

**2020 ECR Plan Status Update Report  
Quarterly Report – Update #8  
October 31, 2022**

**Executive Summary:**

**General**

This report covers LG&E and KU’s (“Companies”) progress on the 2020 Environmental Cost Recovery (“ECR”) Plan through the third quarter of 2022. The Companies filed applications requesting approval on March 31, 2020<sup>1</sup> and received approval on September 29, 2020.

The 2020 ECR Plan safety performance through the third quarter of 2022 remains 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 continues to focus on engineering, procurement and delivery of equipment/materials at all three stations: Trimble County (“TC”) Ghent (“GH”) and Mill Creek (“MC”). At TC and GH work has included installation of above and below ground piping; construction of building foundations; installation of process equipment; installation of fiberglass tanks; erection of pre-engineered buildings and associated interior walls and roof panels. At MC work included excavation and installation of underground piping and duct banks, installation of a concrete sump, and forming of the ELG building foundation.

As reported in the last quarter, the total 2020 ECR Plan filed cost of \$405.2 million (net)<sup>2</sup> as provided in Case Nos. 2020-00060 (KU) and 2020-00061 (LG&E) was reduced to \$242.8 million (net)<sup>2</sup>. The total spend to date has increased from \$124.6 million (net)<sup>2</sup> last quarter to \$153.2 million (net)<sup>2</sup> through September 30, 2022.

**Background**

The Environmental Protection Agency’s (“EPA”) 2015 ELG Rule and amendments precipitated the need to construct ELG water treatment systems at TC, MC and 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 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

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<sup>1</sup> Case No. 2020-00060 and Case No. 2020-00061

<sup>2</sup> 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.

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<sup>3</sup>.

The final ELG Rule also includes up to 10 percent 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**

<b><u>Project</u></b>	<b><u>Project #</u></b>	<b><u>Awarded Contractor</u></b>	<b><u>Status</u></b> <sup>4</sup>	<b><u>Planned / Actual In-Service Date</u></b> <sup>5</sup>
Trimble County Effluent Limitations Guidelines Water Treatment System <sup>6</sup>	KU Project 44 LG&E Project 32	OKEP	Awarded March 15, 2021	July 2023
Mill Creek Effluent Limitations Guidelines Water Treatment System <sup>6</sup>	LG&E Project 31	OKEP	Awarded March 15, 2021	June 2024
Mill Creek Outfall 025 Diffuser	LG&E Project 31	Tetra Tech	Awarded May 12, 2021	Placed in service December 2021
Ghent Effluent Limitations Guidelines Water Treatment System <sup>6</sup>	KU Project 43	OKEP	Awarded March 15, 2021	November 2024
Ghent Bottom Ash Transport Water Recirculation System <sup>7</sup>	KU Project 43	OKEP	Awarded March 15, 2021	December 2023
Ghent Outfall 001 Diffuser	KU Project 43	MAC Construction & Excavating	Awarded March 22, 2021	Placed in service December 2021

<sup>3</sup> 84 Fed. Reg. 64664.

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

<sup>5</sup>The Planned In-Service Dates are per the 2020 ECR Plan filing (Straight Testimony, page 4-5). Actual in-service dates are signified with red font.

<sup>6</sup> ELG Equipment OEM: Frontier

<sup>7</sup> BATW Equipment OEM: United Conveyor Corporation

## **Quarterly Status Update:**

### **General**

The engineering, procurement, and construction, (“EPC”) contracts for TC, MC, and GH were awarded on March 15, 2021 to Old Kentucky Energy Partners (“OKEP”) which is a joint venture between Bowen Engineering (a local company) and United E&C. Work to date has been focused on engineering at all three stations and procurement and delivery of equipment/materials. GH and TC work also included installation of above and below ground piping; installation of process equipment; installation of fiberglass tanks; and erection of pre-engineered building panels/trim work including interior concrete block walls, as well as pre-insulated walls and roof panels. At Mill Creek, work included excavation and installation of underground piping and duct banks, installation of a concrete sump, and forming of the ELG building foundation.

Additionally, the scope of work for developing common and also plant-specific training manuals and operation procedures has been released to obtain a request for proposal (“RFP”) to the same provider used for the TC, GH, and MC process water systems.

