

2020 ECR Plan Status Update Report
Quarterly Report – Update #2
April 30, 2021

Executive Summary:

General

This report covers LG&E and KU's ("Companies") progress on the 2020 Environmental Cost Recovery ("ECR") Plan through the first quarter of 2021. The Companies filed applications requesting approval on March 31, 2020¹ and received approval on September 29, 2020.

The 2020 ECR Plan safety performance through the first quarter of 2021 was excellent with a year-to-date OSHA Recordable Incident Rate of 0.0 and an inception-to-date OSHA Recordable Incident Rate of 0.0, compared to the industry average of 3.2. Work to date has been solely engineering and commercial bidding related. No field construction work has begun on the projects.

The total 2020 ECR Plan filed cost of \$405.2 million (net)² as provided in Case Nos. 2020-00060 (KU) and 2020-00061 (LG&E) will be reduced to \$242.7 million (net)². This reduction is the result of getting ahead of the market peak in securing an EPC contractor and Effluent Limitation Guidelines ("ELG") equipment technology vendor. In doing so early, we were able to obtain competitive pricing and no longer needed the original contingency amount. In addition, we have made two cost-reducing scope changes: 1) there will be no weather canopies over the process tanks and 2) shop fabricated fiberglass tanks will be utilized rather than field constructed concrete process tanks. Total spend to date has increased from \$10.2 million (net)² last quarter to \$20.5 million (net)² through March 31, 2021.

The Companies continue to monitor the COVID-19 pandemic situation as well as work with all contractors to minimize the impact to the projects. To date, there have been no impacts to the work.

Background

The Environmental Protection Agency's ("EPA") 2015 ELG Rule and amendments precipitated the need to construct ELG water treatment systems at Trimble County ("TC"), Mill Creek ("MC"), and Ghent ("GH"), as well as a Bottom Ash Transport Water ("BATW") recirculation system at GH. The EPA's proposed amendments to the 2015 ELG Rule were finalized in the Fall of 2020. The current ELG Rule includes daily maximum and monthly average limits for the concentration of mercury, nitrates/nitrites, selenium and arsenic allowed in Flue-Gas Desulfurization ("FGD") wastewater effluent.

To meet the revised limits for these constituents, the Companies are required to install ELG water treatment systems to treat the effluent from the physical/chemical FGD process water treatment systems recently

¹ Case No. 2020-00060 and Case No. 2020-00061

² Co-Owners of the Trimble County plant: Illinois Municipal Electric Agency (IMEA) and Indiana Municipal Power Agency (IMPA) are responsible for 25%. IMEA owns 12.12% and IMPA owns 12.88%. Co-owner shares are not included in the costs provided in this report.

placed into service as described in the 2016 ECR Plan quarterly reports. Without the proposed 2020 ECR Plan projects at TC, MC, and GH stations, the Companies would not be able to continue steam generating operations at these generating stations and simultaneously comply with the ELG Rule, as enforced by Kentucky Pollutant Discharge Elimination System (“KPDES”) permits at each generating station. This would significantly impair the Companies’ ability to fulfill their mandate to provide adequate, efficient, and reasonable service to their ratepayers as these generating stations are the three largest generating stations within the Companies’ generating fleet. The ELG Rule requires compliance for the FGD wastewater as soon as possible on or after November 1, 2020, but no later than December 31, 2025.³

The proposed amendments to the ELG Rule also include a ten percent (“10%”) volumetric discharge limit (on a 30-day rolling average) for BATW, which must be complied with “as soon as possible” but in no event later than December 31, 2025. This proposed discharge limit requires KU to construct a BATW recirculation system on the existing bottom ash transport system at GH. The recirculation system will collect the transport water currently discharged from the remote bottom ash dewatering facility and reroute it through tanks and piping systems back to the four generating units for reuse. TC and MC do not require a BATW recirculation system due to their bottom ash transport systems being previously converted to a dry transport instead of a wet sluicing system like GH’s.

Schedules

FGD Process Water Treatment Facilities and Diffusers

Project	Project #	Awarded Contractor	Status⁴	ECR Filing In-Service Date⁵
Trimble County Effluent Limitations Guidelines Water Treatment System ⁶	KU Project 44 LG&E Project 32	OKEP	Awarded March 15, 2021	July 2023
Mill Creek Effluent Limitations Guidelines Water Treatment System ⁶	LG&E Project 31	OKEP	Awarded March 15, 2021	June 2024
Mill Creek Outfall 025 Diffuser	LG&E Project 31	TBD	Bids Received and Under Evaluation	November 2021
Ghent Effluent Limitations Guidelines Water Treatment System ⁶	KU Project 43	OKEP	Awarded March 15, 2021	November 2024
Ghent Bottom Ash Transport Water Recirculation System ⁷	KU Project 43	OKEP	Awarded March 15, 2021	December 2023
Ghent Outfall 001 Diffuser	KU Project 43	TBD	Bids Received and Under Evaluation	November 2021

³ 84 Fed. Reg. 64664.

