

Bozeman Water Treatment Plant Process Evaluation

**By Cole Pampe, Ryan Thompson, and Seth
Nims**

A dark blue diagonal graphic that starts from the bottom left corner and extends towards the top right corner, covering the lower half of the page.

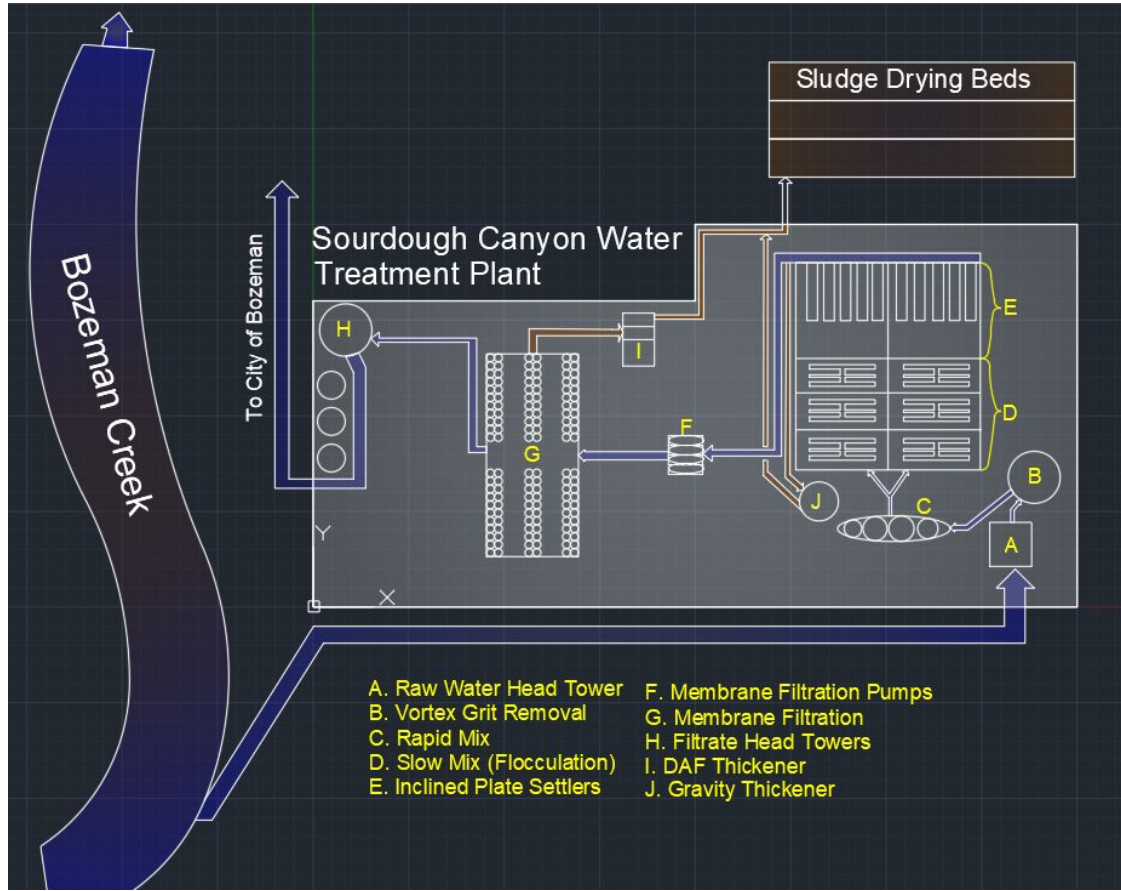


Figure 1: Overview of water path through the BWTP

Backwash and ACH Dosing

Turbidity Average vs. Coagulant Concentration

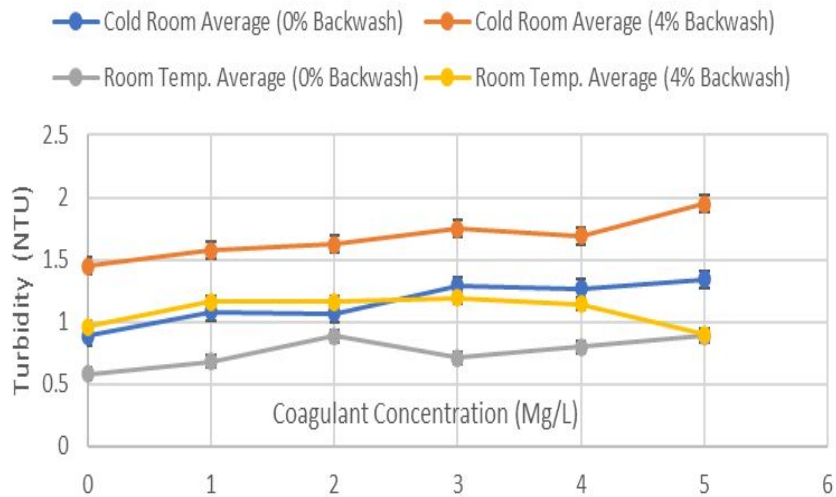


Figure 2: Turbidity Average vs. Coagulant Concentration

Average Turbidity vs. High Dose of Coagulant

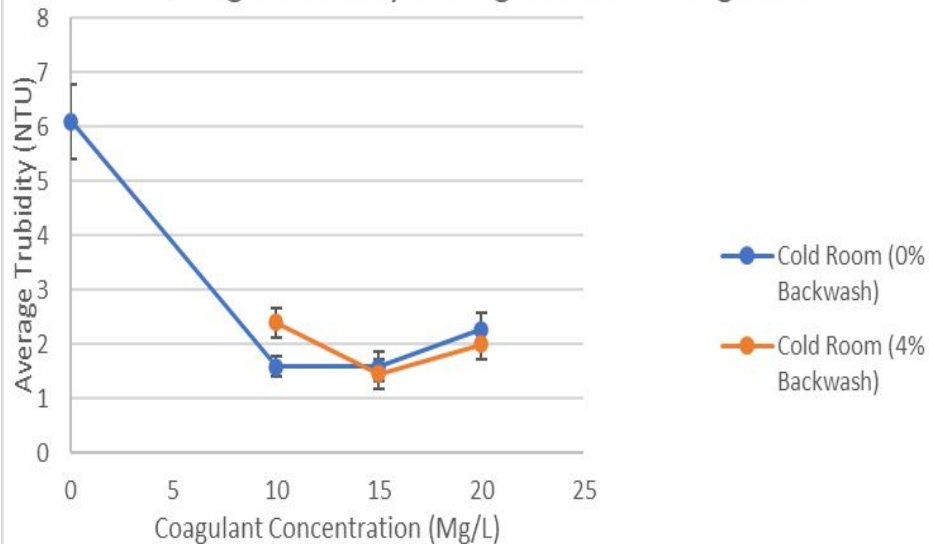


Figure 3: Average Turbidity vs. High Dose of Coagulant

Sludge Settling and Polymer Addition



Table 1: Raw sludge settling data

	L.S 1				L.S. 2				L.S. 3				L.S. 4			
	P/F	4 Min.	60 Min.	Sludge Cake	P/F	4 Min.	60 Min.	Sludge Cake	P/F	4 Min.	60 Min.	Sludge Cake	P/F	4 Min.	60 Min.	Sludge Cake
1					Fail	730	280									
2					Fail	560	250									
3					Pass	500	250	x					Fail	-	280	
4					Pass	440	250						Fail	-	280	
5	Pass	325	225	x	Pass	400	250		Pass	500	300	x	Pass	400	260	x
6	Pass	300	200	x	pass	360	250		Pass	500	300	x	Pass	330	280	