Burns & McDonnell (“B&McD”) is the ELG Owner’s Engineer and is assisting the Companies with reviewing engineering, design and construction support related to submittals and fieldwork from the EPC (OKEP) and ELG technology providers (Frontier – ELG) or United Conveyor Corporation (Ghent BATW).

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

#### **General**

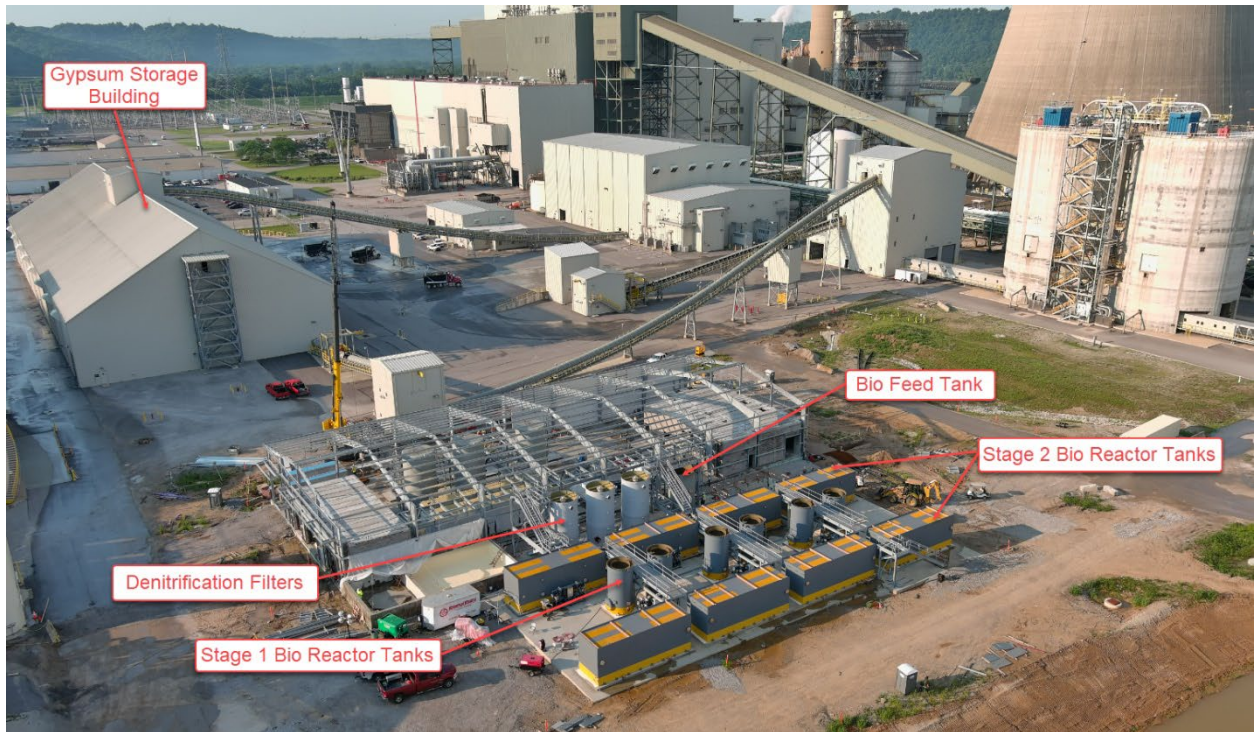
Project 44 (KU) and Project 32 (LG&E) are for construction of an ELG water treatment system at the TC generating station. The current forecasted capital cost to implement these facilities remains at \$47.2 million (net)<sup>2</sup>, being split between KU and LG&E, with construction planned for completion in July 2023. 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 net<sup>2</sup>.

To streamline the review process and to take advantage of multiple internal resources, the TC project team continues to include the MC and GH project teams during all major reviews. This collaborative effort has been implemented to minimize issues associated with the TC project, all while accelerating the review process on the subsequent projects.