⁴ Project Engineering Department or Engineering, Procurement, and Construction (“EPC”) Contract work status.

⁵ At this time, the In-Service Dates are per the ECR filing (Straight Testimony, page 4-5).

⁶ ELG Equipment OEM: Under evaluation – Frontier or Suez

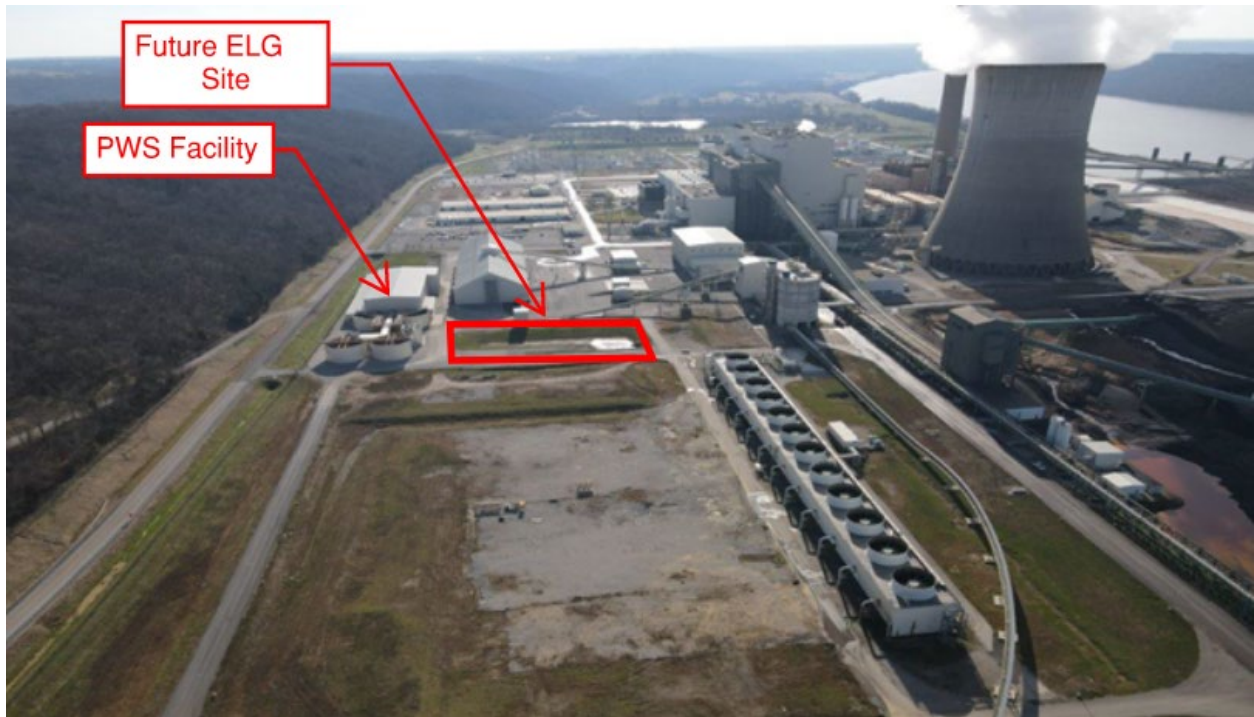
⁷ BATW Equipment OEM: United Conveyor Corporation

Project Details

KU Project 44 and LG&E Project 32 – Trimble County (TC) Station Effluent Limitations Guidelines (ELG) Water Treatment System

This project is for construction of an ELG water treatment system at the TC generating station. The filed estimated capital cost to implement these facilities is \$99.6 million (\$74.7 million net)² being split between KU and LG&E, with construction planned for completion in July 2023. KU's 48 percent share of the net² capital cost for the ELG water treatment system is \$35.9 million (Project 44). LG&E's 52 percent portion of the net² capital cost for the balance of the ELG water treatment system is \$38.8 million (Project 32). The reduced amount is now \$47.2 million (net)². This is split as KU's 48 percent being \$22.7 million (Project 44) and LG&E's 52 percent being \$24.5 million (Project 32) – both of these costs are net².

The ELG system will be constructed in close proximity to the recently completed process water treatment system. All facilities will be installed on land currently owned by KU and LG&E at the generating station. The system will be designed to handle water flow capacity up to 750 gallons per minute.



Trimble County – ELG Water Treatment Future Location – December 2020



Trimble County – ELG Water Treatment Future Location – March 2021



LG&E Project 31 – Mill Creek (MC) Station Effluent Limitations Guidelines (ELG) Water Treatment System and Diffuser

Project 31 is for construction of an ELG water treatment system and wastewater diffuser at the MC generating station. The filed estimated capital cost to implement these facilities is \$114.0 million, with construction planned for completion in November 2021 for the diffuser and June 2024 for the ELG water treatment system. The reduced amount is \$66.9 million.

