

BEFORE THE
PUBLIC SERVICE COMMISSION
OF MARYLAND

In the Matter of the Application)	
Of CP Crane LLC for a Certificate)	
Of Public Convenience and Necessity)	Case No. 9482
Authorizing the Modification of the)	
Charles P. Crane Generating Station)	
In Baltimore County, Maryland)	

DIRECT TESTIMONY OF WILLIAM V. PAUL

ON BEHALF OF THE
MARYLAND DEPARTMENT OF NATURAL RESOURCES
POWER PLANT RESEARCH PROGRAM

March 4, 2019

BEFORE THE
PUBLIC SERVICE COMMISSION
OF MARYLAND

In the Matter of the Application)	
Of CP Crane LLC for a Certificate)	
Of Public Convenience and Necessity)	Case No. 9482
Authorizing the Modification of the)	
Charles P. Crane Generating Station)	
In Baltimore County, Maryland)	

DIRECT TESTIMONY OF WILLIAM V. PAUL

1 **Q. PLEASE STATE YOUR NAME, OCCUPATION, AND CURRENT POSITION.**

2 A. My name is William V. Paul, and I am the Chief of the Combustion and
3 Metallurgical Division of the Air and Radiation Administration, Maryland
4 Department of the Environment (MDE-ARA). My resume is appended to this
5 testimony as Appendix A.

6 **Q. PLEASE DESCRIBE YOUR SPECIFIC PROFESSIONAL EXPERIENCE WHICH**
7 **IS RELEVANT TO YOUR RESPONSIBILITIES ON THIS PROJECT.**

8 A. I have more than 40 years of experience in air pollution control, including 30 years
9 with MDE-ARA and over 10 years with an air pollution control equipment
10 manufacturing firm and an environmental consulting firm. As Chief of the
11 Combustion and Metallurgical Division of MDE-ARA, I have primary
12 responsibility for new source review of major stationary sources subject to federal
13 Prevention of Significant Deterioration (PSD) and Nonattainment New Source
14 Review (NA-NSR) requirements. I have participated in the NA-NSR and/or PSD
15 review of most of the major power plants that have been proposed for construction
16 or modification in Maryland in the last 30 years. These include Mirant Mid-
17 Atlantic's (now NRG Energy, Inc.) Morgantown Coal Barge Unloading project; all

1 the air pollution control projects proposed by Mirant and Constellation Power
2 Source Generation for coal-fired power plants in response to the Maryland
3 Healthy Air Act; the Chalk Point Expansion and the Dickerson Expansion projects;
4 Orion Power Holding's Kelson Ridge Facility in Charles County; Old Dominion
5 Electric Cooperative (ODEC)/Essential Power Rock Springs, LLC Rock Springs
6 power plant; Delmarva Power and Light Company's Dorchester plant; Applied
7 Energy Services' (AES) Warrior Run plant; Panda Energy Corporation's
8 Brandywine plant; Baltimore Gas and Electric Company's Perryman plant; the
9 Potomac Electric Power Company's Station H and Chalk Point plants; the
10 Southern Maryland Electric Cooperative turbine project; the Montgomery County
11 Resource Recovery Facility; the Catoctin Power Facility in Frederick County;
12 Calvert Cliffs Nuclear Power Plant Unit 3; Energy Answers International's
13 Generation Facility in Baltimore City; ODEC Wildcat Point facility in Cecil County;
14 Dominion Cove Point LNG facility in Calvert County; Keys Energy Center in
15 Prince George's County; the CPV Maryland, LLC St. Charles Energy Center heard
16 under Case Numbers 9129 and 9280, and the Mattawoman Energy Center in Prince
17 George's County.

18 **Q. WHAT WERE YOUR RESPONSIBILITIES WITH RESPECT TO THE STATE'S**
19 **ENVIRONMENTAL REVIEW OF THE CP CRANE, LLC COMBUSTION**
20 **TURBINE REPOWERING PROJECT THAT IS THE SUBJECT OF THIS**
21 **CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY?**

22 A. I was the technical expert focused on the evaluation of air quality regulatory and
23 permitting requirements, air emissions evaluations, and assessments for the
24 proposed repowering of CP Crane facility (Project). My review, and the MDE-ARA
25 team's review under my direction, included assessing existing ambient air
26 conditions in the vicinity of the proposed Project, determining potential air
27 emissions from the Project, and evaluating air quality impacts associated with the
28 Project. I also directed and participated in the writing of the results of these

evaluations which are summarized in the Power Plant Research Program's (PPRP's) Project Assessment Report (PAR) being filed in this case, which is entitled, *Project Assessment Report for the Modification of the CP Crane Generating Station* (PPRP Exhibit__(SS-3))

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. The purpose of my testimony is to summarize my review of the Project, potential air emissions from the Project, and the likelihood that the proposed Project will comply with all applicable regulatory requirements. My review consists of analyses conducted directly by myself or others under my direct supervision (hereafter referred to as "we"). My testimony supports the air quality license conditions that are being recommended for the proposed Project.