#### **ELG**

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

Work completed during the third quarter of 2022 includes participating in project technical, engineering, and design meetings with OKEP and the ELG Original Equipment Manufacturer (“OEM”), Frontier; submittal and review of various project documents; commercial and procurement activities; schedule reviews; initial Factory Acceptance Testing (“FAT”) of the Distributed Control System (“DCS”) at the OEM site; design of above ground electrical and miscellaneous civil/structural/piping items. OKEP’s onsite construction activities during the third quarter of 2022 included completing Gate 4 underground and civil work; sheeting and roofing of ELT building; installation of a portion of the above ground electrical cable tray, conduit, grounding and electrical work continued on miscellaneous civil concrete pours for equipment pads, structural stairways, handrail, grating, installation of four Stage 1 Bioreactor Tanks and final delivery and installation of four Stage 2 Bioreactor Tanks, delivery of seven Stage 2 flow control skids, installation of process piping and interior and exterior pipe racks, supports, and valves.



*Trimble County – ELG Water Treatment Future Location – July 2022*



*Trimble County – ELG Water Treatment Location – October 2022*

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

### **General**

Project 31 is for construction of an ELG water treatment system and wastewater diffuser at the MC generating station. The current forecasted capital costs to implement this facility remains at \$66.9 million, with construction completed in December 2021 for the diffuser and planned in June 2024 for the ELG water treatment system.

The MC project team has engaged the TC and GH project teams during all major reviews to apply lessons learned from the other projects. This collaborative effort has been implemented to ensure lessons learned are applied across all the projects to promote a common fleet approach to the ELG program.

### **ELG**

Work completed during the third quarter of 2022 includes continued participation in project technical, engineering, and design meetings with OKEP and the OEM, Frontier; review of submittals and various project documents; commercial activities; and schedule reviews. During the third quarter of 2022 OKEP mobilized to the job site. Construction commenced with excavation work to support the installation of a sump structure, stormwater inlet structures and piping, underground process piping, and underground electrical duct banks. A number of tanks and equipment deliveries were received.

### **Diffuser**

The diffuser was installed in the Ohio River by Tetra Tech and placed into service in December 2021. Final completion was achieved during the fourth quarter of 2021. During the first quarter of 2022, LG&E received the draft Construction Progress Report (“CPR”) and as-builts and has returned comments to the engineer of record for incorporation.

Tetra Tech was contracted to retire two decant lines that were abandoned as a result of the installation of the diffuser. Work commenced in June of 2022 and was completed during July. The engineer of record, AECOM, submitted a construction report during September to document the completion of the work.



*Mill Creek – ELG Water Treatment Future Location – July 2022*



*Mill Creek – ELG Water Treatment Future Location – October 2022*

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

### **General**

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 current forecasted capital costs to implement these facilities remains at \$128.7 million, with construction completed in the fourth quarter of 2021 for the diffuser and expected to be completed in December 2023 for the BATW recirculation system and November 2024 for the ELG water treatment system.

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 purge system, up to 10 percent of the volumetric discharge limit (on a 30-day rolling average) for BATW per the ELG Rule, will be included to control pH and other constituent buildup in the recirculation system.

The GH project team has engaged the TC and MC project teams during all major reviews, to apply lessons learned from the other projects. This collaborative effort has been implemented to ensure lessons learned are applied across all the projects to promote a common fleet approach to the ELG program.

### **ELG**

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

Work completed during the third quarter of 2022 includes participating in project technical, engineering, and design meetings with OKEP and the OEM, Frontier; surveillance visits to major equipment suppliers; safety training and site visits to support the engineering; submittal and review of various project documents; commercial activities; and schedule reviews. Onsite activities at GH during the quarter consisted of



underground piping/ductwork and foundation installation, receipt and installation of tanks and ultra-filtration modules, and erection of the chemical and electrical room concrete block walls.

### **Bottom Ash Transport Water (“BATW”)**

Work completed during the third quarter of 2022 includes participating in project technical, engineering, and design meetings with OKEP and the OEM, United Conveyor Corporation; OKEP continued fabrication and installation of BATW transport piping, installation of the lamella plates in the submerged flight conveyors, as well as receipt and installation of high pressure and low pressure recirculation pumps. OKEP continued construction of the BATW pump building, consisting of electrical room block wall erection, interior steel and exterior wall erection, as well as interior and exterior piping and electrical conduit installation.