The ELG system will be constructed in close proximity to the recently completed process water treatment system. All facilities will be installed on land currently owned by LG&E at the generating station. The system will be designed to handle water flow capacity up to 600 gallons per minute.



Mill Creek – ELG Water Treatment Future Location – December 2020



Mill Creek – ELG Water Treatment Future Location – March 2021

KU Project 43 – GH Station Effluent Limitations Guidelines (ELG) Water Treatment System, Bottom Ash Transport Water (BATW) Recirculation System, and Diffuser

ELG

Project 43 is for construction of an ELG water treatment system, a BATW recirculation system, and a wastewater outfall diffuser at the GH generating station. These facilities are designed to process and lawfully discharge wastewater from GH in accordance with the EPA’s existing and proposed amendments to the ELG Rule and the existing Kentucky Pollutant Discharge Elimination System (“KPDES”) Permit for GH. The filed estimated capital cost to implement these facilities is \$216.5 million, with construction tentatively planned (subject to final EPC contract award) for completion in November 2021 for the diffuser, December 2023 for the BATW recirculation system, and November 2024 for the ELG water treatment system. The reduced cost is now \$128.7 million.

The ELG system will be constructed in close proximity to the recently completed process water treatment system. All facilities will be installed on land currently owned by KU at the generating station. The system will be designed to handle water flow capacity up to 1,000 gallons per minute.



Ghent – ELG Water Treatment Future Location – December 2020



Ghent – ELG Water Treatment Future Location – March 2021

BATW

The ELG Rule requires that BATW be recirculated, instead of used once, to transport bottom ash and then discharged. The BATW recirculation system at GH consists of transfer tanks, low pressure pumps, high pressure pumps, piping, foundations, controls, and related equipment. This system will collect the bottom ash sluice water, after being dewatered from the bottom ash solids in the remote bottom ash dewatering facility and pump the water to collection tanks where the water will then be pumped back to the bottom ash removal systems underneath the four generating unit boilers to be used again for sluicing bottom ash to the remote dewatering facility. The water will be recirculated as necessary, with fresh water being added to replace evaporated water. A 10% purge system, to meet the ELG Rule volume discharge limit, will be included to control pH and other constituent buildup in the recirculation system.

Diffuser

The GH Outfall 001 diffuser will be a multiport diffuser designed to distribute the overflow from the process pond into the Ohio River via the existing KPDES Outfall 001. The diffuser will generally consist of a large header pipe installed in the riverbed with distribution ports, protected by structural piling and rip rap. The diffuser will be installed during the summer and fall of 2021, if river conditions are conducive for construction, with completion in November 2021. As previously stated, TC and MC utilize dry handling systems for their bottom ash systems and therefore already comply with this provision of the amended ELG Rule.

Quarterly Status Update:

General

Burns & McDonnell (“B&McD”) is the ELG Owner’s Engineer and has supported various projects for LG&E and KU such as the TC Unit 1 PJFF and CCRT, MC CCRT and GH PWS construction. B&McD’s scope⁸ related to development of the conceptual layouts and engineering of the ELG treatment facilities, development of the EPC bid technical specifications, support to Project Engineering on the technical reviews of the EPC bidders, assistance in conforming the technical specifications into the EPC contract are complete.

B&McD work assisting LG&E and KU with reviewing and evaluating the technical proposals from the four EPC bidders, as well as technical reviews of the ELG technology providers (Frontier or Suez), and the BATW equipment provider (United Conveyor Corporation [“UCC”]) are complete.

With regards to the EPC contracts for the ELG water treatment facilities at TC, MC, and GH, and the BATW for GH, the Companies issued the EPC request for quotation package to five bidders in May 2020.

⁸ a) specification development b) support during the RFQ period, attending bid review meetings, technical bid evaluation, evaluate clarifications and exceptions to the specification/issue final contract documents; c) equipment and drawing reviews, support for the detail design, permitting studies, procurement evaluation, construction activities: geotechnical, foundations, buildings, electrical, controls, chemical usage, testing plans, and operating, maintenance, and process descriptions, etc.



The Companies have completed technical and commercial reviews with a chosen bidder. The EPC contracts for TC, MC, and GH were awarded on March 15, 2021.

KU Project 44 and LG&E Project 32 – Trimble County (TC) Station Effluent Limitations Guidelines (ELG) Water Treatment System

The ELG water treatment facility EPC Agreement was awarded to OKEP on March 15, 2021. Work completed during the first quarter of 2021 includes: participating in various project kickoff meetings with OKEP and the ELG Original Equipment Manufacturer (OEM) Frontier, site visits to support the engineering and design of the projects, submittal and review of various project documents.

LG&E Project 31 – Mill Creek (MC) Station Effluent Limitations Guidelines (ELG) Water Treatment System and Diffuser

The ELG water treatment facility EPC Agreement was awarded to OKEP on March 15, 2021. Work completed during the first quarter of 2021 includes: participating in various project kickoff meetings with OKEP and the Original Equipment Manufacturer (OEM) Frontier, site visits to support the engineering and design of the projects, submittal and review of various project documents.