Q. PLEASE SUMMARIZE THE SOURCES OF INFORMATION USED IN YOUR REVIEW.

A. I reviewed CP Crane's application for a Certificate of Public Convenience and Necessity (CPCN) for the Combustion Turbine Repowering Project dated May 31, 2018, including the company's supplemental filings on June 21, 2018 and August 31, 2018; and the Applicant's responses to PPRP Data Requests. I was responsible for preparing the air quality section of the PAR as well as the air quality section of the recommended CPCN license conditions with the assistance of technical staff at MDE-ARA. Finally, MDE-ARA staff, under my direction, evaluated air quality impacts related to the proposed Project and prepared the Air Quality Modeling Analysis of the PAR.

Q. WHAT IS THE GOAL OF THE CP CRANE COMBUSTION TURBINE REPOWERING PROJECT?

A. The goal of the Repowering Project involves the permanent shutdown of two coal-fired generating units and replacing a portion of the power generating capacity of

the coal generating units with the installation of three refurbished General Electric (GE) combustion turbines (CTs). The CTs will be fired with natural gas as their primary fuel and will also be capable of firing ultra low sulfur diesel (ULSD) fuel oil in situations when natural gas is not available in sufficient quantities. The Project will provide PJM with additional generating flexibility, including faster startups and faster load changing capacity.

Q. WHAT, GENERALLY, ARE THE AIR EMISSIONS SOURCES ASSOCIATED WITH THE CP CRANE PROJECT?

A. The proposed Repowering Project includes the installation of three refurbished GE LM6000 CTs, each with a nominal rated capacity of 50 MW and one emergency black start generator rated at 1,500 kW.

Q. DID YOU REVIEW THE EXISTING AMBIENT AIR QUALITY CONDITIONS IN THE VICINITY OF THE CP CRANE MARYLAND PROJECT SITE?

A. Yes. We used MDE-ARA air quality monitoring data to characterize the existing ambient air quality in the vicinity of the proposed Project.

Q. WHAT TYPES OF POLLUTANTS WILL BE EMITTED FROM THE CP CRANE PROJECT?

A. All pollutants regulated under the Clean Air Act are subject to review. This includes NO₂, SO₂, PM, PM₁₀, PM_{2.5}, CO, Pb, ozone precursors (nitrogen oxides (NO_x) and volatile organic compounds (VOCs)), sulfuric acid mist (SAM), and GHGs. The proposed sources of air emissions associated with the Project have the potential to emit “criteria” pollutants, hazardous air pollutants (HAPs), and greenhouse gases (GHGs) measured as carbon dioxide equivalents (CO₂e). Criteria pollutants are pollutants for which the EPA has established ambient air quality standards: PM, PM₁₀, PM_{2.5}, CO, SO₂, NO_x, Pb, and ozone. The pollutant GHG as CO₂e is the total of six individual gases: carbon dioxide (CO₂), methane (CH₄),

1 nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and
2 sulfur hexafluoride (SF₆). HAPs are the 187 specific pollutants included in Section
3 112(b) of the Clean Air Act. Although not subject to PSD or NA-NSR review, we
4 also evaluated potential emissions of HAPs and Maryland Toxic Air Pollutants
5 (TAPs). TAPs are those pollutants that are known or suspected to cause serious
6 health problems that are regulated by Maryland under Code of Maryland
7 Regulations (COMAR) 26.11.15 and .16.

8 **Q IS CP CRANE PROPOSING ANY OPERATING RESTRICTIONS ON THE**
9 **EMISSION SOURCES FOR THE PROPOSED PROJECT THAT WILL AFFECT**
10 **POTENTIAL AIR EMISSIONS?**

11 A. Yes. CP Crane is proposing several operating restrictions and pollution control
12 systems that will limit air emissions from the proposed Project; each of these
13 restrictions was factored into our estimates of potential emissions from the
14 proposed Project. Those operating restrictions include the following:

15 1. The restricted use of ULSD fuel oil in the CTs to periods when natural gas
16 supply is unavailable;

17 2. The aggregated operation of the three CTs are not to exceed 7,100 hours in any
18 rolling 12 consecutive month period;

19 3. The aggregated operation of the three CTs while burning ULSD fuel oil are not
20 to exceed 710 hours in any rolling 12 consecutive month period; and

21 4. The black start generator is restricted to burning ULSD fuel with a sulfur content
22 not to exceed 15 parts per million.