### **Diffuser**

The diffuser was installed and placed into service in the Ohio River by MAC Construction in December 2021. Punch list items and final site restoration was completed in the first quarter of 2022. The draft CPR and as-builts were also issued to KU for review during the last quarter and comments were returned to AECOM for incorporation.



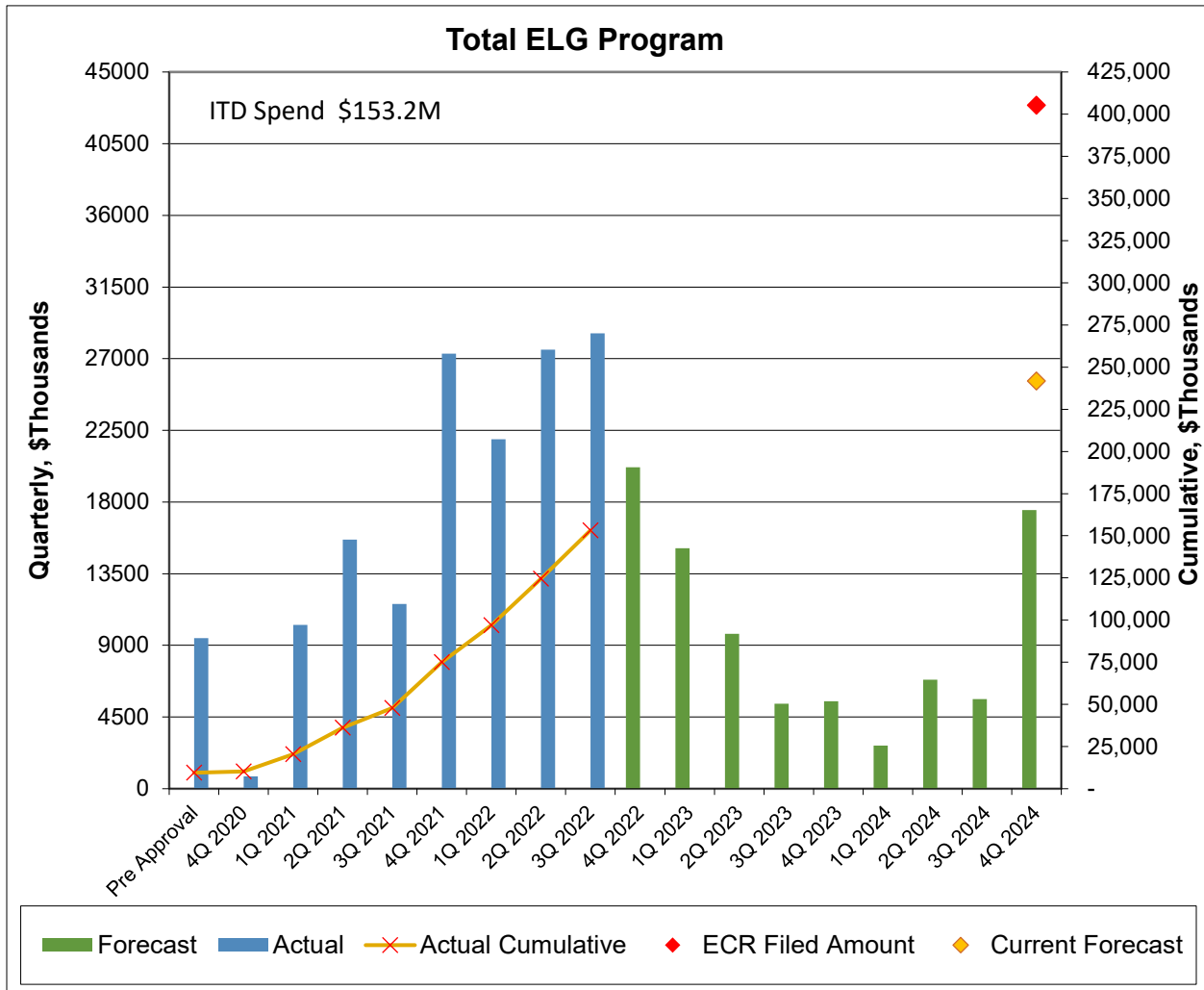
*Ghent – ELG Water Treatment Future Location – July 2022*