Diffuser – Engineering design documents were completed during the first quarter of 2021. Diffuser construction work was issued for bid in February 2021 with bids having been received in early March 2021. A contract for construction will be executed in April 2021 with work commencing in May 2021. Required construction permits from the U.S. Army Corp of Engineers and the Kentucky Division of Water were received. Work is scheduled to be complete by November 2021.

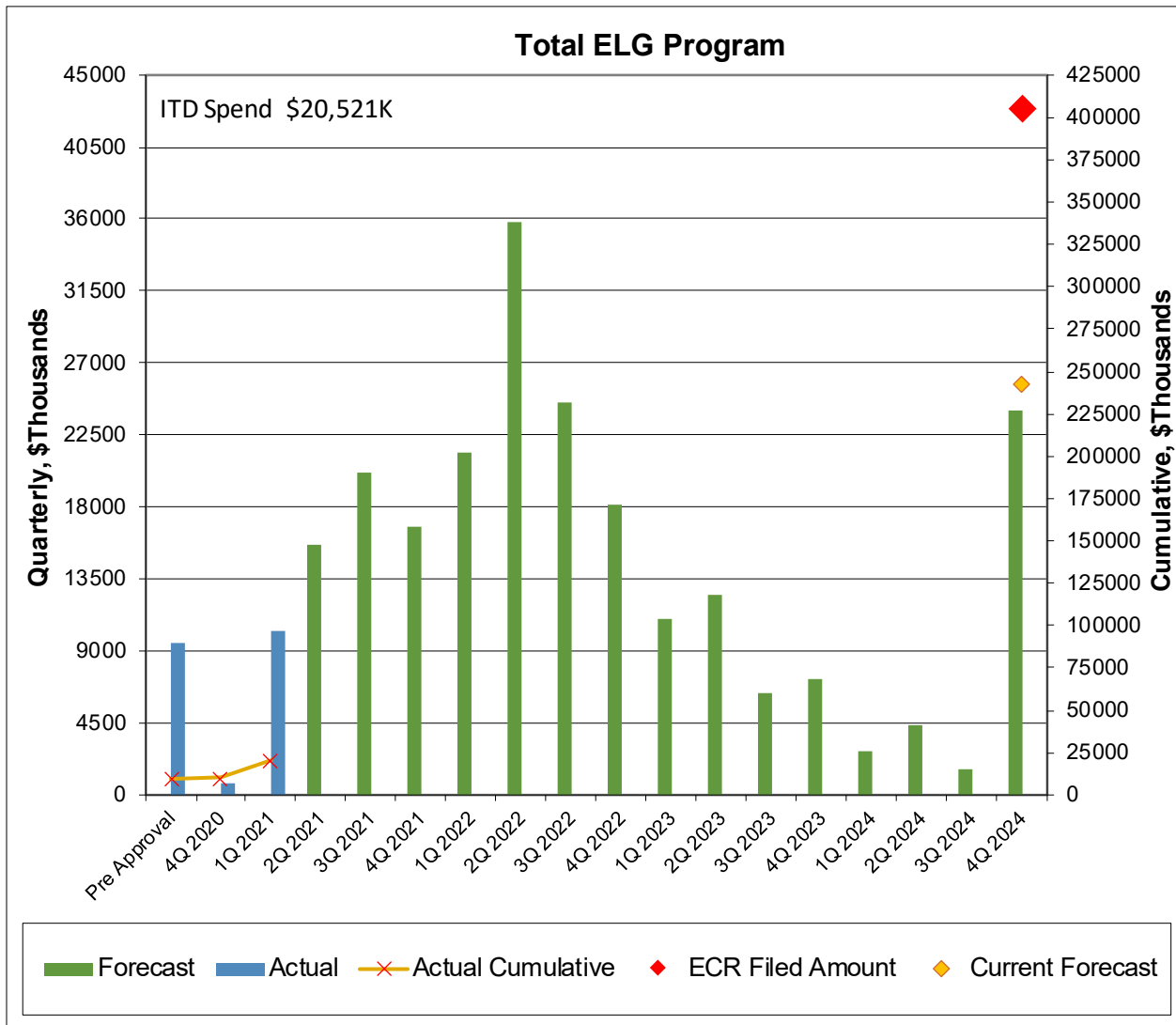
KU Project 43 – Ghent (GH) Station Effluent Limitations Guidelines (ELG) Water Treatment System, Bottom Ash Transport Water (BATW) Recirculation System, and Diffuser

The ELG water treatment facility and BATW EPC Agreement was awarded to OKEP on March 15, 2021. Work completed during the first quarter of 2021 includes: participating in various project kickoff meetings with OKEP and the Original Equipment Manufacturers (OEMs) Frontier and United Conveyor Corporation, site visits to support the engineering and design of the projects, submittal and review of various project documents.

