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GREATROCK NORTH WATER AND SANITATION DISTRICT
ENGINEER'S REPORT
JULY 21, 2015

Concentrate Management Options

As noted at the April Board meeting, we have shifted our attention from concentrate disposal to concentrate management and are looking at several options. The GridBee mixing equipment to enhance evaporation has been tabled due to questionable case history and additional cost considerations. The beneficial reuse applications by Industrial Water Permitting and Recycling have been placed on hold in light of limited use of any State approvals.

The Board recently reviewed the Altela technology that was piloted at the East Cherry Creek Valley water treatment plant. Following the Board's July 7 Board meeting, Director Wyckoff and I met with Steve Cummings, of Altela, at the Box Elder Creek Ranch RO Water Treatment Plant and discussed the District's water treatment operations. I have provided Mr. Cummings with the water quality results of Pure Water Solutions' November 2014 sampling, as well as our current electricity and natural gas costs based upon the most recent billings from United Power and Xcel Energy. Altela is expected to present a proposal to the Board for discussion at the August Board meeting.

As for the evaporation ponds, the south pond elevation was at 4.66 feet on May 11, 2015 – an estimated 6 inches from overtopping the pond. The valve between the ponds was opened on May 12 to transfer water from south pond to north pond. The south pond was isolated on May 20 with water elevation of 3.86 feet and the concentrate flows were directed to the north pond. The elevations in the south pond are tabulated below:

Date	Depth (from daily SCADA report)
May 25, 2015	3.83
June 29, 2015	3.48
July 20, 2015	3.28

Jeff Rabas is providing the north pond elevations from visual observations of a temporary staff gauge:

Date	Measurement (from top of gauge)
May 20, 2015	18"(+)
June 3, 2015	17"
June 8, 2015	16.5"
June 15, 2015	14"
July 10, 2015	14"

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Greatrock North Pump Station Improvements

I have contracted with a new structural engineer who is working through the structural design issues and have received information from Wayne Cass on the proposed distribution pumps, motors, and drives.

Reverse Osmosis Condition Assessment

Pure Water Solutions conducted a condition assessment on May 27, 2015 and presented its findings and recommendations to the District on June 12. Those recommendations were discussed at the July Board meeting and my recommendation was that we delay any action on their recommendations pending receipt of additional information from Pure Water Solutions. In response to my request for additional information, Pure Water Solutions indicated the following:

- The sensors are the windows into the system and the replacements are a suggestion. However, maintaining the sensor calibrations helps document the overall RO unit operation.
- They do not have confidence in the current anti-scale chemical and dosing system.
- New membranes will make all the difference in the world.
- Accurate process readings, along with correct chemical and dosing, will helps improve on over-all recovery, but the exact percentages are to-be-determined.
- Lead times on membranes vary from in-stock to 8-10 weeks.

Other Activities

Water Quality and Hardness – Below are tables of water production data and water quality results from a series of sampling events:

Month	RO Permeate	Unfiltered UKA Water	Unfiltered ALV Wells
July (07/19/15)	17%	35%	48%
June (06/28/15)	23%	37%	40%
May (05/25/15)	39%	42%	19%
April (04/27/15)	37%	39%	24%
March (03/22/15)	41%	40%	19%

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Total Dissolved Solids (TDS)			
Date	BECR Tanks	RHF Tank	GN Tank
July 14, 2015	RESULTS PENDING		
06/10/15	369 mg/l	350 mg/l	341 mg/l
05/11/15	401 mg/l	347 mg/l	366 mg/l
04/13/15	386 mg/l	326 mg/l	322 mg/l
March 2015	274 mg/l	324 mg/l	302 mg/l
02/02/15	350 mg/l	394 mg/l	383 mg/l
01/14/15	350 mg/l	394 mg/l	417 mg/l
12/03/14	417 mg/l	552 mg/l	511 mg/l
10/01/14	538 mg/l	603 mg/l	594 mg/l
07/11/14	565 mg/l	597 mg/l	599 mg/l
03/05/14	586 mg/l	543 mg/l	566 mg/l
01/08/14	553 mg/l	559 mg/l	575 mg/l
10/28/13	677 mg/l	643 mg/l	594 mg/l

Total Hardness (as CaCO3)			
Date	BECR Tanks	RHF Tank	GN Tank
July 14, 2015	RESULTS PENDING		
06/10/15	92.0 mg/l	78.0 mg/l	80.1 mg/l
05/11/15	84.8 mg/l	72.6 mg/l	73.9 mg/l
04/13/15	99.6 mg/l	67.7 mg/l	68.6 mg/l
March 2015	53.7 mg/l	68.3 mg/l	59.1 mg/l
02/02/15	83.4 mg/l	113.8 mg/l	104.6 mg/l
01/14/15	105.2 mg/l	123.0 mg/l	111.7 mg/l
12/03/14	115.3 mg/l	194.5 mg/l	169.8 mg/l
10/01/14	188.8 mg/l	231.7 mg/l	225.6 mg/l
07/11/14	221.5 mg/l	222.7 mg/l	220.4 mg/l
05/16/14	165.2 mg/l	209.6 mg/l	198.1 mg/l

For comparison, hardness values are generally classified as:

Classification	Mg/l
Soft	0 – 60
Moderately hard	61 – 120
Hard	121 – 180
Very hard	GTE 181

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Storage Tank Rule – The Water Quality Control Division has adopted a new version of the Colorado Primary Drinking Water Regulations (Regulation 11). Effective April 1, 2016, the District will be required to develop a written plan for finished water storage tank inspections. In addition to quarterly periodic (visual) inspections, the District will need comprehensive inspections to be scheduled at least every five years.