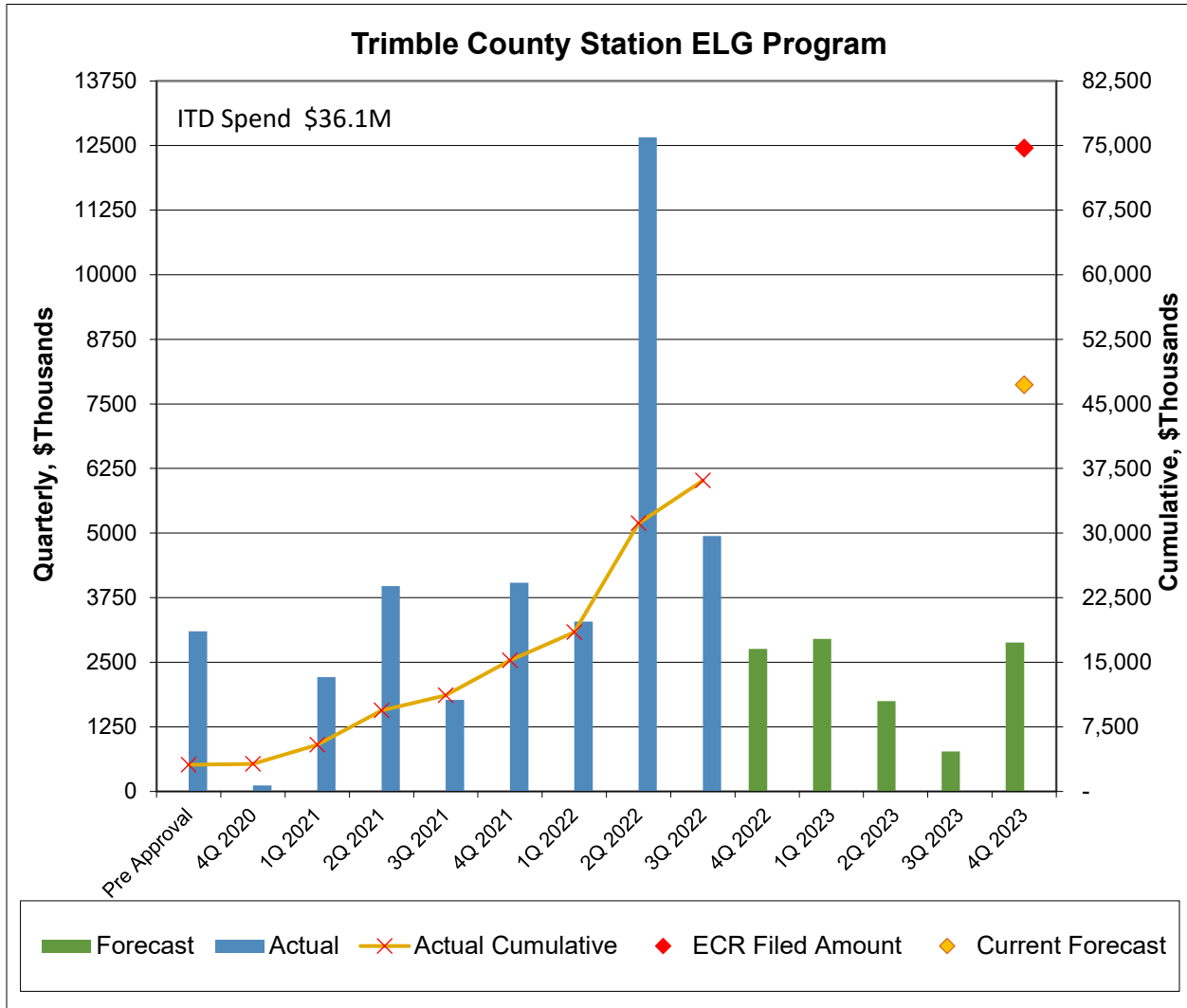
*Ghent – ELG Water Treatment Future Location – October 2022*

