acres, at the calculated volume of water consumed to raise a crop, will be available once the runoff and diffuse water for the corals and dairies is determined. Their calculation yielded 2.2 ft.

The Agri Met Station produces credible data. However, measured data is always much more accurate than calculated data. Raft River Ground Water District conducted a study of their district during 2010, 2011 and 2012. The study included measurement of all the EVC's irrigation production wells and calculated total volume of acre feet pumped for entire years. Electric power data was not received for 2011 so total acre feet was not collected. However, the measured acre feet pumped by EVC during 2010 and 2012 averaged 24,013.44. Dividing the measured volume by the number of irrigated acres yields an actual usage rather than a calculated usage. EVC averages 2.7 ft rather than 2.2 ft.

EXHIBIT

100

tabbies

Therefore, the total available waste stream water should be divided by 2.7 ft instead of 2.2'. This reduces the number of acres that could be irrigated. Consumed water on the EVC farm is greater than described by Brockway.

1.2 Evaporation/Transpiration of the EVC Facility

Included in determining the number of acres that can be irrigated by the waste stream produced by the EVC facility is the water added to the waste stream from the milking facility and any possible run off from the corals. This volume of water is the most difficult to measure, in fact, impossible. Brockway went to great lengths to determine this volume including adding the drops of water rendered from cow excrement.

A much better way to determine the volume of water in the waste stream is to use the METRIC ET data. This data is calculated using data from Landsat satellites and calibrated to surface measurement stations. This system is used extensively by soil and water scientists throughout the world. In fact, the IDWR uses METRIC ET data to determine crop water requirement.

Evaluating the data from METRIC ET images and data for the corals and area in Section 35 Range 11S Township 27E, the section where EVC has their facility, results in a much different volume than the Brockway study. The METRIC ET data from 2010 was analyzed because production well data also exists for that year. This analysis resulted in evaporation from section 35 at 932 acre feet in 2010. In other words, the facility consumed water rather than produced water to be collected in storage basins and pumped to irrigation fields. Brockway describes section 35 as a large producer of water to add to the storage ponds.

1.3 Pond and Storage Basin Evaporation

The same METRIC ET data can be used to determine the evaporation from the ponds and storage basins. Analyzing the METRIC ET data for the ponds was also accomplished for 2010. While the number and size of basins has changed between 2010 and the present there are no scientific circumstances altering the evaporation from a standing body of water during that same period.

The METRIC ET data for the pond located in the SWSE quadrant of Section 26, immediately north of the EVC facility, results in 49.2 inches of evaporation. Simply calculating the size of the pond and adding up the total evaporation according to the METRIC ET data results in total consumption of 23.5 acre feet for that pond.

Simple area calculations of the current ponds and basins and multiplying that area by the evaporation, results in total evaporation from the ponds and basins at 210 acre feet per year. This volume must be subtracted from the total waste water available for crop irrigation.

It is extremely important to note that there is no consideration for the volume of water that is not consumed in evaporation or irrigation but is incidental infiltration. This volume must be considered under the below conditions:

- The subsurface of the Raft River Valley consists of a few feet (2' to 5') of soil underlain by several, even hundreds of feet of fluvial gravels and sediments. The Raft River Groundwater District has installed several shallow injection locations used to recharge the aquifer. The gravels immediately below the top soil is the target formation allowing the water to flow away from the area and into the aquifer. These shallow injection locations are extremely effective and can consume a large volume of water.

These ponds are fitted with in-line flow meters or weirs to measure total volume diverted to the location. The volumes have not been calculated at this point. However, a series of infiltration basins located on Webb Brothers Farm a few miles north of the EVC ponds was measured while flowing with the basins almost full. The ponds were infiltrating 3,170 gpm continuously and had been taking water for almost 1 month. The total volume infiltrated out the bottom of the Webb ponds is greater than 5,117 ac ft per year and 1,401 ac ft for the irrigation season of 100 days. Therefore, without a continuous supply of greater than 3,170 gpm into the EVC ponds, the ponds will go dry from water infiltrating into the subsurface. The same result can be expected from the EVC basins.

- The EVC ponds and basins were constructed to double as catchment basins to collect waste water and also for infiltration basins to consume recharge waters when the Raft River Recharge Group constructs their pipeline. It is reasonable to assume the infiltration out the bottom of the ponds and basins is similar to the Webb Brother basins. This unknown volume must also be subtracted from the water available for crop irrigation.

2.0 SUMMARY

The Brockway study calculated 1,562.7 ac ft available for crop irrigation produced from the EVC facility. If indeed, that is the volume of water produced from the EVC facility it is necessary to subtract from that total the volume of water evaporated from the same area (METRIC ET volume of 932 ac ft), subtract the evaporation from the surface of the EVC ponds (METRIC ET volume of 210 ac ft), then divide the difference by actual measured EVC crop usage of 2.7 ft. The result is enough water to irrigate 156 acres.

The hearing officer must keep in mind that no measurement or calculation of the volume of water infiltrating out the bottom of the EVC ponds has been completed. Using estimated infiltration from the Webb Brothers pond at 14 ac ft/day (3,170 gpm) for 100 days reduces the available volume of water by 1,400 ac ft. Therefore, there is no wastewater available for irrigation.