New Chlorine Residual Requirements – The Water Quality Control Division has adopted a new version of the Colorado Primary Drinking Water Regulations (Regulation 11). Effective April 1, 2016, the District will be required to maintain a minimum of 0.20 milligrams per liter chlorine residual throughout the distribution system.

Warranty Inspections – Ramey Environmental Compliance is tracking the 11-month warranty inspections for the following projects:

- Rocking Horse Farms Pump Station – The warranty inspection was conducted by Jeff Rabas on July 18, 2014.
- Box Elder Creek Ranch Pump Station – The warranty inspection was conducted by Brad Simons on January 26, 2015.
- Rocking Horse Farms Tank Repainting – The improvements were inspected and accepted on June 11, 2014. A preliminary warranty inspection was conducted by Ramey Environmental Compliance on April 24, 2015 and I have met with Coblaco to address some minor surface rust. Coblaco has a new Manager of Coating Projects (Greg Smith – 303-868-7145) who attempted to schedule the work the week of July 6, but I was out of town and could not facilitate the effort. I am attempting to reschedule the work with Coblaco.

Utility Billings and Energy Costs – TZA is tracking the United Power utility bills and associated water operations on a monthly basis. Below are monthly comparisons for June each year, as well as a summary of the six-month periods for 2014 and 2015.

	June 2014 Billings				June 2015 Billings			
	On Peak	Off Peak	KWH	Billing	On Peak	Off Peak	KWH	Billing
Alluvial	4240		4240	$490.03	4073		4073	$471.36
BECR	1360	10120	11480	$829.21	2080	12680	14760	$1,093.72
GN	1520	7520	9040	$713.52	1280	6000	7280	$585.38
RHF	760	2400	3160	$281.51	760	2040	2800	$260.42
		Totals	27920	$2,314.27		Totals	28913	$2,410.88

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The 2015 billings for June are 104% of the 2014 billings for the similar period. The difference can be attributed to the increase in energy consumption at the Box Elder Creek Ranch facilities, likely a result of the District's growth in 2015.

	YTD 2014 Billings (6 months)				YTD 2015 Billings (6 months)			
	On Peak	Off Peak	KWH	Billing	On Peak	Off Peak	KWH	Billing
Alluvial	16249		16249	$1,912.63	15304		15304	$1,806.99
BECR	12720	60040	72760	$5,373.99	14560	68800	83360	$6,466.80
GN	6800	27760	24560	$2,810.12	6880	28840	35720	$2,968.31
RHF	8280	20320	28600	$2,612.86	4000	10200	14200	$1,353.90
		Totals	152169	$12,709.60		Totals	148584	$12,596.00

The 2015 year-to-date billings are 99% of the 2014 billings for the similar period. Although our year-to-date energy consumption is lower in 2015, our higher costs have been influenced by the increase in the CTD2 rate from $0.049 per KWH to $0.05858 per KWH (120% increase).

Curb Stop Box Specification – The recent issues with curb stop boxes witnessed by Director Wyckoff resulted in a review of the District's Rules and Regulations and the boxes specified. TZA's previous recommendations for a screw-style Buffalo-style box having an arch pattern base and an inside diameter of 2.5 inches has been further reinforced with the recommendation the pending revisions to the Rules and Regulations specify a 6500 Series Screw Type curb box, as manufactured by Castings, Inc. (970-243-3032), having a minimum internal diameter of 2.25 inches, or an approved equal. The part number is "C.I. 95-E" and includes a 30" top section and a 39" bottom section allowing for a bury depth of 41 inches to 64 inches. For deeper installations, Castings Inc. offers extensions in 9" (Item 151), 16" (Item 152), 28" (Item 153), and 30" (Item 154) heights.

Well, Pump, and Motor Replacements – The District has initiated efforts to better understand its well infrastructure and the potential need for replacement of pumps and motors, as well as the well structures themselves. As a part of that effort, TZA Water Engineers will need to work with Bishop-Brogden Associates to compile the historical aspects of the wells constructed, the pumps installed, and any other improvements (i.e. water level measuring devices) integrated at each site. This information will be used to evaluate the benefits of a pump, motor, and well maintenance program to detect changes in well performance. Early detection of deterioration in well performance will allow less expensive repairs, rehabilitation, or treatment procedures in order to maximize production capacity. This preventative maintenance program will be discussed with the District's Manager, and a formal proposal will be brought to the Board if deemed appropriate.