2. PARTICULATE TECHNOLOGY EVALUATION

As part of this evaluation, PM control technologies were evaluated based on achieving post-upgrade emissions limits in accordance with the proposed emissions included in the April 24, 2023, MATS proposed rule, 0.010 lb/MMBtu and potentially 0.006 lb/MMBtu. The description and assessment of each control option are discussed in the sections below.

2.1. OPTIONS TO REACH 0.010 LB/MMBTU

2.1.1. Increased Boiler Cleaning Outages

When manual cleaning of the boiler occurs, the following unit operation indicates reduced economizer outlet temperatures and subsequently APH outlet temperatures. The fly ash resistivity is reduced at lower temperatures making it easier to capture in the ESP. The decrease in temperature would also slightly reduce the volumetric flow through the ESP, which may also allow for improved flow and velocity through the ESP, subsequently improving the ESP overall performance. Although scheduling short term outages to complete cleaning of the boiler on a regular basis (regardless of near-term long-term outages) has shown the ability to maintain emissions below the baseline emissions, a PM emission of 0.010 lb/MMBtu likely cannot be achieved and therefore this option was not considered further.

2.1.2. Flow & Distribution Devices

Uniform gas and dust distribution to each ESP casing will allow for uniform treatment/conditions of each casing to facilitate optimal performance of each. Concentrated flow and/or dust to a casing will require that casing to work harder than the others, ultimately contributing to and/or causing other operating inefficiencies within the ESP to reduce its PM removal capabilities. Replacement of existing inlet and outlet flow & dust distribution devices to achieve the latest standards of the Institute of Clean Air Companies (ICAC) Publication No. EF-7 will improve the ESP overall performance. Implementation of other flow correction devices to minimize sneakage between cells and/or around collecting fields as well as to minimize particle re-entrainment from hoppers and collecting surfaces when rapped can also be implemented, as required, to meet best industry practices, if not already implemented as part of ESP designs.

A detailed assessment including computational flow dynamic (CFD) analysis and physical flow model studies would be performed to determine the design and placement of all flow and dust distribution devices. New designs of perforated plates (with rappers) would be implemented to allow for the easy removal of fly ash into the first field hopper to minimize the potential fly ash accumulation in the inlet plenum. Although PM emissions reductions are expected to be achieved with this option, a PM emission of 0.010 lb/MMBtu likely cannot be achieved and therefore this option was not considered further.

2.1.3. Increased Power Supply

In an ESP, the collection efficiency is proportional to the amount of corona power supplied to the unit, assuming the corona power is applied effectively (maintains a good sparking rate). The resulting corona current charges the PM in the flue gas which are then attracted to the grounded, oppositely charged collecting plates. For a given flow rate, the collection efficiency will increase as the corona power is increased. To achieve a high collection efficiency, corona power is usually between 100 and 500 W/1000 acfm, but newer ESP installations