**Financials:**

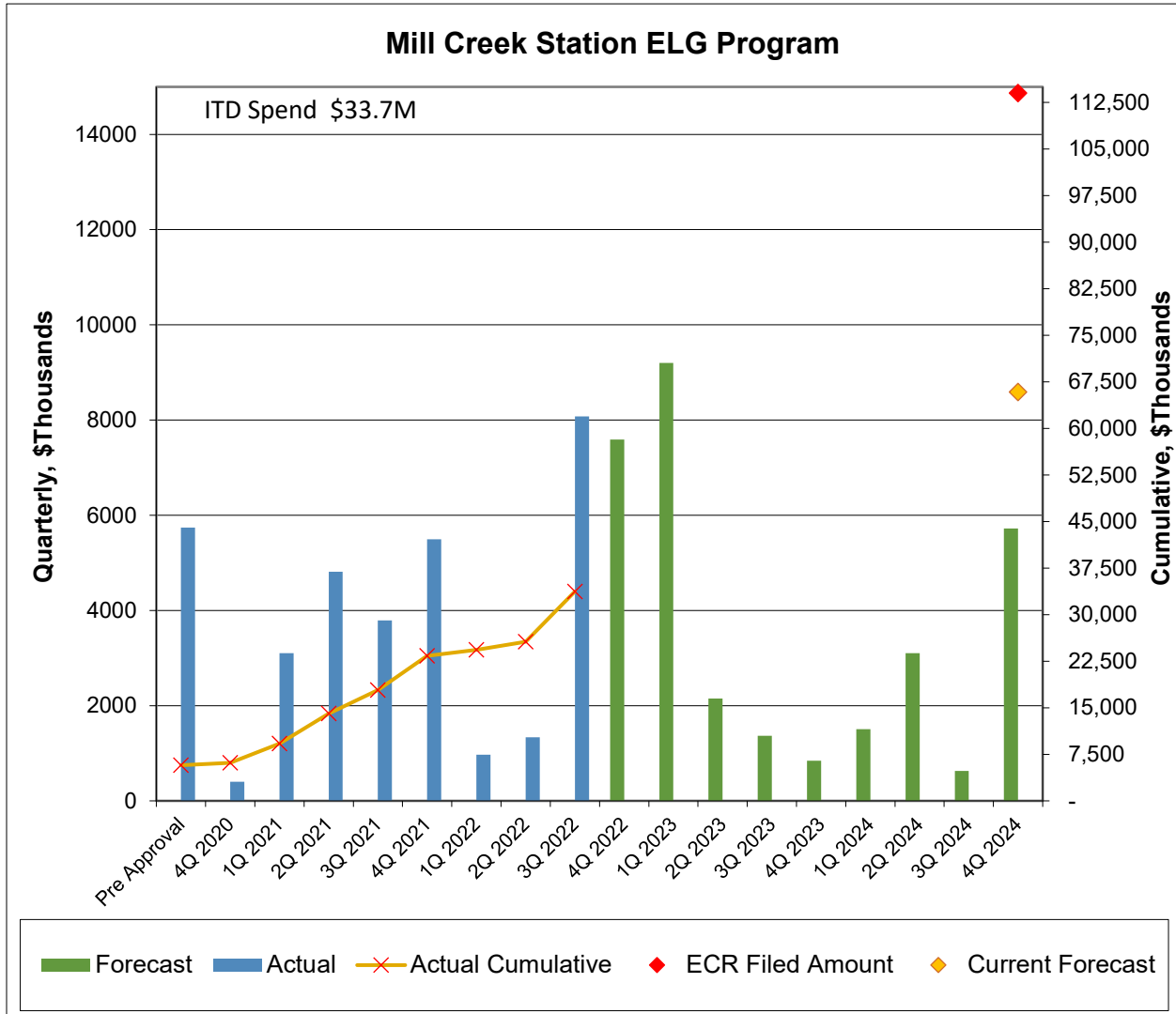
As reported last quarter, the total 2020 ELG Program forecasted cost has been reduced from \$405.2 million, as filed, to \$242.8 million. Total spend has increased from \$124.6 million (net)<sup>2</sup> to \$153.2 million (net)<sup>2</sup> through September 30, 2022. The graph below includes 1) a symbol (◆) to show the current forecast to completion and 2) inception-to-date (“ITD”) Spend in the upper left of the chart.