23 **Q BASED ON YOUR REVIEW OF EMISSIONS AND OTHER INFORMATION**
24 **PRESENTED BY THE APPLICANT, DO YOU ACCEPT CP CRANE'S**
25 **EMISSION RATE AS REPRESENTATIVE OF THE PROPOSED PROJECT?**

A. MDE-ARA reviewed the calculated short-term pound per hour emission rates for NO_x, CO, VOC and other pollutants using the ppm guarantees provided by ProEnergy. MDE-ARA is in agreement with those calculation, including the projected annual emissions based on the short term emission rates.

Q. WHAT IS A “NATIONAL AMBIENT AIR QUALITY STANDARD?”

A. The U.S. Environmental Protection Agency (EPA) established allowable ambient concentration levels for six so-called “criteria pollutants,” namely, carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), particulate matter (PM), lead, and ozone. Concentration levels for PM have been established separately for two particle size ranges: particulate matter less than 10 micron (PM₁₀) and particulate matter less than 2.5 micron (PM_{2.5}). The concentration levels, called the National Ambient Air Quality Standards (NAAQS), are designed to protect public health and welfare with an adequate margin of safety. Ozone is not emitted directly by sources of air pollution, but is instead formed in the atmosphere, primarily on hot summer days, from several precursor pollutants including VOCs and NO_x. VOCs do not have ambient standards *per se*; rather, VOC emissions are regulated as precursors to ozone formation. NO_x emissions are also regulated as ozone precursors, in addition to being regulated as the criteria pollutant NO₂. NO_x and SO₂ also contribute to the formation of PM_{2.5}.

Q. PLEASE EXPLAIN THE TERMS “PREVENTION OF SIGNIFICANT DETERIORATION (PSD)” AND “NONATTAINMENT NEW SOURCE REVIEW (NA-NSR).”

1 A. PSD refers to a set of regulations that apply in “attainment” areas, which
2 are areas of the country that are currently meeting the NAAQS for a given criteria
3 pollutant. The PSD regulations contain requirements for new and modified
4 sources that emit pollutants above a significant emissions threshold. The pollutant-
5 specific thresholds are defined in the regulations and are expressed in tons per
6 year. The PSD regulations contain both control technology and ambient impact
7 assessment requirements. Generally, the control technology requirement for PSD
8 sources is to ensure that emissions are controlled to a level representing the Best
9 Available Control Technology (BACT). The ambient air impact provisions for PSD
10 sources require that emissions from the source produce impacts that are less than
11 PSD “increments” (i.e. allowable incremental increases in ambient pollution
12 levels), and that the source does not cause or contribute to a violation of the
13 NAAQS. Compliance with the PSD ambient requirements is generally evaluated
14 through the use of air quality dispersion models, applied in accordance with
15 guidance established by EPA.

16 NA-NSR is a set of regulations that apply in “nonattainment” areas, locations that
17 are not meeting the NAAQS for a particular pollutant. Sources subject to NA-NSR
18 must apply a level of control technology that represents the Lowest Achievable
19 Emission Rate (LAER). Sources subject to NA-NSR must also secure “emissions
20 reductions” or “offsets” at a ratio sufficient to demonstrate a positive net air
21 quality benefit from the project; must demonstrate that all existing major
22 stationary sources owned or operated by the parent company in the state are in
23 compliance with all applicable emission limitations or are in compliance with an
24 approved federally enforceable plan; and must conduct an evaluation of
25 alternative sites, sizes, production processes, and environmental control
26 techniques to demonstrate that benefits of the proposed project significantly
27 outweigh the environmental and social costs imposed as a result of its location,
28 construction, or modification. In Maryland, emissions offsets must be established

as federally enforceable prior to the commencement of construction.

Q. PLEASE DEFINE “BACT” AND “LAER.”

A. Best Available Control Technology, or BACT, is defined as an emissions limitation, determined on a case-by-case basis, which provides for the maximum degree of reduction of a pollutant, taking into account energy, environmental, and economic impacts and other costs. The “case-by-case” process of determining BACT is a dynamic one, which encourages tightening of emissions control requirements as the effectiveness of control technologies improves over time. At a minimum, BACT must be at least as stringent as any applicable New Source Performance Standard (NSPS) found in 40 Code of Federal Regulations (CFR) Part 60 or National Emissions Standard for Hazardous Air Pollutants (NESHAP) found in 40 CFR Parts 61 and 63. If the Administrator determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of BACT.