7	Pass	325	225						Pass	350	300		Pass	310	270	
8	Pass	300	200						Pass	425	315					
9	Pass	300	300						Pass	390	310					
10	Pass	250	250						Pass	360	310					

Feasibility



Bozeman Daily Chronicle (2017)

ACH and Backwash

- Continued work with Montana State University
- Cost/benefit analysis of additional dosage
- Environmental Impacts
- Land application regulations

Polymer and Sludge Settling

- \$0.16 per day increase spent on polymer (figure 4)
- \$5,111,197 (City Of Bozeman, 2021)
- Environmental impact

$$\frac{9000 \text{ gal}}{\text{day}} * \frac{3.78541 \text{ L}}{\text{gal}} * \frac{1 \text{ mg}}{\text{L}} * \frac{1 \text{ lb}}{453592 \text{ mg}} * \frac{\$ 2.09}{\text{lb}} = \$ 0.16 \text{ per day}$$

Figure 4

References

Houghton, Katherine. Bozeman Daily Chronicle (2017).
Bozeman Looks to Meet Increasing Water Demands

https://www.bozemandailychronicle.com/news/city/bozeman-looks-to-meet-increasing-water-demands/article_e8856f74-e186-5f19-b556-f2b96a21a1f4.html

City Of Bozeman. (2021)

Fiscal Year 2021 Approved Budget

<https://weblink.bozeman.net/WebLink/DocView.aspx?id=222975&dbid=0&repo=BOZEMAN&cr=1>