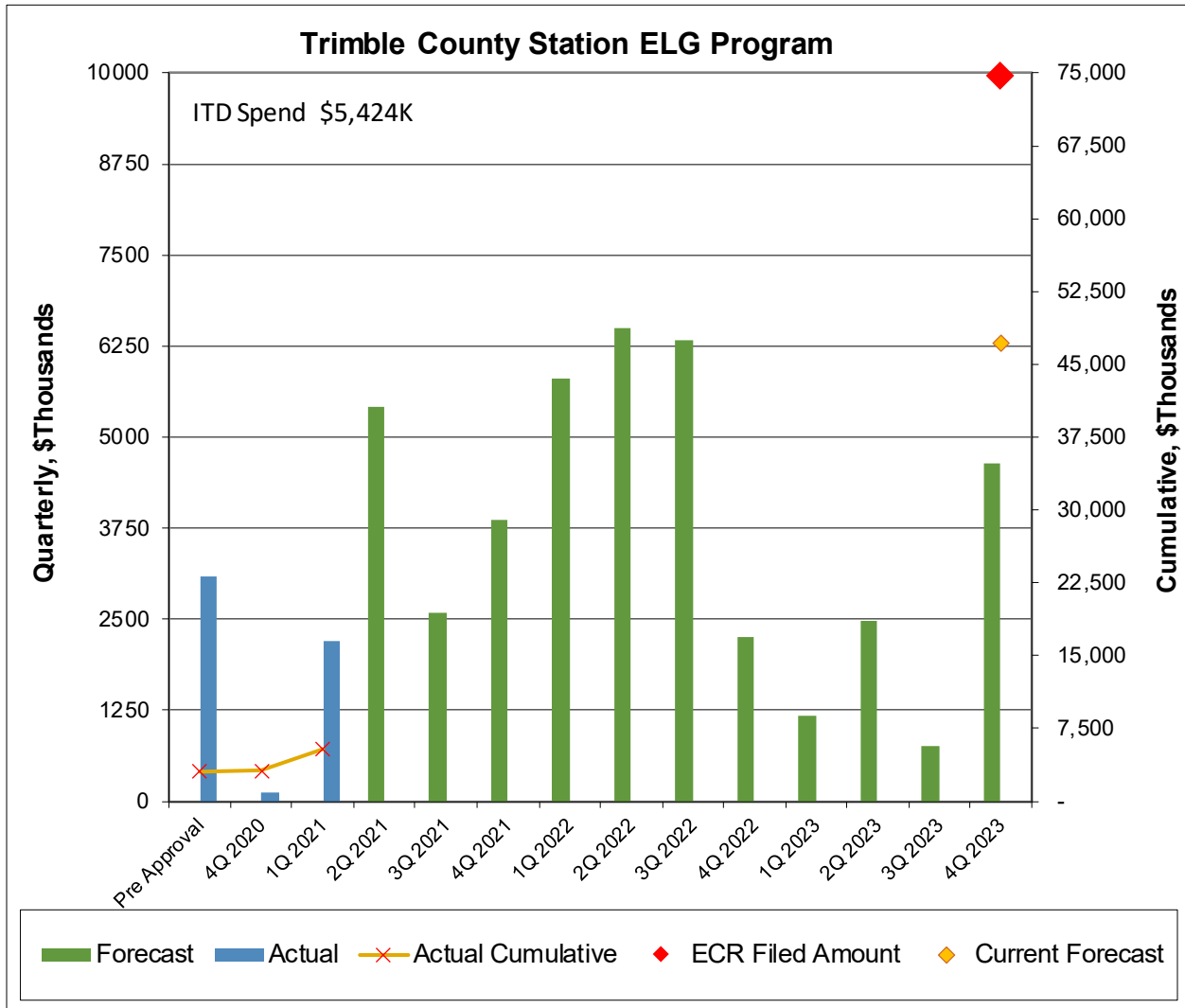
Diffuser – Bids were received from three of the five bidders in February 2021. During the bid process, one of the bidders notified the Company of their intent to not bid, while another decided not to bid without providing any notification. Bid presentations were conducted and additional correspondence occurred with each bidder to normalize the bids. The review process was completed in early March 2021 and contract negotiations began with the best evaluated bidder. The Companies are expected to award the contract in April 2021.

Financials:

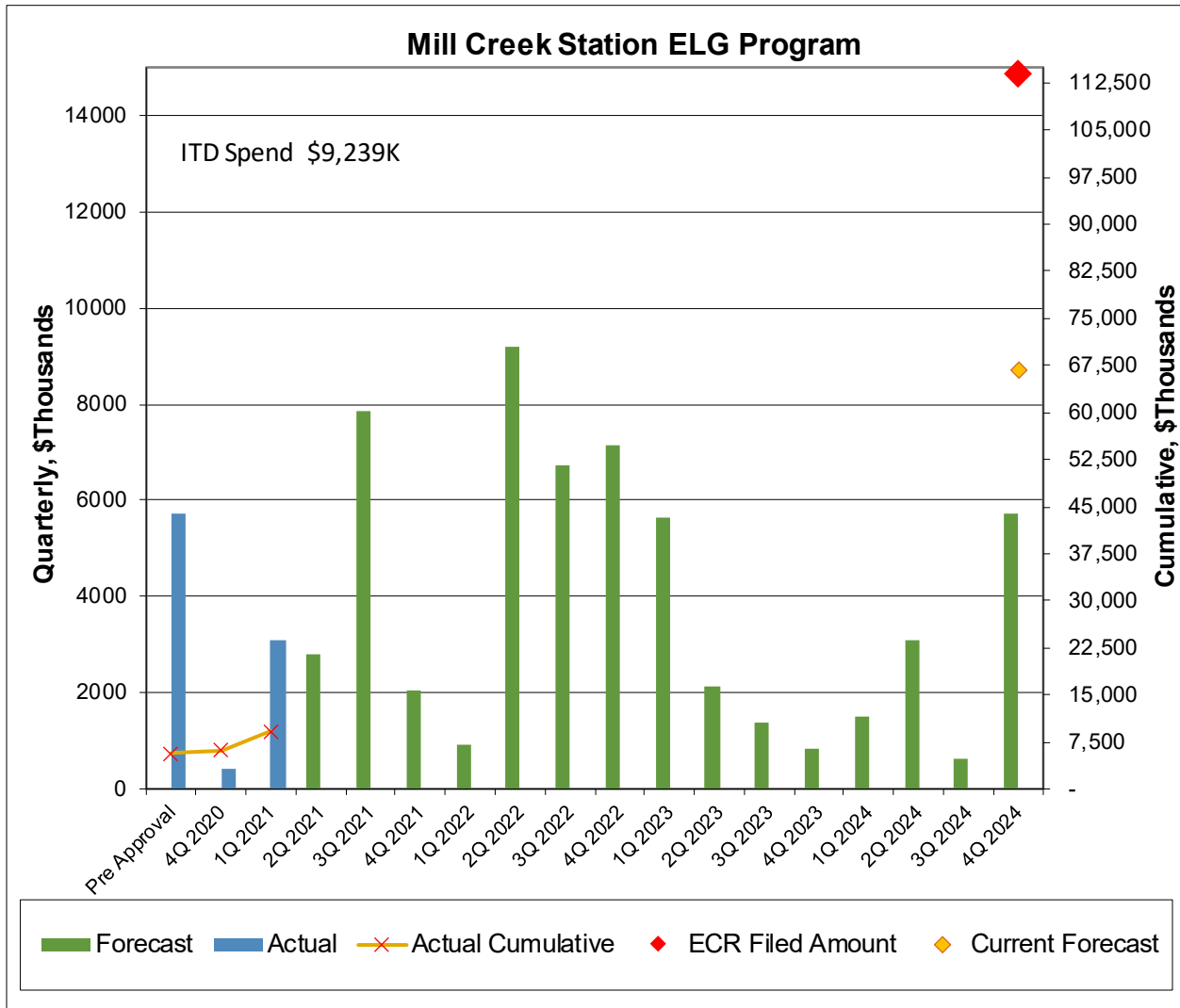
The total 2020 ELG Program forecasted cost has been reduced from \$405.2 million as filed to \$242.7 million. Total spend has increased from \$10.2 million (net)² to \$20.5 million (net)² through March 31, 2021. The graph below includes 1) a symbol (◆) to show the current forecast to completion and (2) inception-to-date (“ITD”) Spend in the upper left of the chart.



