

RESEARCH PROPOSAL: LONG-TERM HEALTH IMPACTS ON EMPLOYEES AT TWO
COAL-FIRED POWER PLANTS IN WEST VIRGINIA

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Introduction

The link between underground coal mining and negative human health outcomes has been rigorously established, particularly in the Appalachian region (Lu, 2021; Cortes-Ramirez, et al., 2018; Hendryx, 2009). The particulates that miners breathe, however, are not simply contained underground. There are numerous health outcomes that are associated with particulate exposure in coal-fired power plants: “abnormal lung function,” “genotoxic risk,” and “higher level of cytogenic markers” (Carbone, 2014; Celik, 2006; Possamai, et al., 2010).

Due to these health risks, the Clean Air Act (42 U.S.C. §7401) first enacted as federal law in 1955, with major revisions twice in the 1970s and 1990, established “health-based standards for ambient air quality” to be set, monitored, and enforced by the Environmental Protection Agency (Lattanzio, 2022). Section 112 of the revised 1990 version of the Act defined “major sources” of pollution to be any stationary source that emits “10 tons per year or more of hazardous air pollutant” and as such “required issuance of technology-based standards for major sources” (U.S. Environmental Protection Agency, 2023). Coal burning power stations are one source of such hazardous emissions. Coal, once mined, pulverized, and transported must be burnt to heat water which spins turbines that turn generators to produce electricity. This process introduces numerous opportunities for particulates to enter the ambient air proximate to mine sites and power stations (Burt, et al., 2013).

FirstEnergy Corp is an investor-owned electric utility company that serves over six million customers in Ohio, Pennsylvania, West Virginia, Maryland, and New Jersey (Mon Power, 2023, About Us). FirstEnergy generates 3.5 gigawatts of electricity primarily from “regulated scrubbed coal” and hydroelectric facilities in West Virginia and Virginia, respectively. 86% of FirstEnergy’s generation capacity is regulated scrubbed coal (Mon Power, 2023, Generation

System). These coal-fired power plants are the Fort Martin Power Station in Maidsville, West Virginia and the Harrison Power Station in Haywood, West Virginia. The Fort Martin Power Station's generating units went online in 1967 and 1968. These units generate 552MW and 546MW, respectively, for a total of 1,098MW of electricity generation annually. The Harrison Power Station has three generation units which were completed in 1972, 1973, and 1974. These units generate a total of 1,984MW of electricity annually.

Over time, FirstEnergy has invested over \$600 million in environmental control systems, the completion of which occurred in 2009 (Mon Power, 2023, Generation System). According to FirstEnergy's most recent Permit to Operate (doing business as Monongahela Power Company) issued by the West Virginia Department of Environmental Protection in 2020, each combustion unit at the Fort Martin Power Station is equipped with environmental control systems with an established "99+% removal efficiency" and "limestone scrubbers for sulfur dioxide SO₂ control" (West Virginia Department of Environmental Protection, 2021 p. 71). Conversely, the Harrison Power Plants Permit to Operate document (2021) states the combustion units are equipped with environmental control systems with an established "99.5% removal efficiency" but no similarly situated limestone scrubber for SO₂ control (West Virginia Department of Environmental Protection, 2020 p. 83). Harrison Power Station's environmental control systems cost FirstEnergy nearly \$1 billion dollars and were completed in 1995 (Mon Power, 2023, Harrison Power Plant).

Each power station's permit to operate lists their respective environmental control system as follows: Fort Martin has two types of electrostatic precipitators; a single flue gas desulfurization unit; and a "gore" system which removes mercury from industrial flue gas. Harrison Power Station only has a single electrostatic precipitation unit; a single flue gas

desulfurization unit; and no gore system. Harrison Power Plant does, however, operate selective catalytic reduction systems in each of the three combustion units.

Based on this background information, it is established that these two coal-fired power plants have distinct environmental control systems that clean fine particulate matter, heavy metal, and other emissions produced from the burning of coal for electricity generation. The research question is whether there is a significant difference in the effectiveness of these systems in protecting the health of power station employees.

The importance of research on the hazards that coal-fired power plant employees are potentially exposed to is urgent. This issue is especially relevant in the state of West Virginia as, for one of the smallest populations in the country, the state is home to the eighth highest number of coal-fired power plants (Global Energy Monitor, 2022). The intended audience of this research is, first and foremost, those exposed to the dangers of thermal combustion of coal: power plant employees. These workers are captive in that they cannot leave sites of pollution during work hours. Secondary audiences for this research include both the Environmental Protection Agency and the Occupational Safety and Health Administration. If it is found that the environmental control systems at these locations do not, in fact, sufficiently protect the health of the employees, then the regulatory agencies should be apprised of that information. Finally, the public most proximate to Fort Martin and Harrison Power Stations deserve to be aware of the dangers inherent to thermal combustion of coal.

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