

1. INTRODUCTION

1.1. PURPOSE

Sargent & Lundy (S&L) was retained by Minnkota Power Cooperative, Inc. (Minnkota) to evaluate potential filterable particulate matter (PM) and mercury (Hg) emissions reductions in response to the proposed rule to amend the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coal and Oil-Fired Electric Utility Steam Generating Units (EGUs), commonly known as Mercury and Air Toxics Standards (MATS) published on April 24, 2023 that would require additional filterable PM and Hg emissions reductions on the Milton R. Young (MRY) Station Unit 2. These proposed revisions are the result of EPA's review of the residual risk and technology review (RTR) from May 22, 2020. Based on the proposed rule, EPA is planning to revise the filterable PM standards from 0.030 lb/MMBtu to 0.010 lb/MMBtu and is soliciting comments to consider even more stringent standard of 0.006 lb/MMBtu or lower. For lignite-fired units, EPA is also proposing to revise and tighten mercury emission standard from 4.0 lb/TBtu to 1.2 lb/TBtu to make it same as other units firing bituminous and subbituminous coal.

S&L reviewed the existing MRY Unit 2 PM and Hg control technologies to determine potential optimizations that could achieve incremental emission reductions as well as consider new PM and Hg control technologies. S&L prepared an evaluation of available control technologies including technical feasibility and effectiveness, and costs based on the current emissions from the unit. S&L's evaluation was completed based on past experience on similar projects, as well as input from established original equipment manufacturers (OEMs) regarding predicted performance for the lignite application at MRY Unit 2.

1.2. FACILITY BACKGROUND

The MRY station is located approximately seven (7) miles southeast of Center, North Dakota or forty (40) miles northwest of Bismarck, North Dakota on ND Highway 25 at 3401 24th Street SW, Center, North Dakota 58530. MRY station provides energy to the Midcontinent Independent System Operator (MISO) system. MRY station consists of two (2) units. Both MRY units are lignite-fired Babcock and Wilcox (B&W) cyclone boilers. The Unit 1 single wall cyclone boiler was placed into service in 1970 and has a typical output capacity rating of 257 MWg (gross). The Unit 2 opposed wall cyclone boiler (Carolina type, radiant pump assisted natural circulation) was placed into service in 1977 and has a typical output capacity rating of 470 MWg (gross). Both boilers fire North Dakota lignite coal supplied from BNI Coal, Ltd.'s Center Mine located in close proximity to the plant. Both units utilize selective non-catalytic reduction (SNCR) and separated overfire air (SOFA) systems for NO_x control, fuel additive (halide injection) system and non-halogenated powdered activated carbon (PAC) for Hg control, dry electrostatic precipitators (ESP) for PM emissions control, and wet flue gas desulfurization (WFGD) systems for sulfur dioxide (SO₂) control.

1.3. DIFFERENCES IN MRY UNIT 1 AND 2 DESIGN & OPERATION

MRY Unit 1 and 2 have the same air pollution control equipment in series; however, the design of the equipment differ in ways other than unit MWg size. Of particular note, the Unit 2 ESP design attributes are superior to Unit 1, with use of a wider plate spacing (12 vs. 9 inches), and a higher specific collection area (375 ft²/1000 actual cubic feet per minute (acfm) vs. 288 ft²/1000 acfm). However, the Unit 2 ESP design consists of the first 2 fields' specific corona power = 160 W/1000 acfm and the last 2 fields = 240 W/1000 acfm.