Lowest Achievable Emission Rate, or LAER, is defined as the more restrictive of either: (1) the most stringent emissions limitation which is contained in the implementation plan of any state for a class or category of stationary sources, unless the owner or operator of the proposed stationary source demonstrates that these limitations are not achievable; or (2) the most stringent emissions limitation which is achieved in practice by a class or category of stationary sources. LAER is always at least as stringent as BACT.

Q. WHAT ARE THE POLLUTANTS OF CONCERN FOR THE STATE’S ANALYSIS OF THE CP CRANE PROJECT?

A. All pollutants regulated under the Clean Air Act are subject to review. This

includes NO₂, SO₂, PM, PM₁₀, PM_{2.5}, CO, lead, ozone precursors (NO_x and VOCs), and GHGs. Although not subject to PSD or NA-NSR review, we also evaluated potential emissions of HAPs and Maryland TAPs.

Q. CAN YOU CHARACTERIZE THE AMBIENT AIR QUALITY IN THE VICINITY OF THE PROPOSED PROJECT?

A. The area of Baltimore County, where the existing CP Crane facility is located, is designated as nonattainment for ozone and SO₂, and in attainment of the NAAQS for the remaining criteria pollutants (NO₂, CO, PM₁₀/PM_{2.5}, and lead).

Q. DID THE STATE EVALUATE THE CPCN APPLICATION AND MAKE A DETERMINATION REGARDING THE APPLICABILITY OF THE PSD AND NONATTAINMENT NSR PERMITTING PROGRAMS?

A. Yes. We determined that potential emissions of regulated pollutants from the CP Crane Project will be below the significant emission rates (SER) for PSD. In addition, potential emissions of nonattainment pollutants (SO₂, NO_x, and VOC) are also below the SER and are therefore, not, subject to NA-NSR review. A detailed assessment of the netting analysis is provided in Section 4.4 of the PAR.

Q. PLEASE EXPLAIN WHAT IS MEANT BY THE “SIGNIFICANT” EMISSION INCREASE AND THE THRESHOLD EXCEEDENCE YOU JUST MENTIONED.

A. PSD and NA-NSR applicability is determined by comparing the potential air emissions for the proposed Project against emission thresholds for each pollutant as defined in 40 CFR Part 52.21. If the net emission increase for the proposed Project exceeds the emission threshold, then it is considered a “significant” emission increase. If a pollutant is determined to have a “significant” emission increase, then it triggers PSD and/or NA-NSR review and requires the proposed Project to be evaluated to determine the impact of this “significant” emission increase. For the CP Crane Repowering Project, the netting analysis confirmed that

emissions resulting from the shutdown of the two coal fired boilers will result in a net decrease of all criteria pollutants.

Q. DID CP CRANE CONDUCT AN AIR QUALITY MODELING ANALYSIS AND IF SO, WAS IT CONDUCTED CONSISTENT WITH EPA AND STATE GUIDANCE?

A. Yes. CP Crane did conduct an air quality modeling analyses and it was done in a manner consistent with EPA and State guidance.

Q. PLEASE SUMMARIZE THE RESULTS OF THE STATE'S AMBIENT AIR QUALITY.

A. As outlined in the PAR, MDE-ARA evaluated the modeling methodology (including the model used and the development and application of the meteorological database) and the actual model application by CP Crane. MDE-ARA's conclusion based on this evaluation is that the methodology is adequate to determine the impact of emissions from the CP Crane Project. In his testimony being filed in this case (PPRP Exhibit__(MFW-1)), Mr. Michael F. Woodman describes in detail the air quality impact assessments conducted for the proposed CP Crane Repowering Project.

Based on the information provided in the CPCN application and responses to PPRP Data Requests, supplemented with independent analyses conducted by the State, MDE-ARA has concluded that emissions from the proposed Project will not adversely affect the NAAQS for NO₂, CO, PM₁₀, and PM_{2.5}, and air quality impacts due to emissions from the proposed Project will demonstrate compliance with all applicable NAAQS.

Q. WHAT FEDERAL AIR REGULATIONS ARE APPLICABLE TO THE PROPOSED PROJECT?

A. The CTs are subject to New Source Performance Standards for Combustion Turbines (40 CFR Part 60, Subpart KKKK); New Source Performance Standards for Greenhouse Gas Emissions for Electric Generating Units (EGUs) (40 CFR Part 60, Subpart TTTT); and the Clean Air Act Title IV Acid Rain provisions. In addition, elements of the CP Crane Project are subject to the GHG Gas Reporting Rule (40 CFR Part 98) and the Cross State Air Pollution Rule, CSAPR (40 CFR Part 97).

