

Sara Bossenbroek

From: Patrick Rolan <patrickrolan@frontierwater.com>
Sent: Monday, June 1, 2020 4:08 PM
To: Sara Bossenbroek; Tim Pickett
Cc: Flanders, Phillip; Danielle Stewart
Subject: RE: Clarification on 2019 Cost Data

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Sara,

Our UF systems utilize two types of chemical cleans. The first is chemically-enhanced backwashes (CEBs), which occur on either an automated or operator-initiated basis, depending on plant preference. These cleans are generally just slightly longer than non-chemical backwash events, and use small amounts of chemicals. In an average application, the FWS guideline is to perform these cleans once a week per UF train. The second type of chemical event is a clean-in-place (CIP), these events require more time and chemical than CEB events, but typically only occur once every 60 days per UF train. CIPs are typically operator-initiated. Both types of chemical cleans are included in the estimations of our operating costs.

Let me know if you have any additional questions.

Best Regards,

Patrick Rolan

Project Engineer



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From: Sara Bossenbroek [mailto:Sara.Bossenbroek@erg.com]
Sent: Wednesday, May 27, 2020 11:22 AM
To: Tim Pickett <timpickett@frontierwater.com>
Cc: Flanders, Phillip <Flanders.Phillip@epa.gov>; Patrick Rolan <patrickrolan@frontierwater.com>; Danielle Stewart <Danielle.Stewart@erg.com>
Subject: RE: Clarification on 2019 Cost Data

Hi Tim,

We have one follow-up question regarding cleaning frequency for the UF. Could you elaborate on the frequency of the UF membrane cleaning, at least for a typical FGD system? We understand that exact cleaning frequency can be site specific, and this frequency can impact membrane degradation and replacement schedule. The cost information provided in September 2019 mentions that cleaning is automated, but could you provide a rough estimate of how often you expect that to occur? Or at least, how many times a month you've assumed for the purposes of the cost estimate.

Thank you,
Sara

Sara Bossenbroek | Environmental Engineer
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From: Tim Pickett <timpickett@frontierwater.com>
Sent: Thursday, April 23, 2020 6:22 PM
To: Danielle Stewart <Danielle.Stewart@erg.com>
Cc: Flanders, Phillip <Flanders.Phillip@epa.gov>; Sara Bossenbroek <Sara.Bossenbroek@erg.com>; Patrick Rolan <patrickrolan@frontierwater.com>
Subject: Re: Clarification on 2019 Cost Data

Danielle,

On the effluent tank, this should be included in our scope, and no effect on the cost.

On the UF membrane replacement frequency— this one is harder to answer, as it will be dependent on site water chemistry, plant capacity factor and run time, CIP/CEB frequencies and protocols, plant operation and maintenance protocols, etc. The most runtime we have on any UF module in an FGD application is about 2 years to date. It is hard to extrapolate life as all sites are different but the frequency will vary based on the above factors. The 12 years would be a good best case scenario. For our OPEX costs curve we calculated replacement costs based on a 8.3 year schedule.

Our current membrane replacement costs are as follows:

100 gpm \$64,000
300 gpm \$86,000
600 gpm \$128,000
1200 gpm \$192,000

Tim

Tim Pickett
Co-Founder and Chief Technology Officer



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From: Danielle Stewart <Danielle.Stewart@erg.com>
Date: Friday, April 3, 2020 at 5:58 AM
To: Tim Pickett <timpickett@frontierwater.com>
Cc: "Flanders, Phillip" <Flanders.Phillip@epa.gov>, Sara Bossenbroek <Sara.Bossenbroek@erg.com>
Subject: RE: Clarification on 2019 Cost Data

Hi Tim,

Do you have any updates on these couple of questions we sent back in February? We'd like to include as much clarifying information in our response to public comments as we can.

Unfortunately, our deadlines for finalizing the ELG remain unchanged, even with all the impacts of COVID-19. Hopefully, you and your team are adapting to things ok. We don't need answers today, I just want to make sure this doesn't get too lost in the shuffle. If we could get answers in the next 2 weeks or so I think we would still be in good shape.

Thanks,
Danielle

From: Danielle Stewart
Sent: Friday, March 13, 2020 10:44 AM
To: Tim Pickett <timpickett@frontierwater.com>
Subject: RE: Clarification on 2019 Cost Data

No worries. I did hear from Ron that you guys have been pretty busy responding to several requests from industry.

If you need another couple of weeks to get to this that's fine also. I think ideally, if we could have some information by the end of the month that would be sufficient on our end. Thanks for continuing to keep us updated!

Danielle

From: Tim Pickett <timpickett@frontierwater.com>
Sent: Friday, March 13, 2020 10:40 AM
To: Danielle Stewart <Danielle.Stewart@erg.com>
Cc: Sara Bossenbroek <Sara.Bossenbroek@erg.com>; Flanders, Phillip <Flanders.Phillip@epa.gov>; Jordan, Ronald <jordan.ronald@epa.gov>
Subject: Re: Clarification on 2019 Cost Data

Danielle,

Sorry for the delay. We have all hands on deck right now bidding several FGD jobs and this fell through the cracks. I'll have this answered for you today.

Tim

From: Danielle Stewart <Danielle.Stewart@erg.com>

Date: Tuesday, February 25, 2020 at 4:22 AM

To: Tim Pickett <timpickett@frontierwater.com>

Cc: Sara Bossenbroek <Sara.Bossenbroek@erg.com>, "Flanders, Phillip" <Flanders.Phillip@epa.gov>, Ron Jordan <jordan.ronald@epa.gov>

Subject: Clarification on 2019 Cost Data

Tim,

We're working through evaluating public comments and finalizing the Steam Electric ELG and would like to follow up with you on two specific topics regarding the cost memorandum you provided back in September 2019. I've attached the cost memo to this email as a reminder.

1. Could you elaborate on what the "ultrafiltration polishing system" includes? What equipment is included as part of this system in addition to the UF unit(s)? We are specifically interested in knowing whether or not an effluent tank or holding tank for treated wastewater of any kind is included? Some questions have been raised about the fact that "effluent tank" was crossed out or removed from the estimate (see redlined item in the 4th equipment bullet).
2. These costs note a UF membrane replacement frequency of every 12 years. Can you elaborate on how this frequency is determined? And provide some details on what most impacts the life of the membrane. We would like to better understand how this life expectancy can be prolonged. Also, roughly how much is the replacement UF membrane? A rough estimate or roughly what percent of total O&M costs are represented by a replacement membrane is sufficient. We're trying to gain an understanding of how much this replacement membrane impacts the O&M costs.

Let us know if it would be easier to have a call to chat about these topics.

Thanks in advance.

Danielle

Danielle Stewart

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