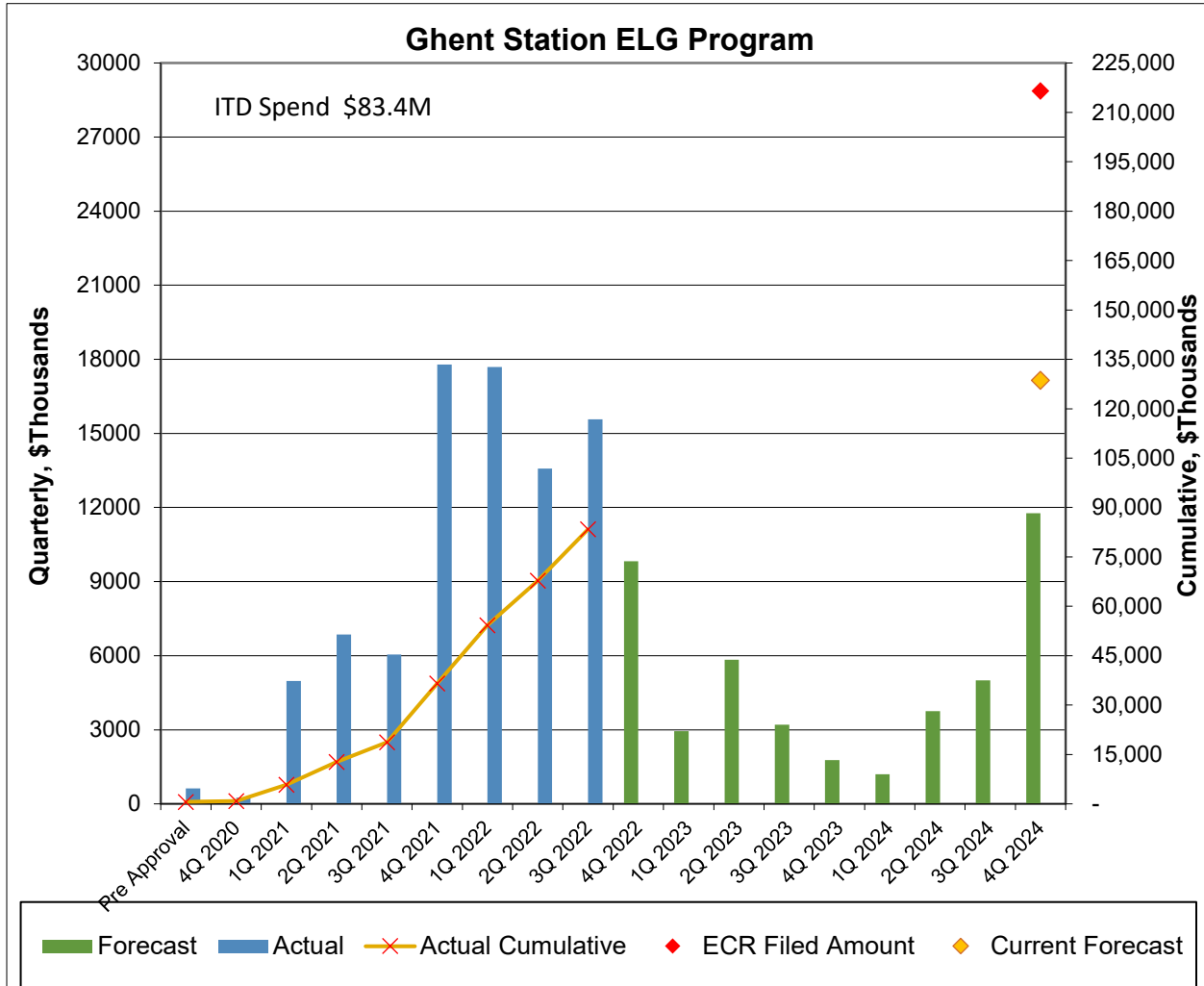
As previously reported, the total Trimble County Station ELG Program forecasted cost has been reduced from \$74.7 million (net)<sup>2</sup>, as filed, to \$47.2 million (net)<sup>2</sup>. Total spend has increased from \$31.2 million (net)<sup>2</sup> to \$36.1 million (net)<sup>2</sup> through September 30, 2022. 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.