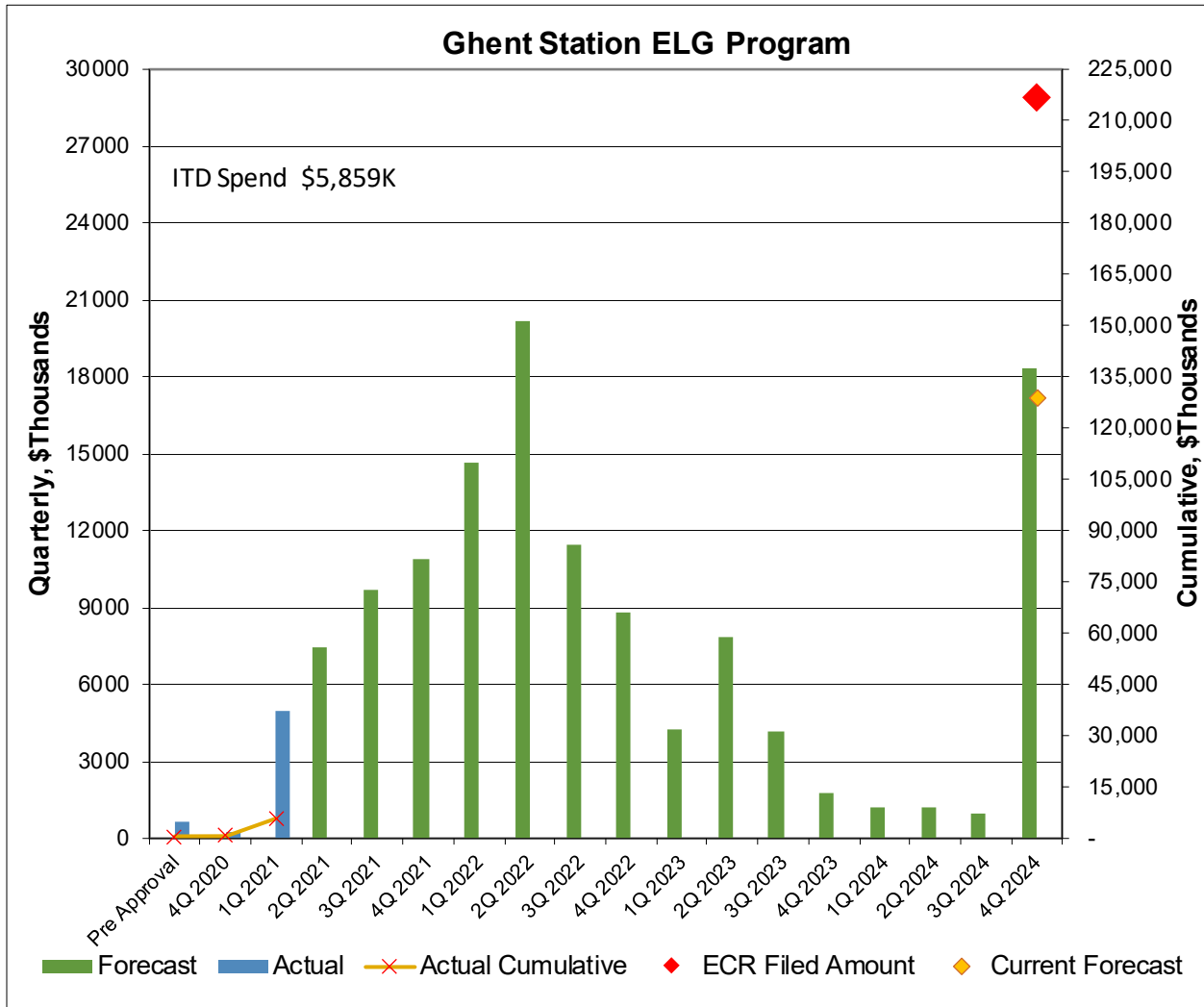
The total Trimble County Station ELG Program forecasted cost has been reduced from \$74.7 million (net)² as filed to \$47.2 million (net)². Total spend has increased from \$3.21 million (net)² to \$5.42 million (net)² through March 31, 2021. The graph below includes 1) a symbol (◆) to show the current forecast to completion and (2) inception-to-date (“ITD”) Spend in the upper left of the chart.



The total Mill Creek Station ELG Program forecasted cost has been reduced from \$114.0 million as filed to \$66.9 million. Total spend has increased from \$6.14 million to \$9.24 million through March 31, 2021. The graph below includes 1) a symbol (◆) to show the current forecast to completion and (2) inception-to-date (“ITD”) Spend in the upper left of the chart.



The total Ghent Station ELG Program forecasted cost has been reduced from \$216.5 million as filed to \$128.7 million. Total spend has increased from \$0.88 million to \$5.90 million through March 31, 2021. The graph below includes 1) a symbol (♦) to show the current forecast to completion and (2) inception-to-date (“ITD”) Spend in the upper left of the chart.



Planned Activities for Next Quarter:

KU Project 44 and LG&E Project 32 – Trimble County (TC) Station Effluent Limitations Guidelines (ELG) Water Treatment System – LG&E and KU will continue to have meetings with OKEP to review the engineering and design of the project; review project submittals and design documents; and support onsite activities such as general site visits, preliminary survey activities, as well as geotechnical explorations.

LG&E Project 31 – Mill Creek (MC) Station Effluent Limitations Guidelines (ELG) Water Treatment System and Diffuser – ELG: See Ghent below. Diffuser: finalize engineering scope of work.

KU Project 43 – Ghent (GH) Station Effluent Limitations Guidelines (ELG) Water Treatment System, Bottom Ash Transport Water (BATW) Recirculation System, and Diffuser

ELG/BATW – B&McD to provide support with the engineering reviews and site activities during the construction, commissioning and testing phases of the projects.

The Companies completed the evaluation and contract award by March 15, 2021, begin setup of contract kick-off, which includes commercial activities, technical engineering and design meetings, schedule reviews, training and site visits for geotechnical and tie-in investigation.