Q. WHAT WERE THE RESULTS OF THE APPLICABILITY EVALUATION WITH NSPS REGULATIONS FOR THE CT?

A. The proposed CTs are subject to the requirements of the NSPS for Combustion Turbines (40 CFR Part 60, Subpart KKKK) and the NSPS for GHG emissions from EGUs (40 CFR Part 60, Subpart TTTT). As such, emissions of NO_x and SO₂ from the CT will be limited to applicable standards in the Subpart KKKK regulation and GHG emissions will be limited to the applicable standards in Subpart TTTT. Section B-IV of the recommended license conditions specifies the associated stack testing, fuel sampling, emissions monitoring, recordkeeping, and reporting requirements. Section B-IV also specifies the methodology by which CP Crane shall demonstrate compliance with the NSPS regulations. MDE-ARA believe that the Project as proposed will be able to comply with the applicable NSPS standards.

Q. DID CP CRANE ADDRESS COMPLIANCE WITH THE REQUIREMENTS OF THESE FEDERAL REQUIRMENTS TO YOUR SATISFACTION?

A. Yes. The Applicant has addressed compliance with the applicable requirements of federal air quality standards to our satisfaction. More specifically, subsequent to the filing of the CPCN application, CP Crane was advised that a CT performance guarantee was required from the vendor, ProEnergy, to satisfy the COMAR

1 definition of a "complete application". MDE-ARA considered that the absence of a
2 vender guarantee could result in an additional liability to the Applicant in the event
3 that any of the refurbished CTs failed the required emissions performance tests. CP
4 Crane was able to secure the necessary performance guarantee specifying that each
5 refurbished CT will be designed to comply with all applicable federal and State
6 emission standards

7 **Q. ARE THERE STATE AIR REGULATIONS TO WHICH THE PROPOSED**
8 **PROJECT WILL BE SUBJECT?**

9 A. Yes. The facility and individual emissions units that comprise the Repowering
10 Project would be subject to various State air quality requirements as specified in
11 COMAR 26.11. The specific State requirements are detailed in the recommended
12 license conditions.

13 **Q. HAS CP CRANE ADDRESSED COMPLIANCE WITH APPLICABLE STATE**
14 **REGULATIONS TO YOUR SATISFACTION?**

15 A. Yes. MDE-ARA is satisfied that CP Crane can comply with all applicable State
16 regulations provided the recommended license conditions are incorporated into
17 the final CPCN.

18 **Q. DOES THAT CONCLUDE YOUR TESTIMONY AT THIS TIME?**

19 A. Yes, it does.

**APPENDIX A
STATEMENT OF QUALIFICATIONS
for William V. Paul**

Professional Background

As Chief of the Combustion and Metallurgical Division, Air Quality Permits Program of the Maryland Department of the Environment, Mr. Paul has acquired more than 40 years of experience in air pollution control and the permitting of major stationary sources. This includes 30 years with MDE and 10 years in the private sector designing and marketing air pollution control equipment and environmental consulting. As a Division Chief, he has primary responsibility for overseeing air quality application reviews of major stationary sources subject to Prevention of Significant Deterioration (PSD) and non-attainment New Source Review (NSR). In the past several years, Mr. Paul has been extensively involved in permitting the following electric generating stations and independent power producers in Maryland: Old Dominion Electric Cooperative's (ODEC's) Rock Springs, Orion Power's Kelson Ridge, PEPCO Station H, PEPCO Chalk Point, Southern Maryland Electric Cooperative (SMECO), BGE Perryman, AES Warrior Run, Panda Brandywine, Montgomery County Resource Recovery Facility, the Town of Berlin, Sempra Catoctin, Mirant Chalk Point, Mirant Dickerson, ODEC Wildcat Point, Dominion Cove Point LNG facility, Keys Energy Center, the CPV Maryland St. Charles Energy Center, and the Mattawoman Energy Center. These projects have involved detailed assessments of ambient air quality impacts, the application of best available air pollution control measures, and ensuring the inclusion of all applicable federal and state air quality control requirements.

Education

B.S. Chemical Engineering, 1975, Lehigh University, Bethlehem, PA.
Masters, Business Administration, 1982, Loyola College, Baltimore, MD.
Masters, Environmental Policy, University of Maryland, College Park, MD, pending.