As previously reported, the total Mill Creek Station ELG Program and Diffuser forecasted cost has been reduced from \$114.0 million, as filed, to \$66.9 million. Total spend has increased from \$25.6 million to \$33.7 million through September 30, 2022. 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.



As previously reported, the total Ghent Station ELG Program, BATW, and Diffuser forecasted cost has been reduced from \$216.5 million, as filed, to \$128.7 million. Total spend has increased from \$67.8 million to \$83.4 million through September 30, 2022. 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:**

General: Evaluate the RFP and award contract for common and also plant-specific training manuals and operation procedures to the same provider used for the TC, GH, and MC process water systems.

### **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 conduct meetings with OKEP to review the engineering and design of the project; review project submittals and design documents; delivery of remaining major components will continue; and onsite construction activities will be ongoing such as above-ground piping, building overhead doors, side and roof panel erection, and installation of equipment.

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

ELG – LG&E will continue to conduct meetings with OKEP to review engineering and design of the project; review project submittals and design documents. OKEP will complete installation of underground utilities and begin to form and pour concrete foundation slabs for the ELG Building and Tank Area. Tanks and other equipment will continue to be received.

Diffuser – Tetra Tech retired and plugged the 24” and 48” decant lines with concrete, as they are no longer required as a result of the installation of the diffuser.

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

ELG – KU will continue to conduct meetings with OKEP to review the engineering and design of the project; review project submittals and design documents; and onsite construction activities will be ongoing. Delivery of major components will continue; and onsite construction activities will be ongoing, such as above-ground piping, building erection, and installation of equipment.

BATW – The Companies continue with various safety reviews, commercial activities, and schedule reviews. Recirculation supports and piping installation will continue. The new BATW pump building structural installation will be completed, and electrical installation will be ongoing.

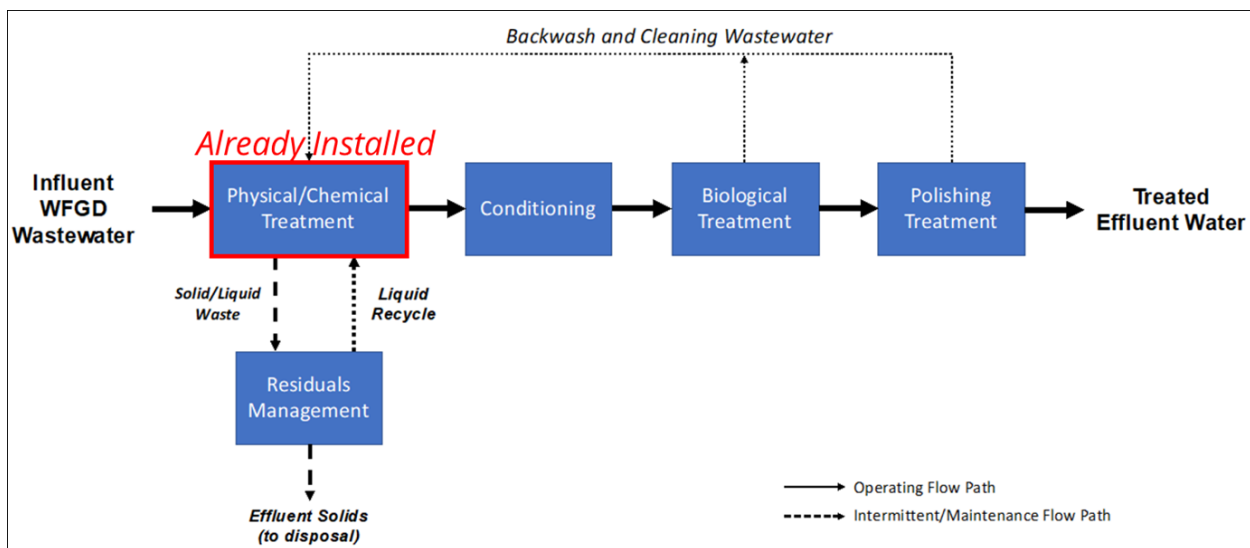
Diffuser – The CPR and as-builts are expected to be completed during the second quarter of 2022.

## 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”)<sup>8</sup> 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

<sup>8</sup> 84 Fed. Reg. 64624.