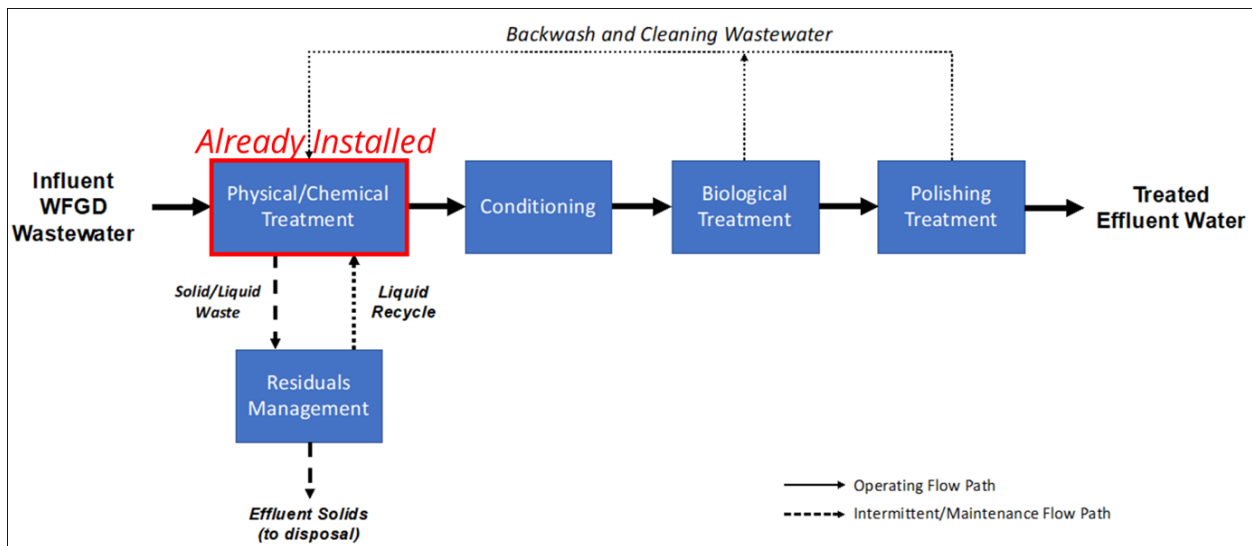
Diffuser – KU plans to award the contract for the Ghent Outfall 001 Diffuser construction in April 2021. The planned construction activities for the quarter include initial mobilization, site survey, tree clearing, preliminary earthwork and grading activities, and material deliveries.

APPENDIX

ELG Water Treatment System Description – TC, MC, and GH

The ELG Rule requires the Companies to use the Best Available Technology Economically Achievable (“BAT”)⁹ to control particulate, metals, arsenic, mercury, selenium, and nitrates/nitrites. Current BAT technology is physical/chemical treatment plus biological treatment. The process water systems are physical/chemical systems designed to capture particulate and most metals; however, they are not designed to capture nitrates/nitrites and selenium. The levels of nitrate/nitrite and selenium capture required by the ELG Rule requires biological treatment of the process water treatment system’s effluent.

The first step in the biological treatment process is denitrification, which is the reduction in concentration of nitrates/nitrites through a biological process utilizing denitrification equipment. Effluent from the denitrification equipment is discharged to the first stage reactor, which is comprised of fiberglass vessels and internal reactor surfaces. The reactor contains living microorganisms, which are fed nutrients and convert the nitrates/nitrites and selenium molecules in an aerobic atmosphere, to an elemental form. Effluent from the first stage reactor flows into a second stage reactor, where additional biological processes reduce remaining selenium. The elemental form of selenium is transferred, via a backwash phase of the process, to the equalization tanks at the beginning of the process water treatment system for particulate removal. The second stage reactor feeds to an ultrafiltration (“UF”) system where remaining particulate metals are filtered out. The UF tank is then discharged to a series of clean water tanks, which can be used to backwash the biological and UF systems or be discharged. A “typical” flow diagram is shown below.



The majority of the mechanical and electrical systems will be constructed in a building for weather protection, whereas most of the biological process tanks will be located outside. The building houses the denitrification equipment, UF systems, effluent tanks, various pumps and support subsystems. The system

⁹ 84 Fed. Reg. 64624.

also requires cleaning and chemical feed equipment, pumps, piping, valves, and electrical equipment. Separate rooms must be constructed inside the treatment building to house battery systems and electrical equipment. A control room is also required, along with restrooms. The reactor area, including the vessels housing the microorganisms, will be constructed outside the building under a weather canopy. All of the tanks and reactors in the system must be large enough to handle the immense volume of water flowing through the effluent treatment process. In other words, the system must be sized commensurate with the process water treatment systems recently commissioned to enable treatment of the effluent of flow from the process water treatment systems.

Diffusers Description – GH and MC

The diffusers planned to be installed at GH and MC are large multi-port pipes that connect to the stations' wastewater outfall pipe and are placed into the bottom of the Ohio River with the discharge ports above the riverbed and facing downstream. The pictures shown below provide a general concept of the GH diffuser, which will be similar to the proposed MC diffuser. As this graphic representatively shows, the diffuser is a single large discharge pipe that is installed in the riverbed. The diffuser ports face downstream to disperse the water out of multiple discharge ports instead of a single, larger point of discharge.

Ghent Outfall 001 Diffuser Concept

